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Determination of Isokinetic Strength of Upper and Lower Body of Elite Male Boxers

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Abstract

It is well known that punching force is highly important to boxers for winning and one of the key components of amateur boxing. Boxing needs also get blocking position, after throwing a punch to not receive a punch.The aim of the study was to determine the dominant internal-external shoulder muscles and dominant extension-flexion leg muscles strength of the elite boxers at 60° and 180° sec-1. In the study, 10 male elite boxers 22.10 ± 1.37 years, height 174.60 ± 6.41 cm and 72.60 ± 10.74 kg participated in the study. The isokinetic knee and shoulder strength tests were performed with an isokinetic dynamometer (Cybex, Humac Norm 2004) in the kinanthropometry laboratory of Selcuk University. Statistical analysis of the data was performed using SPSS 22 package program. Descriptive data of the participants were given as mean, minimum, maximum and standard deviation. it was determined that the peak dominant leg strength of elite boxers were found for extension 224,900 nM (60 °/s) and 135,70 nM (180 °/s). The peak dominant leg strength of elite boxers found for flexion 120,50 nM and 72,30 nM at 60 °/s and 180 °/s respectively. Elite boxers' leg strength was similar to literatür. As a result of the study, it can be said that the internal muscle group of boxers produce more power than external muscle group. It can be concluded that the boxers have better punching strength than defense.

Keywords: Box, isokinetic strength, knee, shoulder.

INTRODUCTION

The human body is in physical, physiological, biomotoric and psycho-mental forms with a great balance (homeostasis) and adaptation. Also, boxing needs adaptation to strength, dynamic and static features (15). As a full-contact martial arts game, it is possible to throw a clear and accurate punch to the opponent without getting a punch in the face of amateur boxing intent (6). In an amateur boxing match, competitors are allowed to use their glove's fingertip area and their punches toward the target area (i.e., side to side or from the front and above the belt) (2).

Boxing demands a high-developed technical, tactical ability and a high physical and physiological fitness level to succeed. The high-intensity performance in the period of rounds, with insufficient breaks for maintaining, is identified with amateur boxing (2). It is reported that the higher anaerobic threshold you have, the more you can succeed in boxing (17). it has been observed that amateur boxing (a form of 3X3) demands durability in the period of a boxing match (2). Boxers should have well-developed muscle strength and power to sufficiently manage the physical and technical-tactical needs (10, 11).

A typical boxing event is held over 3x2 minutes for the novice and 4x2 minutes for the middle boxer, while open-class boxers can take 3x3 or 4x2 minutes rounds depending on the coach's agreement. The intervals between the rounds are usually 1 minute (16). Boxing fitness components include cardiovascular endurance, muscle strength, muscle endurance, flexibility, and body composition. Skill related components include speed, agility, strength, balance, coordination, and response time. Most combat sports require a mix of technical, strength, aerobic fitness, power and speed. Often a single performance feature is not dominant in martial sports. The physiological responses, especially the heart rate and the maximum oxygen uptake (VO2max), the blood lactate values vary even according to the weight category and the rounds (14).

Muscules generate high-intensity force in a short time. It is well known that punching force is highly important to boxers for winning and one of the key components of amateur boxing. Not only speed but also power are needed to be effective for throwing a punch (2). In boxing also after throwing a punch, boxers have to get blocking position to not receive a punch. In this study, shoulder and leg strength of the boxers will be determined.

MATERIAL & METHOD

A total of 10 elite male boxers studying in Selçuk university at Sports Science Faculty were recruited to participate voluntarily in the study. All subjects were first informed about the aim and possible risks of the study. All subjects provided written informed consent. Data of 10 boxers (age: 22.10±1.37 years, height: 174.60±6.41 cm, weight: 72.60±10.74 kg). Subjects participated in national and international championship repeatedly.

Study design

Participants were taken to the sports science faculty laboratory at 09.00 am. Participants were warned to not participate in any exercise in the past 48 hours until the end of the test section. Participants were informed about the amount and type of food (55% carbohydrates, 25% lipids and 20% protein due to energy metabolism) that they had to take 24 hours prior to the trial day (17). Subjects were applied to standard warm-up including stretching movements. Following that, participants were taken to the isokinetic knee strength test. 1-minute rest was given between the velocities and 5-minutes were given between limb changes (13).

Isokinetic Strength Exercise

The isokinetic knee and shoulder strength tests were performed with an isokinetic dynamometer (Cybex, Humac Norm 2004) in the kinanthropometry laboratory of Selcuk University. Boxers participating in the study were taken to the isokinetic knee exercise after warming up. Participants are seated in the correct position in the test seat. The participants' holders and the middle sections of the thighs were stabilized to the seat by the tapes. In addition, they were allowed to support by holding the handles on the right and left sides of the seat during the test.

Five repeats maximal contractions knee extension (hamstring) and flexion (quadriceps) torque values were obtained at 60° sec-1 speed. In addition, 15 repeats maximal contractions exercise were done at 180° sec-1 speed. 1-minute rest was given between the velocities and 5-minutes were given between knee changes (12). Peak power of the dominant leg was recorded during the test. Participants were supported by verbally encouraging expressions in order to achieve higher performance during the test. Also, the best values were recorded during the exercise.

Statistical Analyses

Statistical analysis of the data was performed using SPSS 22 package program. Descriptive data of the participants were given as mean, minimum, maximum and standard deviation.

RESULT

Table 1. Descriptive information of the participants

		N	Minimum	Maximum	Mean	sd
Boxing group	**Age (year)**	10	20.00	24.00	22.10	1.37
	Height (cm)		165.00	184.00	174.60	6.41
	Body Weight (kg)		58.00	85.00	72.60	10.74

Table 2. Isokinetic leg strength outputs of the participants

		Movement	Minimum	Maximum	Mean	sd
Leg strength	60°/s	Extension (Nm)	16.00	286.00	224.90	40.18
		Flexion (Nm)	91.00	148.00	120.50	19.81
	180°/s	Extension (Nm)	84.00	165.00	135.70	25.25
		Flexion (Nm)	42.00	98.00	72.30	18.74

Table 3. Isokinetic shoulder strength outputs of the participants

		Movement	Minimum	Maximum	Mean	sd
Shoulder strength	60°/s	Internal (Nm)	50.00	84.00	63.70	10.49
		External (Nm)	34.00	56.00	40.90	6.78
	180°/s	Internal (Nm)	42.00	85.00	56.20	13.89
		External (Nm)	24.00	43.00	31.80	6.67

In Table 2-3, the dominant arm and leg 60°/s and 180 °/s isokinetic strength levels of the boxers are given. At 60°/s rotation, the average extension was 224.90±40.18 and the flexion average was 120.50±19.81, 180°/s rotation, the average extension was 135.70±25.25 and the flexion average was 72.30±18.74, 60 °/s rotation, internal mean was 63.70±10.49 and external mean was 40.90 ± 6.78, 180 °/s rotation, internal mean was 56.20 ± 13.89 and external mean was 31.80 ± 6.67.

DISCUSSION & CONCLUSION

In this study, isokinetic strength measurements of the dominant arm and dominant leg in arm and leg rotation of 60 °/s and 180 °/s were performed to volunteer individuals engaged in active sports at elite boxing level.

As a result of findings, the peak dominant leg strength of elite boxers found for peak extension 224.900 nM and 135.70 nM at 60 °/s and 180 °/s respectively. The peak dominant leg strength of elite boxers found for flexion 120.50 nM and 72.30 nM at 60 °/s and 180 °/s respectively. Similarly, Kocahan et al. (9) stated in their study that, the peak dominant leg strength of elite boxers found for extension 212 nM at 60 °/s and 123 nM at 240 °/s. The flexion measurements of the legs were found 114 nM at 60 °/s and 85 nM at 240 °/s. Lower extremity muscle strength is a key determinant of performance for boxing. The knee flexor and extensor muscles stabilize the knee joint and play an important role in lower extremity-related movements to perform spore-specific activities such as acceleration, deceleration and change direction Kocahan et al. (9). As a result of literature, we could not find any studies about the isokinetic strength of lower extremity of amateur elite boxers. However, there are studies in the literature that determine the knee joint isokinetic muscle strength profile in handball, volleyball, sailing, football, judo and wrestling athletes (1,5,18, 19). In the literature, it is emphasized that the most appropriate angular velocity is 60 ° / s to determine the force difference of the knee flexion/extension ratio and it is stated that this ratio increases when the angular velocity increases (8). Hammami et al. (7) stated in their study that, the peak dominant leg strength of elite taekwondo players found for extension 231 nM at 60 °/s and 132 nM at 180 °/s. The flexion measurements of the legs were found 129 nM at 60 °/s and 95 nM at 180°/s. The study results of Hamami and Kocahan are similar to our results. It can be said that taekwondo and boxing have similar energy metabolism, similar spore-specific activities, and spores that require similar physiological requirements. That is why similar outputs were found.

The findings of dominant shoulder peak internal strength of elite boxers were 63.70 nM and 56.20 nM at 60 °/s and 180 °/s respectively. dominant shoulder external strength of elite boxers was 40.90 nM and 31.80 nM at 60 °/s and 180 °/s respectively. Similarly, Kocahan et al. (9) stated in their study that, the peak dominant shoulder strength of elite boxers found for internal 67 nM at 60 °/s and 65 nM at 240 °/s. The external measurements of the shoulders were found 33 nM at 60 °/s and 27 nM at 240 °/s. Isokinetic muscle strength of the shoulder joint and IR-ER (internal, external) movement was evaluated in most studies determining the upper extremity muscle strength profile (4). To the literatüre, it is determined that internal muscle strength is stronger than external. In the present study, IR is stronger than EX as in the literature. The reason can be that the IR muscles group is numerically more and bigger (3). According to present studies finding, IR also has more strength than EX. This can be due to the adaptation of the muscles to the box-specific jabs and hooks.

As a result of the study, it can be said that boxers have stronger IR muscle group than EX this gives boxers a good attack. However, the weaker EX can not give boxers a good defense so boxers need to put more IR muscle strength movement in their training program.

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Examining the Empathetic Tendency Levels of theAthletes Dealing with Team and Individual Sports

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Abstract

The aim of this study is to determine the empathetic tendency levels of the athletes dealing with team and individual sports, and to specify whether there is a statistically significant difference concerning gender and sports experience variables. In total, 524volunteer athletes (232 males and 292 females) participated in the study, whose ages ranged between 15 and 27. The "Empathy in the Sports Environment (ESE)" scale, which was developed by Erkuş and Yakupoğlu (2001), was used in the study for the data collection. The SPSS 22.0 package program was used in the analyses of the data. The Independent Samples T test was employed for the paired comparisons, and the Spearman's rho correlation analysis for determining the relations among the variables. The significance level was accepted as $p<0.05$ in the evaluation of the results. As the conclusion of the study, it was determined that there was statistically no significant difference between the athletes dealing with team and individual sports concerning the emotional empathy dimension; however, it was determined that the athletes dealing with team sports gained higher scores in the prediction dimension; it was found that the emotional empathy scores of the female athletes were higher for the gender variable and male athletes had higher scores concerning the prediction dimension. Considering the sports experience dimension, it was determined that the higher the years of experience, the higher the levels of emotional empathy and prediction.

Key Words: Empathy, team athlete, individual athlete

INTRODUCTION

In the sports environment, particularly during the sports competitions, it is conceivable that the empathetic skills of the athletes are efficient in the sports branch. Particularly in the team sports, the athlete's use of empathetic skills towards the team mates, trainer, and the opponents can be an important factor in predicting his/her possible behaviors, in forming the team spirit, and thus, in the team success. It is not wrong that the sense of team unity of the athletes, who have high level of empathetic skills,is high as well. Considering the fact that the teams with a high sense of team unity will be more successful, it is suggested that the empathy levels of the athletes constituting the team should be improved (9).

There are different definitions of empathy today. These are mostly defined as looking from the perspective of the interlocutor by putting oneself into the shoes of him/her, and the process of understanding his/her thoughts accurately, feeling it and conveying it to him/her; it is generally discussed under two titles as the cognitive and emotional empathy (8, 14, 15, 23, 12, 11).

It is stated that empathy is one of the basic human characteristics that contributes to harmony. Therefore it is inevitable that empathy is used in all aspects of life (5). Empathy is both a cognitive and an emotional process and it is employed by imagining oneself in the position of another and remembering his/her similar experiences. Empathy also produces reactions appropriate to these sharings of emotions and thoughts (like helping the ones in need) (6).

Empathy is a verbal response reflecting the motive behind the emotions and emotional content

of the speech. Not being used much in the daily life, empathy is one of the most difficult components of communication skills that should be learned and comprehended (26). Empathy can also be defined as being objectively aware of emotions and opinions of others as well as their various meanings, and representatively experiencing the emotions and opinions of them (6).

The studies conducted to measure the empathy skills and tendencies of individuals are generally based on a certain listing of empathetic reactions (1). In other words, individuals might be in harmony with the society since they can show empathy, or similarly, they might have developed their sense of empathy since they can comply with the society. However, whatever the direction of the relationship, the fact that there is a relationship between the empathy and certain variables emphasizes the importance of empathy in our daily life (10).

As is understood from the studies conducted on this field in the literature, empathy makes important contributions to the level of the relationships among individuals. In this context, it can be stated that the higher the emphatic approach implemented in the sports environment the higher it will contribute to success. In this study, which was conducted in the light of these pieces of information, initially, answers were sought for the questions, is there a difference between the empathic tendencies of athletes dealing with team or individual sports?, and do the gender and sports experience have any influence on the empathetic tendency?

METHOD

This is a descriptive research study aiming at determining the empathetic tendency levels of athletes dealing with team and individual sports. Additionally, in this study, the differences were examined concerning gender and sports experience variables. In total, 524 volunteer athletes (232 males and 292 females) participated in the study, whose ages ranged between 15 and 27. Branch distributions of the participants are given below. The "Empathy in the Sports Environment (ESE)" scale, which was developed by Erkuş and Yakupoğlu (2001), was used in the study for the data collection. The ESE, which was comprised of 16 items, is a four pointlikert scale and it is evaluated under two dimensions as emotional empathy and prediction (cognitive) dimensions. The Cronbach alpha values concerning the sub-dimensions were determined as, respectively, .72 and .79. The least possible score to be gained from the emotional empathy sub-dimension was 5 and the highest score was 20, while the least value was 11 and the highest was 44 for the prediction dimension.

The SPSS 22.0 was used in the analyses of the research data. The Independent Samples T test was employed for the paired comparisons, and the Spearman's rho correlation analysis for determining the relations among the variables. The significance level was accepted as $p<0.05$ in the evaluation of the results.

Table 1. Branch Distribution of Participating Athletes

Branch	n	%
Football	123	23.5
Volleyball	224	42.7
Basketball	57	10.9
Tennis	37	7.1
Athletics	26	5.0
Ping pong	15	2.9
Badminton	10	1.9
Handball	32	6.1
Total	524	100.0

FINDINGS

The comparison of the empathy levels of team and individual athletes are given in the Table 2. It was determined that there was statistically no significant difference concerning the emotional empathy sub-dimension ($p>0.05$). It was also determined that there was statistically significant difference in favor of the athletes dealing with team sports for the prediction dimension ($p<0.05$).

In general, when the average scores were examined, it was determined that the average scores of the emotional empathy and prediction dimension were high.

The comparison of the empathy levels of the research group concerning the gender variable is given in Table 3. It was determined that there was a statistically significant difference in favor of the females in the emotional empathy sub-dimension, while there was statistically significant difference in favor of the males concerning the prediction dimension ($p<0.05$).

The relationship between the sports experience and the empathy levels of the research group is given in Table 4. Accordingly, it was determined that there was a positive and weak relationship between the sports experience and prediction dimension. In other words, the higher the sports

experience of the individuals, the higher their empathy tendency levels.

Table 2. Comparison of the empathy levels of athletes dealing with team and individual sports

	Branch	N	Mean	Sd.	t	p
Emotional Empathy	**Team sports**	412	17,33	2,59	1.451	.147
	Individual sports	112	16,92	2,87		
Prediction Dimension	**Team sports**	412	31,06	4,94	2.405	.017
	Individual sports	112	29,78	5,22		

Table 3. The comparison of the empathy levels of the research group concerning the gender variable

	Gender	N	Mean	sd	t	p
Emotional Empathy	**Male**	232	16.93	2.50	-2.499	.013
	Female	292	17.51	2.76		
Prediction Dimension	**Male**	232	31.60	4.48	3.318	.001
	Female	292	30.15	5.34		

Table 4. The relationship between the sports experience and the empathy levels of the research group.

		Emotional Empathy	Prediction Dimension
Sports Experience	**r**	.092*	.265**
	p	.035	.000

DISCUSSION & CONCLUSION

In this study, which was conducted to examine the empathy levels of the athletes dealing with team and individual sports, the relationships were also examined concerning the gender variables and sports experiences of the athletes, and the obtained results are discussed in this part.

While there was statistically no significant difference concerning the branch status in the emotional empathy sub-dimension, it was determined that the athletes dealing with the team sports had higher scores in the prediction (cognitive empathy) dimension. Additionally, when the average scores were examined, it was determined that the average scores of the emotional empathy and prediction dimensions were high. Therefore, it can be stated that the empathy tendencies of the participant athletes are high. When previous studies conducted on athlete groups are examined, it is generally stated that the empathy behaviors of athletes are high (9, 25, 24, 17, 16, 27, 2, 21).

It was determined that there was a statistically significant difference in favor of the females in the emotional empathy sub-dimension, while there was statistically significant difference in favor of the males in the prediction dimension. When the studies are examined in the literature, it is stated that the females have higher emotional and general empathy tendency levels (4, 17, 19, 13, 20, 22, 9, 25, 16, 27, 24, and 2). In a recent study, it was stated that the level of empathic tendency of senior field hockey athletes was also higher in female athletes (18). However, there are findings indicating that empathic tendency does not differ in terms of gender variable (3). This result might have emerged from the fact that females give more emotional reactions to events compared to males.

It was concluded that, the higher the sports experience of the research group, the higher the emotional and cognitive empathy tendency levels. When the studies in the literature are examined, it is observed that there are findings indicating that the cognitive empathy increases with the sports experience (7, 16, and 27).

As the conclusion, it was determined that there was statistically no significant difference between the athletes dealing with team and individual sports concerning the emotional empathy dimension; however, it was determined that the athletes dealing

with team sports gained higher scores in the prediction dimension; it was found that the emotional empathy scores of the female athletes were higher for the gender variable and the male athletes had higher scores concerning the prediction dimension. Considering the sports experience dimension, it was determined that the higher the years of experience, the higher the levels of emotional empathy and prediction.

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Acute Effect of Different Stretching Protocols on Flexibility, Yoyo IR-1 and Repeated Sprint Ability Performance

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Abstract

The purpose of this study was to examine the acute effect of different stretching protocols on flexibility, Yo-Yo IR-1 and repeated sprint performance. The sample group of this study consists of 15 male who were doing regular exercise at least 3 years. This group performed 5 different stretching protocols on non-consecutive days. Stretching protocols were determined as follows: light jogging for only 5 minutes (NS), light jogging and static strectching (SS), light jogging and dynamic stretching (DS), light jogging and static + dynamic stretching (SDS), light jogging and dynamic + static stretching (DSS). Altough participants did not have a statistically significant effect on flexibility performance ($p > 0.05$), the best flexibility value was SS. Repeated sprint performance (best) values of different stretching protocols did not have statistically significant effect on repeated sprint performance (moderate, worst, decline, post fatigue index) values ($p > 0.05$). Repeated sprint performance was found to have a statistically significant effect on Borg values and HR mean values ($p < 0.05$). It was found that Yo-Yo IR-1 has a statistically significant effect on BORG values, Yo-Yo IR-1 performance HR (pre) values, Yo-Yo IR-1 performance HR (middle) values and Yo-Yo IR-1 performance lactate values ($p<0.05$). According to the findings obtained as a result of the research; it has been observed that different stretching protocols have different effects in terms of repeated sprint, flexibility and Yo-Yo IR-1 performance parameters. Overall, these results suggest that flexibility performance may be improve after static stretching exercise.

Key words: Aerobic, Anaerobic, Flexibility, Stretching

INTRODUCTION

A single exercise session usually comprises four phases, warm-up, stretching, conditioning or sports-related exercise, and cool-down. The warm-up period consists of 5 to 10 minutes of low to moderate physical activity and is generally accepted and recommended to prepare the body for exhausting activity (25, 10). Stretching exercise, which is used as a part of pre-movement warm up, is used to increase the range of motion, reduce the flexibility resistance, provide more free movements and improved performance. The effects of stretching have been associated with both mechanical (e.g., viscoelastic deformation, plastic deformation of connective tissue) and neural (e.g., neuromuscular relaxation, modification of sensation) factor (14, 21, 33).

The first aim of warm up is to increase the internal temperature of the muscles. the increase in muscle temperature can affect performance by causing a decrease in viscous resistance in the muscles and joints. Moreover, it is stated that the physiological and performance changes after heating can lead to permanent metabolic acidemia (acid increase) (6, 20). Hemoglobin releases approximately two times more oxygen (at 41 ° C at 36 ° C) and decomposes oxygen twice as quickly as the heat increases. The same effect is shown on the dissociation curve of myoglobin (3, 5). Moreover, increased temperature causes vasodilatation and increase blood flow in the muscle. Febbraio et al. (13) reported that the increase in muscle temperature increases muscle glycogenolysis, glycolysis and high energy phosphate degradation during exercise. In addition, increased muscle temperature increases the rate of transmission of nerve impulses and increases central nervous system function (CNS). The improved CNS function may have a particularly critical effect for activities requiring fast reactions and complex body movements (26).

When the literature is examined, there are different stretching protocols such as static, dynamic, combined, ballistic, proprioceptive

neuromuscular facilitation (PNF). One of these stretching protocols is static stretching includes holding the joint at the extended position for 15 to 60 seconds until the end of the range of motion (35). Many studies have reported that static stretching does not affect short-term muscle strength, but moderate and high levels of static stretching (30-60-90 seconds) reduce vertical jump, speed, and power performance. (7, 9, 18, 32, 23). Ogura et al., (2007) was to investigate whether duration of static stretching could affect the maximal voluntary contraction (MVC). No static stretching condition was used as a control condition and the other groups were 2 different durations of static stretching of their hamstring muscles in the dominant leg: 30 and 60 seconds. At the end of the study they found that the hamstring flexibility was significantly increased by 30 and 60 seconds of static stretching; however, there was no significant difference between 30 and 60 seconds of static stretching conditions. The MVC was significantly lowered with 60 seconds of static stretching compared to the control and 30 seconds of the stretching conditions. However, there was no significant difference between control and 30 seconds of static stretching conditions. Therefore, it was concluded that the short duration (30 seconds) of static stretching did not have a negative effect on the muscle force production (23). Winchester et al., (2008) was to establish whether the deleterious effects of static stretching (SS) would wash out the performance enhancements obtained from the dynamic warm-up (DW). Eleven males and 11 females, who were athletes of a NCAA Division I track team, performed a DW followed with either a SS or rest (NS) condition. They finally found that time for the NS versus the SS group was significantly faster for the second 20 m with a time of 2.41 versus 2.38 seconds, and for the entire 40 m with a time of 5.6 and 6.04 versus 5.7 6.04 seconds (32). It can be said that the negative effects on performance are effect of neuromuscular factors such as mechanical (changes in muscle stiffness and reflex sensitivity) and MTU (reduced motor neuron stimulation) (16). One of the preferred stretching methods is dynamic stretching. Dynamic stretching includes exercises based on jumps and various special movements (12). In some studies, it has been reported that dynamic stretching increases the speed (2), enhancing T-line agility, health ball throw, 5-step jump (22), vertical jump (17) performance. It has been reported that low to high intensity contractions such as dynamic stretching can increase strength and performance by activating nerve muscle activation (11, 15).

The importance of this study is there are no studies in which 5 different stretching protocols (NS, SS, DS, SS + DS, DS + SS) are used to measure flexibility, repeated sprint ability and acute effect on Yo-Yo IR-1 performance in the same study. The aim of the study is to examine the acute effect of different stretching protocols on flexibility, Yo-Yo IR-1 and repeated sprint ability. For this purpose, research hypotheses; (1) flexibility, yoyo intermittent recovery test-1 (Yo-Yo IR-1) and repeated sprint ability (RSA) performance would be affected by different stretching protocols, and (2) flexibility, Yo-Yo IR-1 and RSA performance are expected to improve with dynamic stretching.

MATERIAL AND METHOD

Participants

The sample group of this study consists of 15 male (age: 21.80±1.37 years, height: 1.77±.032 meter, weight: 69.09±6.65 kg, body mass index (BMI) 21.94±2.01 (kg/m2), body fat ratio (BFR) 10.87±3.98 (%) who were doing regular exercise at least 3 years. Volunteers' criteria for participation in the study are: (a) have at least 3 years of experience in sports; (b) there is no functional limitation that may affect test performance; (c) no medical condition affecting the tests; (d) the authorization form. The study was approved by the Research Ethics Committee of the institution. The criteria for exclusion from the test are any health problems during the study period, irregularity in participation in the measurements, optimum level of performance not exhibited and sloppy behaviors. All tests and training practices were performed at the same time of the day (9: 00-11: 00) to avoid diurnal rhythm effect. Subjects were told to sleep for 7-8 hours before testing and participants signed a voluntary form.

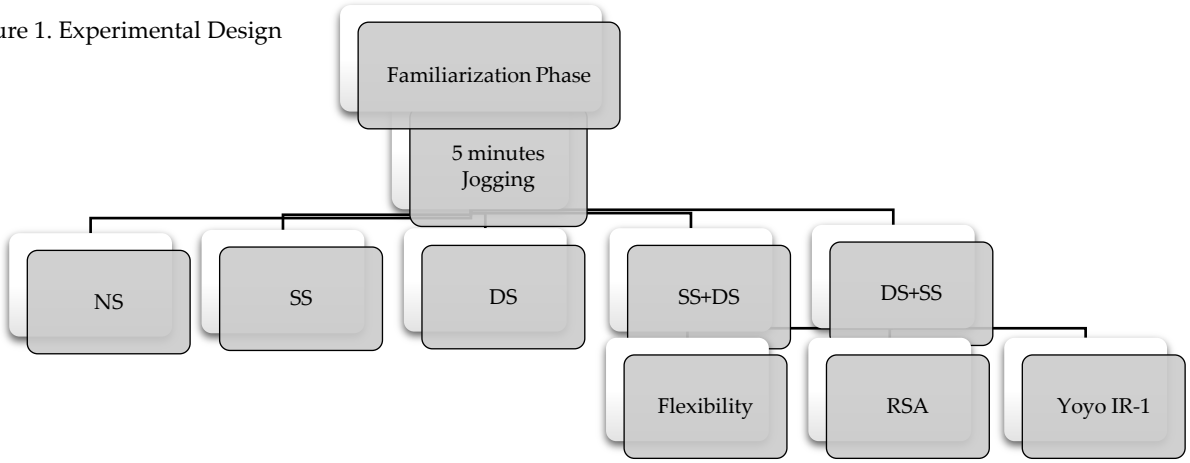
Experimental Design of the Study

Anthropometric measurements of the volunteers in the study were determined. Measurements were made at Faculty of Sports Science' Sports Hall. All volunteers who agreed to participate in the study were informed in full detail of the content of their work prior to the study. Before the practice started, volunteers gave necessary information about the subject, the location and the time of the tests. After the initial warm-up (5 minutes of moderate aerobic running-jogging), stretching protocols were under the supervision of

the leader. Volunteers were informed 24 hours before the tests that they should not use heavy exercise, alcohol, caffeine, and not to use the ingredients that are included in the ergogenic supplement. Each stretching protocol started with a low tempo (jogging) aerobics run for 5 minutes. Flexibility, repeated sprint ability, yoyo intermittent recovery test-1 performances were measured respectively after each stretching except the first stretching protocol. This study continued aproximately 20 days. Repeated sprint ability and yoyo intermittent recovery test-1 were measured on different days. All protocols continued consecutive days.

Stretching Protocols

Figure 1. Experimental Design



No Stretching Phase (NW)

No stretching protocol consists of 5-minute low-tempo aerobic run. After 5 minutes of low-tempo aerobic run, the flexibility of the subjects, repeated sprint performance, Yo-Yo IR-1 performances were measured. The maximum heart rate of the subjects was determined (29). Then, each subjects' warm up rate was calculated as 30-40% according to heart rate (19). Subjects participating in the study were run under the control of the experts. In this way, both the intensity of warm up and the warm up differences between subjects who participate in the study were removed.

Table 1. Stretching Exercises

NS	SS	DS	SS+DS	DS+SS
5 minutes low speed running	Latissimus Dorsi (Back) Muscle Group	High Glute Pull	Latissimus Dorsi (Back) Muscle Group + High Glute Pull	High Glute Pull + Latissimus Dorsi (Back) Muscle Group
	Pectoralis Major (Chest) Muscle Group	Walking Lung	Pectoralis Major (Chest) Muscle Group + Walking Lung	Walking Lung + Pectoralis Major (Chest) Muscle Group
	Trapezius (Neck) Muscle Group	Light High Knees	Trapezius (Neck) Muscle Group + Light High Knees	Light High Knees + Trapezius (Neck) Muscle Group
	Abdominis (Abdominal) Muscle Group	High Knee Pull	Abdominis (Abdominal) Muscle Group + High Knee Pull	High Knee Pull + Abdominis (Abdominal) Muscle Group
	Gluteus Maximus (Hip) Muscle Group	Straight Leg Kick	Gluteus Maximus (Hip) Muscle Group + Straight Leg Kick	Straight Leg Kick + Gluteus Maximus (Hip) Muscle Group
	Quadriceps (Upper calf) Muscle Group	Carioca	Quadriceps (Upper calf) Muscle Group + Carioka	Carioka + Quadriceps (Upper calf) Muscle Group
	Hamstring (Back calf) Muscle Group	A Skip	Hamstring (Back calf) Muscle Group + A Skip	A Skip + Hamstring (Back calf) Muscle Group
	Calf (Lower thigh) Muscle Group	B Skip	Calf (Lower thigh) Muscle Group + B Skip	B Skip + Calf (Lower thigh) Muscle Group

(NS: no stretching, SS: Static stretching, DS: dynamic stretching)

Statistical Analysis

Repeated ANOVA was used for the significance test between different stretching protocols. At the same time, bilateral comparisons of stretching protocols were analyzed by the Bonferroni corrected equivalence comparison test. The effect of five stretching protocols were analysed by an "ANOVA for Repeated Measures" (NS x SS x DS x SDS x DSS), with sphericity checked using "Mauchly's Test". The effect sizes of the different stretching protocols were explained by the values in square meters (◎2). The findings are presented as mean ± SD (standard deviation) and an alpha level of $p<0.05$ was considered statistically significant for all analyses. All data analysis was conducted using SPSS statistics computing program version 23.0 (SPSS Inc, Chicago, IL).

FINDINGS

Table 1. Demographic and Anthropometric Values of Participants

Parameters	N	Minimum	Maximum	Mean	Standard Deviation
Age (years)	15	19.00	24.00	21.80	1.37
Height (m)	15	1.73	1.84	1.77	.032
BM (kg)	15	58.80	81.70	68.42	6.81
BMI (kg/m²)	15	19.18	25.79	21.81	2.00
BFR (%)	15	6.20	18.00	10.87	3.98
LBW (%)	15	55.00	71.30	60.83	5.13
RHR (rpm)	15	54	70	63.73	4.52

BM: Body mass, BMI: Body mass index, BFR: Body fat ratio, LBW: Lean body weight, RHR: Resting heart rate)

Table 1 shows that the participants' mean age is 21.80 ± 1.37 years, mean height is 1.73 ± 03 meters, mean body mass is 68.42 ± 6.81, mean BMI is 21.81 ± 2.00, mean BFR 10.87 ± 3.98, mean LBW 60.83 ± 5.13 and mean RHR 63.73 ± 4.52.

Table 2. Participants' Perceived Exertion Ratings (Borg Scale)

Warm up Protocols	N	Minimum	Maximum	Mean	Standard Deviation
NS (1)	15	7	8	7.46	.51
SS (2)	15	8	12.00	10.13	1.06
DS (3)	15	10.00	15.00	13.66	1.34
SS+DS (4)	15	12.00	14.00	12.73	.79
DS+SS (5)	15	12.00	13.00	12.66	.48

(NS = No stretching, SS = Static stretching, DS = Dynamic stretching)

Table 2 shows that participants' perceived exertion ratings after stretching were found NS 7.46 ± .51, SS 10.13 ± 1.06, DS 13.66 ± 1.34, SS + DS 12.73 ± .79 and DS + SS 12.66 ± .48.

Table 3. Repeated Sprint Ability Performance (RSAP (best)), RSAP (average), RSAP (worst), Sprint Performance Reduction (SPR (%)), Fatigue Index Values

	Stretching Protocols	RSAP (best) (p)		RSAP (average) (p)		RSAP (worst)		SPR (%)		Fatigue Index (sn) (p)	
RSPV	NS (1)	7.47 ± .29	.36	7.74 ± .24	.26	8.08 ± .32	.47	3.69 ± 1.61	.98	.5327	.90
	SS (2)	7.43 ± .25		7.71 ± .30		8.01 ± .37		3,81 ± 1.56		.3707	
	DS (3)	7.49± .37		7.80 ± .37		8.21 ±.63		3,95 ± 1.98		.5267	
	SS+DS (4)	7.43 ± .33		7.72 ± .35		8.09 ± .49		3,91 ± 1.48		.4913	
	DS+SS (5)	7.53 ± .31		7.83 ± .35		8.12 ± .42		3,92 ± 1.30		.5180	

(RSAPV: Repeated sprint ability performance values, SPR: Sprint performance reduction)

Table 3 shows that different stretching protocols did not have statistically significant effect on RSAP (best) (p = 0.36), RSAP (average) (0.26), RSAP (worst) (0.47), SPR values (.98) and fatigue index values (.90).

Table 4. Repeated Sprint Ability Performance HR, Lactate Values and Borg Values

	Stretching Protocols	RSAP HR (first) (p)		RSAP HR (second) (p)		RSAP HR (third) (p)		Lactate Values (p)		Borg Values (p)		
RSAPV	NS (1)	111.40 ± 13.68	.01*	147.00 ± 14.85	2>4*	179.20	.57	8.28	.06	14.80	3>1*	.00*
	SS (2)	108.06 ± 12.42		151.60 ± 7.95		175.66		7.96		15.20		
	DS (3)	121.93 ± 12.87		151.66 ± 15.26		174.26		8.68		16.13		
	SS+DS (4)	114.53 ± 14.16		140.33 ± 9.58		177.40		6.70		16.40	4>1*	
	DS+SS (5)	118.46 ± 13.99		139.73 ± 13.45		174.06		6.15		16.00	5>1*	

Table 4 was found that different stretching protocols have statistically significant effect on first heart rate values (F (4,56) = 3.313, p = .017), HR mean values (F (4,56) = 4.175, p = .005). The third HR values didn't have statistically significant effect (F (4,56) = .736, p = .572).

When the repeated sprint ability BORG values were examined, it was determined that different stretching protocols had a statistically significant effect on RSAP (F (4,56) = 6.725, p = .005). According to the Bonferroni analysis results, a statistically significant difference was found between DS with NS, SS + DS and NS and DS + SS with NS warm up (p <0.05).

Lactate values were not statistically significant effect on lactate values (F (4,56) = 4.326, p = .064).

Table 5. Yo-Yo IR1 Performance, Borg, Vo_{2maks} and LA (son)

	Stretching Protocols	Performance Values (p)		Borg Values (p)		Vo_{2maks} (p)		La (son) (mmol)	
Yo-Yo IR1 Running Performance, Borg, Vo_{2maks} and La (son) Values	NS (1)	1442.66 ± 452.41	0.16	15.53 ± 1.40	0.02*	48.51 ± 3.80	0.16	8.20 ± 2.61	.00*
	SS (2)	1490.66 ± 538.03		16.00 ± 1.19		48.91 ± 4.51		6.59 ± 2.07	
	DS (3)	1704 ± 664.66		16.64 ± 1.34		50.71 ± 5.58		6.60 ± 1.54	
	SS+DS (4)	1472 ± 452.34		15.46 ± 1.40		48.76 ± 3.79		6.42 ± .85	
	DS+SS (5)	1626.66 ± 648.98		16.53 ± 1.55		50.06 ± 5.45		5.68 ± 1.86	

(Yo–Yo IR-1: Yo–Yo intermittent recovery test, LA: Lactic acid)

Table 5 was found that Yo-Yo IR-1 performance values (F (4,56) = 1.954, p = .16) and $VO_{2\ max}$ values (4,56) = 1.958, p = .164) didn't statistically significant. Borg values ($F_{(4,56)}$= 3.130, p=.02). and LA values of Yo-Yo IR-1 (F (4,56) = 5.969, p = .000) are statistically significant (p< .05).

Table 6. Yo-Yo IR1 Heart Rate (HR) and Flexibility Values

	Stretching Protocols	HR (first) (p)	HR (second) (p)	HR (third) (p)	Flexibility (p)
Yo-Yo IR1 Heart Rate (HR) Values	NS (1) SS (2) DS (3) SS+DS (4) DS+SS (5)	0.00*	0.00*	0.54	0. 36

The HR (pre) values of the different stretching protocols before Yo-Yo IR-1 were statistically significant effect on Yo-Yo IR-1 performance HR (second) values (p <0.05) in table 6. According to the Bonferroni analysis results, a statistically significant difference was found between DS and NS, DS with SS, SS + DS with SS, DS + SS with SS and finally DS with DS + SS (p <0.05). It was found that the different stretching protocols had a statistically significant effect on the Yo-Yo IR1performance HR (F (4,56) = 6.097, p = .000). According to the Bonferroni analysis results, a statistically significant difference was found between NS and SS + DS, DS and SS + DS, and finally between DS + SS and SS + DS (p <0.05).

Table 7. Flexibility Values

	Stretching Protocols	Minimum	Maximum	F	p
Flexibility Values	NS (1)	27.53 ± 7.32	7.32	1.107	0.36
	SS (2)	26.33 ± 8.12	8.12		
	DS (3)	25.86 ± 7.50	7.50		
	SS+DS (4)	26.13 ± 7.75	7.75		
	DS+SS (5)	26.60 ± 6.28	6.28		

Flexibility values didn't have statistically significant effect (F (4,56) = .1107, p = .363) in table 7.

DISCUSSION

The purpose of this study was to examine the acute effect of different stretching protocols on flexibility, Yo-Yo IR-1 and repeated sprint performance. The main findings were that no significant differences in the flexibility values variables were found between the five stretching protocols. When the flexibility performance values of the participants in terms of different stretching protocols were examined, NS: 27.53 ± 7.32, SS: 26.33 ± 8.12, DS: 25.86 ± 7.50, SS + DS: 26.13 ± 7.75 and DS + SS: 26.60 ± 6.28 and statistically significant effect on the obtained values (F (4,56) = .1107, p = .363).

When the literature is examined, there are some studies about the effect of stretching protocols on flexibility performance. Unick et al. (30) examined the flexibility performance values by applying 3 different test procedures on 3 different days for 16 female basketball players. Three different stretching protocols were applied to the subjects. The first warm-up protocol included only general warm-up, while the second protocol included 15-second 3 repeated static stretching exercises for some muscle groups (quadriceps femoris, hamstring and gastrocnemius muscle groups); while the third group had 30 seconds of ballistic stretching exercises on the same muscle groups. They reported that ballistic and static stretching exercises did not affect the flexibility values of the study results. This suggests that stretching prior to competition may not negatively affect the performance of trained women. Faigenbaum et al. (11) were to compare the acute effects on youth fitness of 3 different warm-up protocols utilizing static stretching or dynamic exercise performance. Sixty children performed warm- up protocols consisted of 5 minutes of walking and 5 minutes of static stretching (SS), 10 minutes of dynamic exercise (DY), or 10 minutes of dynamic exercise plus 3 drop jumps from 15-cm boxes (DYJ). After each warm-up protocols, subjects were tested on the vertical jump, long jump, shuttle run, and v- sit flexibility. Vertical- jump and shuttle-run performance declined significantly following SS as compared to DY and DYJ, and long-jump performance was significantly reduced following SS as compared to DYJ. Perrier et al. (24) compared the effects of a warm-up with static vs. dynamic stretching on countermovement jump (CMJ) height, reaction time, and low-back and hamstring flexibility. Flexibility was better after both static stretching (SS) and dynamic stretching (DS) compared to after no stretching, with no difference in flexibility between SS and DS. Su et al. (28) compare the acute effects of foam rolling, static stretching, and dynamic stretching used as part of warm-up on flexibility and muscle strength of knee flexion and extension. The flexibility test scores improved significantly more after foam rolling compared to static and dynamic stretching. Ahmed et al., (1) was to compare the effectiveness of modified hold-relax stretching and static stretching in improving the hamstring muscle flexibility. The subjects were randomly placed into three groups: the modified hold-relax stretching, static stretching and control groups. According to the results of this study, both the modified hold-relax stretching technique and static stretching are equally effective and there was no significant difference in improving the hamstring muscle flexibility between the two groups. Some researchers suggest that stress may cause relaxation in the tendon, thereby reducing muscle strength to the bone, reducing musculotendinous stiffness (8). Static stretching or warm up can decrease in power may be due to an increase in the length of the muscle tendon unit (27). Another theory has been suggested to be related to myogenic reflex, which indicates a decrease in natural contraction when movements in the muscles are very fast (8).

The main findings were that different stretching protocols did not have a statistically significant effect on heart rate preliminary values in RSA performance (F (4,56) = 3.313, p = .017). RSA performance of different stretching protocols was found to have a statistically significant effect on HR mean values (F (4,56) = 4.175, p = .005). Repeated sprint performance of different stretching protocols was found to have no statistically significant effect on final HR values (F (4,56) = .736, p = .572). When the repeated sprint performance BORG values of the participants were examined, it was determined that NS was 14.80 ± 1.26, SS 15.20 ± 1.26, DS 16.13 ± 31.06, SS + DS 16.40 ± .63 and DS + SS 16.00 ± 92. It was found that different warm up protocols had a statistically significant effect on the borg values in repeated sprint performance (F (4,56) = 6.725, p = .005). Repeated sprint performance of different stretching protocols was found to have no statistically significant effect on lactate values (F (4,56) = 4.326, p = .064).

When the literature is examined, there are some studies about the effect of stretching protocols on RSA performance. Beckett et al., (4) examined the effects of static stretching during the recovery periods of field-based team sports on subsequent repeated sprint ability (RSA) and change of direction speed (CODS) performance. They found that, there was a consistent tendency for RSA times to be slower after the static stretching intervention for three performance variables. Further, sprint times is slower in the CODS-SS trial compared with the CODS-CON across all sprint variables, with a significantly slower ($p<0.05$). In another study Tillaar et al. (29) aimed to compare the effects long and short warm-up of football players on repeated sprint performance. Ten male football players conducted two types of warm-up as long warm-up and short warm-up. RPE and heart rate were significantly higher after the long warm-up and short warm-up is as effective as a long warm-up for repeated sprints in soccer.

The main findings were that there were no statistically significant effect on Yo-Yo IR-1 performance values, VO2 max values. When the Yo-Yo IR1 performance Borg values of the participants were examined there was found had a statistically significant effect on the Yo-Yo IR-1 performance values (F (4,56) = 3.130, p = .022), post-Yo Yo IR-1 lactate values of Yo-Yo IR-1 (F (4,56) = 5.969, p = .000), Yo-Yo IR-1 performance on HR (F (4,56) = 6.097, p = .000). There were also statistically significant difference was found between NS and SS + DS, DS and SS + DS, and finally between DS + SS and SS + DS ($p <0.05$). The HR (pre) values of the different stretching protocols before Yo-Yo IR-1 were statistically significant effect on the Yo-Yo IR-1 performance HR (second) values ($p <0.05$).

Only 1 study has focused on the effects of Yo-Yo IR-1. Yanaoka et al. (31) examined the effect of half-time rewarm-up (RW) of soccer referees on Yo-Yo Intermittent Recovery Test level 1 (Yo-Yo IR-1). The Yo-Yo IR1 performance, blood glucose, free fatty acids (FFAs), triglycerides (TGs), creatine kinase (CK), and lactate concentrations, the rating of perceived exertion, mean HR, and HRmax were analyzed. The Yo-Yo IR1 performance was higher in the halftime RW trial than in the control trial (3,095 ± 326 vs. 2,904 ± 421 m, $P \leq 0.05$).

In conclusion, repeated sprint performance was found to have a statistically significant effect on the mean HR values ($p <0.05$). After stretching protocols Yo-Yo IR-1 performance values, HR values and Yo-Yo IR-1 post-performance lactate values were found to have a statistically significant effect ($p <0.05$). This study shows that coaches can suggest SS to athletes before flexibility exercise.

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Relationship Between Lower Extremity Strength Asymmetry And Jump And Sprint Performance

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Abstract

The relationship between inter-limb strength asymmetry and athletic performance is not clearly well-known. Different results in the literature makes it difficult to form a common consensus on this issue. The aim of this study was to investigate the relationship between contralateral inter-limb strength asymmetry (ILLSA) values and jump and sprint performances. Forty-eight individuals (21.5±2.8 years, 1.74±0.1 m, 67.3±9.7 kg) voluntarily participated in this study. All participants participated in squat (SJ), Countermovement jump (CMJ), 40m sprint run tests and right and left isokinetic concentric knee flexion and extension strength (IS) test at low (60°.s-1) and high (300°.s-1) angular velocities. The symmetry angle formula was used in order to determine the isokinetic knee strength asymmetry values between inter-lower limb. According to the results it was revealed that there was no relation (p>0.05) between ILSSA at low and high angular velocities and squat jump (r = -0.106−0.200), countermovement jump (r = -0.11−0.087) and 40m sprint (r = 0.012−0.810) performance. In conclusion, there is no negative or positive relationship between inter limb isokinetic knee strength symmetry angle and jump and sprint performances in physically active individuals.

Key words: Imbalance Sprint Performance, Isokinetic Strength, Muscle Balance, Vertical Jump

INTRODUCTION

While in most of the sports branches (long jump, high jump, 100m, 200m sprint), reaching maximum jump height and sprint speeds determines the winner, however it does not affect the result in some sports (volleyball, basketball, football etc.) jump and sprint are performance components that are performed repeatedly in many sports branches and are very important to win. It is stated that there is a direct relationship between jump and sprint performances and muscular strength such as lower extremity strength, strength-velocity relationship or indirect relationship such as strength generation rate and also that individuals with more muscle strength are better at jump and sprint performances than those with less muscle strength (36).

In humans, there is a tendency to use one side of the body in motor activities such as jump and sprint. This preference tendency is due to the fact that one hemisphere is dominant over the other, which is called cerebral dominance. This preference in humans is usually seen as a preference for the hand or foot on a particular side during a motor skill. This is usually associated with mechanical asymmetry, which is defined as a kinetic / kinematic difference between the right and left sides of the lower extremity (1, 11, 18). There are many studies showing that protecting the strength rate between both the agonist-antagonist muscles (Hamstring-Quadriceps) and the contralateral muscles in lower extremities (predominant and non-dominant or the right/left side of Hamstring-Hamstring or Quadriceps-Quadriceps) is very important in terms of both protection from injuries and elimination of losses which could develop during athletic performance (10, 14, 21, 28, 38). Bilateral strength asymmetry, in the assessments of neuromuscular function of lower extremity, generally refers to the maximal strength difference between the two legs according to a reference point or the strength rate in relation to the contralateral muscle (7, 20, 41).

In many research samples, the asymmetry index is obtained by calculating the percentage by taking the dominant or stronger side as a reference point (31). In the literature, there are different formulas such as right/left side ratio, asymmetry index, symmetry angle, which are symmetry- or asymmetry-oriented (7, 20, 31, 41). For example, the

expression of that the left knee flexor strength is 15% lower than the right knee provides an opportunity of the assessment of asymmetry percentage in a simple way for coaches or sports experts. Along with that, the terms symmetry and asymmetry can be used in the same sense; while symmetry is defined as the ability of an extremity to reflect the movement of the other extremity in the same way, asymmetry means deviation from symmetry (16).

Strength is a basic performance component in many sports branches. The strength of the lower extremity muscle groups is very important to generate or absorb high strengths during athletic performances such as bounce, tapping, sprint, acceleration or deceleration. The isokinetic strength is defined as the maximum torque (turning moment) value that can be improved at all the angles of the movement during voluntary contraction at a stable angular velocity. Isokinetic dynamometers are electromechanical devices that can measure the performance of isokinetic muscle movements involving major joints. Isokinetic dynamometers are widely used in the tests determining of the strength difference between the lower extremities (22, 28, 29, 32).

While the effects of the inter-limb strength asymmetry index or symmetry angle on sports performance are not known clearly, there are different results in the literature. While there are results indicating that high asymmetry in strength is associated with the risk of disability (26), may limit athletic performance of the athlete (40) or may have a negative effect on jump performance (2), there are also study results indicating that high strength asymmetry is associated with a better performance (6). These different research results cause confusion for researchers and coaches. It can help coaches and sports experts plan strength training programs to reduce possible strength imbalances between the extremities that may be present in athletes and thus it can increase functional performance by reducing performance losses. Therefore, the aim of this study is to investigate whether there is a relationship between ILSSA and 40-meter sprint performances in physically active but not highly trained individuals.

METHOD

In this study, whether there is a relationship between isokinetic knee strength asymmetry angle and squat jump, countermovement jump and 40-meter sprint time was investigated. The isokinetic knee strength was obtained by the peak torque obtained as a result of 5 maximal repetition of concentric flexion and extension at slow and fast (60 and 300°.s-1) angular velocities. As for the jump, it was obtained by a jump test conducted with hands on hips and a mat that calculates the time spent in the air. The sprint time was measured with a photocell stopwatch.

Participants

The participants of this study were 50 volunteers who were physically active but not highly trained 35 male and 15 female and whose ages were 21.5±2.8 (average ± standard deviation), heights were 1.74±0.1 m, body weights were 67.3±9.7 kg, body fat percentages were 14.4 ± 5.6%, and body mass indexes were 21.7±2.4 kg/m2. In this cross-sectional study, all participants participated in all measurements. The criterion for inclusion in the study was determined as doing regular physical conditioning training for at least 2 days a week, and the criteria for exclusion were determined as having suffered from lower extremity sports injury or disability. All participants were verbally informed prior to the study, their informed consent was obtained with signatures after stating that they were going to participate in the study on a voluntary basis and be free to leave the study in any part of it. The study was performed in compliance with the Helsinki Declaration and approved by Eskişehir Osmangazi University Non-invasive Clinical Researches Ethical Committee (Date: 02/01/2019, No:25403353-050.99-E.291, Decision: 2018-308, Confirmation link: https://ebysnetm.ogu.edu.tr/Home/Dogrulama/6235d729-673e-495e-b290-43168ffb7e27).

Research Design

One week before the measurements, all participants were given an introduction and trial of the measurements for their adaptation. On this trial day, the heights of the participants were measured with a fixed wall stadiometer (Holtain Ltd. UK), and the body weights and body fat percentages were measured with a bioelectrical impedance analyzer (Tanita MC 180MA, Japan). Measurements were taken on 2 different days and there were at least 48 hours between the measurements. On the first day of the measurements, jump and sprint tests were conducted and on the second day, isokinetic knee strength measurements were taken. It was stated verbally to the participants that they should not

participate in heavy physical activities, take diuretics like caffeine or alcohol, that they should continue their routine diet and hydration and sleep for a sufficient time during the day before the measurements. The measurement days started with calisthenics involving dynamic stretches and submaximal dynamic contractions for approximately 10 minutes and warm-ups involving plyometric jumps. After warm-up, 3-5 minutes break was given for a passive rest and then the measurements started. Before every measurement, the content of the test was repeated verbally to the participants.

Measurements and Analyses

Squat Jump: SJ was measured as a vertical maximal jump (without moving up and down and not involving an eccentric phase and elastic energy) from a 1-2 seconds long half squat position in which the body is slightly forward in flexion, knees and hips are at approximately 950 flexion, eyes are looking across, hands are on waist, feet are shoulder width apart (8, 30).

Countermovement Jump: CMJ starts with a downward movement (eccentric phase) with knee and hip flexion from the standing position where the hands are on waist and the feet are shoulder width apart. It is an upward vertical jump with a knee and hip extension in a fluid and maximal way (stretch-shortening cycle) without any pause after getting into the half-squat position (8, 23).

SJ and CMJ tests measured (with 1 cm precision) with a mat (Smartspeed, Fusion Sport, Australia) determining the time spent in the air during the jump with double leg (bilateral). The best of 3 attempts, which had one minute breaks between them, was recorded for analysis (30).

40-Meter Sprint Test: Sprint performances of the participants were determined by a flat running test at a maximum speed of 40 meters. The sprint test was performed on a closed athletic tartan track, which had a sufficient distance from the finish line for deceleration. Two pairs of photocells are positioned at the start (0. meter) and finish lines (40 meters). It was applied from the standing position between the starting line and the line which was approximately 1 meter behind this line with a high start and without pre-acceleration. Before the sprint test, at least two test runs at the submaximal speeds were performed by the participants and following this, the test was performed after a sufficient break was given. Sprint tests were measured twice with 0.01 seconds precision and the better performance was recorded for analysis. At least 2 minutes of active rest was given between two tests (30, 37).

Isokinetic Strength Test: Isokinetic knee strength tests were conducted by using an isokinetic dynamometer (Humac Norm Testing & Rehabilitation System, Model TM 770, USA). On the measurement day, firstly the calibration of the device was done. After 10 minutes of general warm-up including no-load cycling, the seat and dynamometer angle adjustment of the device was made according to the physical characteristics of the individual to be tested. Then the participant was fixed to the seat with calf and body belts which were tightened as so not to cause any disturbance. The test procedure was explained to the participants again and the participants were verbally motivated during the tests. The soft pad on the adjustable arm of the dynamometer is fixed to the leg from the proximal alignment of the medial malleol as so to allow the dorsal flexion of the participant's ankle. The axial rotation of the dynamometer arm is adjusted to the lateral femoral epicondyle alignment. Before each angular velocity, for warm-up and acclimatization 3 submaximal repetitions were performed and they were followed by a 30 sec rest period. Then, it was completed with concentric 5 maximal flexion/extension movements at low (60°.s-1) and high (300°.s-1) angular velocities with 1-minute rest intervals between the angular velocities. The tests were performed on right and left extremities and at the end of the test, peak torque values (Nm) were recorded via a computer connected to the device (9, 12, 15).

Asymmetry Analysis: While very different asymmetry indexes (4, 20, 31, 34) are used in calculation of asymmetry between extremities, the results of these calculations may differ from each other. In the simplest form, an asymmetry calculation can be calculated as a percentage by taking the predominant or stronger side as a reference value (Equilibrium 1). The symmetry angle formula can reveal the direction of the asymmetry by using the values of the right and left sides as a vector. If the result is negative in the symmetry angle, it shows that the left side value is higher; if positive, it shows that right side value is higher (41). In addition to this, in this study, contralateral isokinetic knee strength asymmetry values of each

participant were determined with the symmetry angle of Zifchock et al. (41) (Equilibrium 2), because it uses a standard reference point in interpreting lateral dominance and decreases the possibility of artificial inflation of the data. In this formula, if the symmetry angle value is 0%, it means that it is perfectly symmetrical (7).

$$\text{Asym\%} = \frac{max-min}{max} * 100 \quad (1)$$

$$\theta_{sy} = \frac{(45^0 - \arctan(\frac{Xleft}{Xright}))}{90^0} * 100\%$$

θ_sym:symmetry angle, Xleft:left side isokinetic strength value, Xright:right side isokinetic strength value

Statistical Analysis

The sample size was calculated by using a statistical power analysis software (Gpower 3.1.9.2, Brunsbuttel, Germany). Assuming the effect size = 0.3 (medium), P = 0.05, power (1-β) = 0.7, the minimum sample size, according to the apriori power analysis result, was 47 participants (30). Descriptive statistics were given as average, standard deviation. The Shapiro-Wilk test (p>0.05) showed that all the data were normally distributed and it was observed that there was no extreme value. Pearson Correlation Coefficient Analysis was used to determine the relationship between isokinetic knee flexion and extension strength asymmetry values at slow and fast angular velocities and the average values of SJ, CMJ and 40m sprint performance. The alpha value for the statistical significance was set at 0.05. All statistical analyses were calculated by using SPSS v20 computer software (IBM SPSS Inc., IL, USA). In order to determine the correlation level, r = 0-0.3 was set to be weak, r = 0.3-0.6 to be medium, r = 0.6-0.9 to be strong, 0.9-1 to be very strong and 1 was set to be full correlation (19).

RESULTS

The performance values of 40 meters sprint, squat and countermovement jump and the values (Table 1) and flexion-extension knee isokinetic strength and inter-limb contralateral strength symmetry angle are shown in Table 2.

Table 1. SJ, CMJ, 40m sprint average and standard deviation values

Performance Parameters	Mean	Standard Deviation
Countermovement jump height (cm)	35.3	7.1
Squat jump height (cm)	31.8	6.1
40m sprint time (s)	5.80	0.57

Table 2. Isokinetic knee strength, symmetry angle and asymmetry index values

Isokinetic Parameters		60°.s-1 Angular Velocity			300°.s-1 Angular Velocity		
		Torque value (Nm)	Symmetry angle (θ_{sym})	Asymmetry index (%)	Torque value (Nm)	Symmetry angle (θ_{sym})	Asymmetry index (%)
Flexion	Right	131.5±34.1	1.26±3.44	8.7±5.9	85.6±20.9	0.26±3.13	7.3±5.4
	Left	126.1±31.5			84.7±19.5		
Extension	Right	178.7±47.5	0.56±3.32	7.3±6.4	94.0±25.1	1.11±2.72	7.5±4.5
	Left	175.3±45.6			90.8±24.8		

ort±ss, Nm: Newtonmeter, θ_{sym}: Symmetry angle (Zifchock et al., 2008), %: Asymmetry angle (Impellizzeri et al., 2007)

Table 3, shows the relationship between the inter-limb strength symmetry angle values and jump and sprint performances. There was no statistically significant relationship (p> 0.05) between the contralateral strength symmetry angle values and squat jump, countermovement jump and 40 meters sprint performances (Table 3).

Table 3. The relationship between contralateral inter-limb strength symmetry angles and SJ, CMJ and 40m sprint performance (Pearson's correlation test).

Symmetry Angles Values		SJ		CMJ		40m sprint	
		r	*p*	*R*	*p*	*r*	*p*
Extension symmetry	60°.s-1	-0.106	0.473	-0.116	0.434	0.016	0.916
Flexion symmetry	60°.s-1	0.024	0.870	0.010	0.948	0.012	0.938
Extension symmetry	300°.s-1	0.200	0.892	0.087	0.557	0.810	0.583
Flexion symmetry	300°.s-1	0.050	0.737	0.062	0.678	0.090	0.542

SJ: Squat jump, CMJ: Countermovement jump

DISCUSSION

The aim of this study was to investigate the relationship between inter-limb flexion and extension isokinetic knee strength asymmetry at low and high angular velocities and sprint and jump in physically active and healthy individuals. The main findings of this study are that there is no significant relationship between inter-limb strength asymmetry and SJ, CMJ and 40m sprint performances. There are different research results in the literature about the relationship between asymmetry and jump and sprint performance. While there are studies indicating that there is a negative correlation between *Quadriceps* and *Hamstring* strength asymmetry and SJ and CMJ performances (13), there are also studies indicating that contralateral knee extensor asymmetry has no effect on jumping in volleyball players (35).

The SJ and CMJ findings of this study show parallelism with Yoshioka et al.'s (39) and Bell et al.'s (5) results revealing that 10% bilateral strength asymmetry does not affect jump performance. In addition, it also have parallels with Maloney et al.'s (25) study whose results have indicated that there is no correlation between the asymmetry determined particularly by the movement of depth jump measured unilaterally and jump height and reactive strength index. According to these results, although the strength outputs between the right and left extremities do not differ, it can be said that there is no difference in jump performance in relation to the symmetrical extremities and the stronger extremity can compensate the strength loss of the weak side. According to the results of this study, the fact that the strength asymmetry in the range of 7.3-8.7% (Table 1), based on the index calculation of Impellizzeri et al. (20), does not affect the SJ and CMJ performance negatively or positively might have derived from this.

There are also studies indicating that there is a negative correlation between strength asymmetry and jump performance (2). According to the results of this study, it can be said that there is no positive or negative correlation between right and left *quadriceps* and *hamstring* isokinetic strength asymmetry at low and high angular velocities and bilateral closed kinetic chain activities involving stretch and shortening cycle like jump and performances involving cyclic activity like sprint. In addition, it can also be said that although inter-limb strength differences were observed, functional athletic performance was not positively or negatively affected by this. The result of the studies of Bailey et al. (2) and Bazyler et al. (3), stating that asymmetry has a negative effect on unloaded jumps and jumps loaded with 20 kg, might derive from the fact that the heights and weights of the participants of these studies were relatively above the average. Accordingly, it can be considered that the physical and anthropometric properties of athletes may further enhance the effects of asymmetry on athletic performance. Future studies might be aimed to investigate the degree of impact of physical properties on the effect of asymmetry on performance.

According to the results of this study, it was observed that there was no statistical relationship between concentric flexion and extension knee strength asymmetry at high and low angular velocities and 40m sprint time. Lockie et al. (24) stated that in individuals playing team sports with strength training, there was a negative correlation between concentric isokinetic knee strength asymmetry at 180 and 240°.s^{-1} angular velocities and 40m sprint time. Sannicandro et al. (33) stated that in elite football players, ILSSA, measured functionally, affected 10m sprint time but did not have effect on 20m sprint time. In addition, Coratella et al. (13) reported that in elite young football players, there was a positive correlation between inter-limb hamstring isokinetic strength asymmetry at high angular velocities (300°.s^{-1}) and 10 and 30m sprint. Meyers et al. (27) stated that there was no relationship between asymmetry and maximal sprint in 11-16 years old males. Considering the results of this study, there are very different results in the literature about the relationship between asymmetry and sprint.

According to the obtained results, it is observed that in healthy individuals, approximately 7-8% inter-lower extremities strength difference has no negative effect on jump and sprint performance. However, the diversity in the results of the studies is insufficient to create a consensus about the effects of asymmetry. For this reason, if the coaches and sports experts, aiming to decrease asymmetry, carry out asymmetry evaluations specific to sports branch, training level and physical characteristics of the individuals and movement in their studies related to

asymmetry, they will get more accurate results. The fact that this study's being limited to concentric isokinetic strength asymmetry might have an effect on the results should be taken into account. In addition, in future studies, contralateral and ipsilateral extremity asymmetry can be evaluated as well as that how asymmetry is affected by individual anthropometric or physical properties can be researched. In addition to the lower body asymmetry, there is a need for more studies on asymmetry between upper extremities. The investigation of possible adaptive changes in strength asymmetry, balance asymmetry or other different asymmetry evaluations as a result of different training methods will provide useful information for a more accurate understanding of the effects of asymmetry on athletic performance.

CONCLUSIONS

People have a tendency to use one side of the body during physical activities (18). This is seen in the form of a hand or foot on a particular side during a physical activity (11). It is accepted that this preference tendency is caused by the dominance of a hemisphere called cerebral dominance over the other hemisphere (1). This means that a hemisphere is more responsible than the other in a particular function. This is usually associated with mechanical asymmetry, which is defined as a kinetic/kinematic difference between the left and right sides of the lower extremity (18). It can be thought that dominance in some athletic performances may affect asymmetry with the laterality, task- and/or sport-specific effects and cerebral dominance. According to the results of this study, it can be seen that athletic performances such as jumping and sprinting didn't affected by the strength asymmetry. In the light of these results, it is thought that it will give an idea to coaches and sports experts in determining the specific nature of the sport or the specific training programs specific to the sport. Besides that, the results suggest that the lower limbs may be able to tolerate jumping and sprinting performances in return to sport after injuries.

As a conclusion, according to the results of this study, there is no negative or positive relationship between inter-lower limb concentric isokinetic knee strength symmetry angle at high and low angular velocities and jump and sprint performances in physically active but not highly trained healthy individuals.

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Evaluate Professional and Amateur Athletes' Social Insurances with Legal Aspects in Turkey.

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Abstract

With this study, we aimed to evaluate professional and amateur athletes' social insurances with legal aspects in Turkey.In this study -which was prepared by making use of descriptive analysis- related laws, regulations and literature were reviewed and the recent situation was demonstrated by researching the obtained resources. It's understood that professional and amateur Athletes' contracts are a sort of service contracts, but neither group is subject to Labor Law No. 4857, therefore they cannot demand severance pay, notice pay or annual leave; and that general and special provisions of Law on Debts No. 6098 were implemented for the athletes who signed a contract with a club; and it is also understood that state athletes, jockeys and foreign athletes were subject to the Law On Social Insurance and General Health Insurance No.5510; and that, amateur athletes who have a contract with a club were evaluated in the scope of private health insurance, despite that, amateur athletes without contract to any club aren't subject to social insurance provisions.

Key words: Athletes, Social Security.

INTRODUCTION

Social security as defined in the universal declaration of human rights; "Measures to compensate and compensate for the damages of the hazards that occur outside the wishes and wills of individuals, which in turn lead to losses in their assets, revenues and / or working power, and to make the lives of their dependents more difficult or impossible" (9). In other words, social security is to ensure the safety of all individuals against the loss of income and the increase in expenses caused by certain social risks (19).

The purpose of social security is to protect the person against the risks that are subject to social security. In other words, it is to protect the individuals against the economic consequences of social risks such as illness, accident, old age, disability, death, unemployment and child rearing which may come from inside or outside of working life (14). A number of tools are used when performing protection tasks. These tools can be listed as social insurance, social services and social assistance. Social insurance is the most advanced and widespread of social security techniques. A certain number of social risks that employees may be exposed to in a country is an insurance technique to be met by an autonomous, self-governed institution established and organized by the state with the participation of workers and employers (18). Social services, which is another social security tool, are the services aimed at creating an environment in which individuals can survive in accordance with the general conditions of the country they live in, and to help the solution of their social and economic problems (27). In the face of the extraordinary and unplanned social events and social risks that sometimes arise, no matter how advanced the social insurance system of a state is today, an insurance system cannot fulfill the basic goals of social security in a way that encompasses everyone. Social aids at this point are often help from the state budget for those who are born poorly for reasons not in their own hands or who are subsequently deprived of poverty and therefore need help in the absolute sense or who are partly in need of help because they do not have sufficient income (3).

Sport is one of the most widespread and effective social institutions of modern societies (35). Sports in the world and in our country every year, developing rapidly compared to the previous year, and professional and amateur sports every year by

increasing the number of people who work rapidly increasing. Nowadays, sports are becoming more and more popular and become an interest of individuals working in many fields (2). It is important to note that it is essential to ensure the continuity of sports, which is a social institution, and the athletes performing the performance of this institution in a healthy and orderly manner with legal arrangements. This study of professional and amateur athletes in Turkey has tried to present the current social security situation.

METHOD

In this study, which is designed according to qualitative research model, document (document) examination model is used. Document review; the examination of documents in qualitative research, archive records, and the collection and analysis of the data of the research subject of various materials (11). In this study, relevant laws, regulations and related literature have been searched and the current situation has been examined.

Social security in sports for legal size

Republic of Turkey in the 59th article of the Constitution: "The State shall take measures to develop the physical and mental health of Turkish citizens of all ages, sport encourages the spread of the masses", while in the 60th article, "everyone has the right to social security. The State shall take the necessary measures to establish this security and establish its organization (30).The relevant provisions of the Constitution of the Republic of Turkey on the general framework is thought to be considering legal requirements of athletes take part in the social security system in the Republic of Turkey.

Sport And Sports Concepts

Sports, personal or collective games can be defined as all of the body movements performed according to a set of rules that usually lead to competition and competition. According to this, sportsmanwho is engaged in sports, actively involved, competing, match maker (13).

Professional Athletes

Professionalism means that the athlete is engaged in a certain organization in order to gain a material profit. Professional athletes make sports as a profession to make a living and to survive (15). In order for a sports branch to become professional in the Turkish sports sector, according to Article 24 of the Law on Youth and Sport Services No. 3289, the determination of this professional sports branch by the Ministry of Youth and Sport and the establishment of this professional sports branch, (4/35). In Article 18 of Law No. 3289 entitled Formation of federations and determination of professional branches mad, one or more sports branches are connected to one federation, both technically and administratively. The number of amateur federations and professional branches are determined by the Ministry of Youth and Sports. Amateur and professional football activities carried out by two separate boards connected to the Turkey Football Federation ", is situated phrases; Furthermore, it is stipulated that the provisions of Law no. 3289 on professional football shall not be applied (32/35).

Today, as in some European countries, Turkey too is seen only when it is recognized athletes in the framework of the legal regulations of professional identity in the football industry. Indeed, Turkey Football Federation, 16.05.2009 date and published in 27230 Official Gazette No. 5894 dated Turkey Football Federation establishment and status of professional footballers as interests in accordance with the law on duties and transfer authorization, professionalism in football and has determined amateurism requirements and guidelines. Accordingly, in the third article of the instruction entitled"professional footballers fied, the professional football player is defined as" a footballer who has signed a club with a contract and who is paid a greater amount than the expenses he incurred in football activities, If the amateur football player in Article 4 of the instruction is defined all footballers who are excluded from the definition mentioned in article three are considered as amateur footballers (32).When the related laws, regulations, instructions and communiqués are examined, all sports except football are legally regarded as amateur. It should be noted that all sports except football are authorized to regulate the Ministry of Youth and Sports (2,15,20,31).

Social Security of Professional Athletes

Clubs, professional athletes and pay the price of doing business. Therefore, legal relationships of professional athletes with employers are based on a service contract (26). However, professional athletes are not subject to labor law no. 4857 and therefore cannot demand severance pay, notice of compensation and annual leave in accordance with

the provisions of the labor law. In accordance with Article 393 of the Code of Obligations, athletes working in a certain club under contract with the special provisions governing the service contract and the general provisions are applied legislation (18,2).

In this context, professional athletes are insured within the scope of the service contract within the scope of Social Security and General Health Insurance Law no. 5510 (24). Profits of professional athletes based on premiums, social securityand according to Article 80 of the Universal Health Insurance Law. Professional sports clubs are obliged to notify the Social Security institution of their athletes (21).

Amateur Athletes

The concept of amateurism, which is derived from the word land "amare" mas which means. Love ı in Latin, means that the athlete likes to do sports because he likes and likes. To be able to talk about amateurism in this sense, the athletes should not have chosen the sport as a profession and the sport should not be made in order to generate continuous income (15).

Social Security of Amateur Athletes

Athletes contracts signed between athletes and clubs are contracts that pay debt to both parties. Under this contract; athletes, their own branch in the name of the club to compete or to compete, in matches or competitions are required to show the maximum performance, the club against this service to pay the athlete's wages in time, if there are other acts under the contract to fulfill them, the athlete is obliged to give the premium stipulated in the contract with the athlete. The amateur athletes are excluded from the scope of the Labor Law in accordance with the paragraph (g) of Article four of the Labor Law No. 4857, as professional athletes (12). Amateur athletes work on the basis of the service contract because of the provisions of the Law No. 5510 4 / a paragraph of the provisions of insurance (2,21,24).

However, amateur athletes have made various arrangements. These regulations are as follows:In accordance with the provisions of the General Health Insurance, which was put into force by the Implementation Law no. 5510 in 2013, various additions were made. Athletes older than 18 years of age can be covered by the health insurance by the first, second and third teams in the Olympic Games, at the World or in the European Championships as a team in individual or team sports (24,26).

On 10.04.2013, the Ministry of Health and the Ministry of Youth and Sports, independent federations affiliated to the Ministry of Youth and Sports and TFF, and amateur athletes who could not benefit from the health assistance of any social security institution were signed a protocol on the provision of health services from the health institutions affiliated to the Ministry of Health (19,21,26,36). Athletes who are licensed and who do not have any health insurance can benefit from this protocol.

In some sports (basketball, handball, volleyball, etc.) private health insurance system is used. The weak point is the assurance of amateur athletes who have no more contracts. Article 393 of the Turkish Code of Obligations dated 11/1/2011 and Article 6098 of the Turkish Code of Obligations provides for the provision of spor service contracts spor to the amateur athletes working in a certain club, the special provisions governing the service contract and the general provisions of the law on the related sports branch. On the other hand, it is necessary to state that amateur athletes engaged in sports without any fee from their clubs are not subject to the social insurance law no 5510 (2,16).

Social Security Provisions in Amateur Sports Federations

There are a total of 63 amateur sports federations in Turkey. Federations are established in accordance with the relevant articles of the Law on Youth and Sports Services No. 3289. An important part of the federations in our country is an independent sport federation. Implementing Regulation on Working Procedures and Principles of Independent Sport Federations dated 9 July 2012.It was put into effect after being published in the Official Gazette No. 28358. Taking the necessary measures on issues related to the health of the athletes gere in the scope of Article 6, title,duties and Authorities of the Federation gere, is included in the related regulation (5,23). The sports federations, except the football federation, are preparing the regulations in accordance with this regulation. The social security provisions that can be reached in amateur sports federations are shown in the table below within the framework of the relevant legislation.

Table 1. Social Security Provisions in Amateur Sports Federations

Basketball	**Turkey Basketball Federation of Association Board of Directors' Duties Article12:** Basketball, manager, coach, technical staff, referee, technical commissioner, basketball player, masseur and similar elements to make the necessary arrangements for education, to take all kinds of measures to develop these elements, to provide social security rights to make regulations, to prepare and implement the status and instructions (29).	**Turkey Basketball Federation Basketball Contractual Licensing, Registration and Transfer Instructions Obligations of Clubs Article 26**: To register the social security institution after signing the contract and to keep the basketball player's contract until the expiry date and to pay the premiums. 1)The club will be notified to the SGK to notified. 2)Negligence seen club managers SSI notified (6).
Handball	**Turkey Handball Federation's Duties and Powers Article 6:** To take necessary precautions in the subjects related to health of athletes (36).	**Sportsman Registration License and Transfer Instruction Article 6:** Document indicating that the athlete was insured from official and private health institutions (36).
Volleyball	**Turkey Volleyball Federation Volleyball Athlete Registration, License and Transfer Instructions Article 7:** If the contract is signed between the club and the athlete, it is the club's responsibility to insure and follow the athlete in accordance with the provisions of the SSI legislation. The notarized signature circular of the athlete is handed over to the federation licensing office with the contract (33).	

63 amateur sports federation, the relevant regulations and instructions can be accessed by reviewing social security provisions were examined. As a result of the research conducted in the main status of the amateur sports federations in the main status of the following text has been shown: are in the area of duty within the scope of the Federation, manager, manager, coach, trainer, instructor, masseur, technical staff, referee and similar elements to train, to take all kinds of measures for development, to coordinate with relevant clubs and / or units on social security rights, to determine the procedures and principles related to their club exchanges and activities.

As it is seen, it is obvious that the concept of athletes in this text is not sufficiently given to the social security phrase of the athletes and it can be said that basketball, handball and volleyball federations are more sensitive to social security. However, the need to take a long way about the social security of amateur athletes has emerged once again.

As mentioned above, amateur athletes engaged in sports in any club with the service contract are evaluated within the scope of private compulsory health insurance. Private health insurance system is used in multi-league branches such as basketball, handball and volleyball. It should also be noted that amateur athletes engaged in sports without paying any fee to their clubs are not subject to the social insurance system and that the regulations on the social security of amateur athletes have not been adequately covered in the regulations introduced by the federations. Social security does not merely represent a guarantee against health risks (injury, disability, etc.), but against inevitable situations such as old age and death. The more important sporting success for the athlete, the more robust a pension is in old age.

Social Security Practices for Athletes Presenting

Differences

Jockeys, national athletes, state athletes (sportsman's honor) and foreign athletes are able to evaluate in this category.

Jockeys

The jockey and coaches subject to the Law on Horse Races dated 10.07.1953 and numbered 6132 have the phrase law Provisions for those who are insured under Article 4/1 B of the Law No. 5510 10 (25,26).

National Athletes

Article 23 of the Law on Youth and Sport Services regulates the insurance of national athletes. The athletes selected for the national teams and the technical staff of these teams, from the beginning of the camp work to the residence of the students after the competition, and the other officials in the national team list from the dates of the competition to the date of arrival to the residence, It is insured against the special insurance system. The principles and procedures of insurance are regulated by regulation (10,35).

In order to determine the principles and procedures of these insurance transactions prescribed by the Law, the Regulation on the Insurances of National Team Members was published by the General Directorate of Youth and Sports published in the Official Gazette dated 13.8.1991 and numbered 20959. This regulation covers the national athletes who form the civil and military teams other than professional football activities, the manager, the technical staff and all other personnel assigned to these teams. These persons are required to be insured by private insurance companies and insurance premiums are covered by the General Directorate. The

amount of insurance costs is determined by an instruction issued by the general Directorate of Youth and sports each year (17,18).

State Athletes (athlete's honor)

With the Law No. 5774 on providing the Name of the State Athlete with the Monthly Attachment to the Successful Athletes, the name of the pension granted to the successful athletes is defined as the Athlete's Honor pension. According to the 2nd article of Law No. 5774, acceptance In the category of adults who have been accepted by the International Olympic Committee (IOC) as an Olympic, Paralympic and defective sport in the period of competitions; In the Olympic Games, at the World or European Championships, the first, second and third amateur athletes in the team or in individual teams and their spouses and children in the event of their death, and the national team coach and coaches of the amateur athletes who are Olympic or world champions in teams (7). The amateur athletes who are given the title of State athlete are bound by the decision of the Council of Ministers under the name of ın Sportsman's Honor Pension Turk with the decision of the Council of Ministers to be started from the date they are 40 years old and they maintain their Turkish citizenship. Again, the athletes who died while receiving an honorary pension, their spouses and their children are given this monthly by adhering to the social security laws (23).

Foreign Athletes

It was possible for foreigners to work in our country within the framework of article 5 and 6 of the Law No 4817 on Work Permits of Foreigners (12); However, with the International Labor Law No. 6735 published in the Official Gazette dated 13/8/2016 and numbered 29800, work permit for foreign players, foreign coaches and other athletes is obligatory (34). This law covers not only football clubs, but also all sports clubs.With the exception of those who are in the national social security agreement based on reciprocity, the employees who are contracted with the service contract from foreign nationals have been accepted as insured under Law 4 / a and c (24).

CONCLUSION AND RECOMMENDATIONS

Social security; It can be said that it protects people from diseases, accidents, dangers throughout their lives and includes the periods when their work abilities are reduced or disappeared.Athletes, One of the sides of the sports world, are divided into two parts as amateur and professional. Considering factors such as labor, time and experience spent on sports, only the distinction between amateur and professional athletes is contrary to the system of social security (2).

Both professional and amateur athletes are excluded from the scope of labor law in accordance with Article 4 / g of Labor Law No. 4857. For this reason, it is not possible to consider the athletic contracts as a labor contract. The relationship between the athlete and his club is the, Service Contract and, which is regulated in Article 393 of the Turkish Code of Obligations No. 6098 dated 11/1/2011. The provisions of the Turkish Code of Obligations related to the service contract and the related sports branch are applied to this relationship (16). Professional athletes have social security rights even if they are not covered by the Labor Law. Professional athletes under the Article 4 / a of Law No. 5510 employer those employed by one or more employers by the service contract dais are counted as 4 / a insured (21) For amateur athletes other than professional athletes, the provisions of 4 / a of the Law No.5510 are not applicable (1/24).

Amateur athletes engaged in sports in any club with the Service Agreement are considered within the scope of private compulsory health insurance. Private health insurance system is used in multi-league branches such as basketball, handball and volleyball. On the other hand, it is important to note that the amateur athletes engaged in sports without paying any fee to their clubs are not subject to the social insurance system and that the regulations on the social security of amateur athletes are not sufficiently included in the regulations introduced by the federations. Athletes with varying conditions such as jockeys and foreign athletes are subject to insurance provisions under Article 4 / a and c of Law No. 5510. The amateur athletes who are given the title of State athlete are bound by the decision of the Council of Ministers under the name of ın Sportsman's Honor Pension Turk with the decision of the Council of Ministers to be started from the date they are 40 years old and they maintain their Turkish citizenship. Again, the athletes who died while receiving an honorary pension, their spouses and their children are given this monthly by adhering to the social security laws (23).

In almost all of the studies conducted on the social security of athletes from the past to the present, there are many suggestions regarding this situation by emphasizing that the missing point is the social security of the athletes. However, as of today, it is not possible to say that there is a

complete solution to this issue. In the determination of the social security of the employees of the sports field, it is necessary to look at the Labor Law, the Code of Obligations, the Social Security Law and the instructions issued in the field, in particular in relation to the professional sports field. In other words, it is not possible to talk about a totality (2/15/20).In the light of all this, taking into account the needs in practice, regardless of whether a sport branch is legally recognized as a professional or not,Professionalism-amateur distinction is not suitable for sports, but for athletes. Professional sports gün and ortaya professional sportsman ası concepts need to be separated from each other (15). Again, the legal arrangements to be made on the basis of this distinction and the legal status of both amateur and professional athletes in terms of social security needs to be stabilized and secured.

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Effects of Melatonin on Some Antioxidant Enzymes in Streptozotocin-induced Diabetic Rats

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Abstract

In this study, it was aimed to determine the effects of melatonin application in experimentally induced diabetes. For this purpose, thirty two adult male Wistar Albino rats were used. Animals in control group were not any treatment. Melatonin group animals received 50 mg/kg melatonin intraperitoneally in daily for eight weeks. Diabetes was induced by subcutaneous injections of streptozotocin at dose of 40 mg/kg for two days as a single dose per day in diabetes group animals. Animals in Diabetes+Melatonin group were made diabetic by streptozotocin in the same way and then these animals received 50 mg/kg melatonin intraperitoneally in daily for eight weeks. In blood samples taken from all animals, insulin, glucose, HbA1c, MDA, GSH, SOD were determined. The insulin level in diabetes group was lower than control group, while blood glucose level was higher ($p<0.05$). Melatonin treatment to diabetic animals resulted in significantly differences in these parameters compared to diabetes group ($p<0.05$). HbA1c in diabetes group was higher than control group ($p<0.05$). Melatonin application to diabetic animals significantly decreased HbA1c compared to diabetes group ($p<0.05$). In diabetes group, GSH and SOD levels were found to be lower than control group, whereas MDA level were high ($p<0.05$). The changes in GSH and SOD levels with melatonin application to diabetic animals were not important compared to diabetes group, while MDA level was significantly reduced ($p<0.05$). As a result, we concluded that the melatonin treatment to experimentally induced diabetic rats obviously improved the some negative changes in metabolic parameters resulting from diabetes.

Key words: Diabetes, melatonin, antioxidant, HbA1c, rats.

INTRODUCTION

Today, Diabetes is a disease characterized by hyperglycemia resulting from insulin resistance or insulin insufficiency. Various disorders develop in carbohydrate, fat and protein metabolism as a result of hyperglycemia in diabetes (30, 33). The prevalence of this disease, which can be seen at all ages, continues to grow and to become a major health problem worldwide (33). Although the etiology of the disease has not been fully established, autoimmunity, nutritional disorders, obesity, genetic predisposition, viral infection and environmental factors are shown as the cause of diabetes (19, 25, 37, 50, 53). There are many complications affecting vascular system, kidney, retina, lens, peripheral nerves and skin in diabetes (30). The increased oxidative stress is one of the most effective factors in the development and progression of diabetes complications (5, 6, 10). Disorders in diabetes are usually accompanied by increased production of free radicals (5, 6, 12, 62) or deteriorated antioxidant defense systems (18, 32, 52). The mechanisms of increased oxidative stress associated with complications of diabetes are partially known. These mechanisms are the activation of transcription factors, advanced glycated end products (AGE) and protein kinase C (PKC) activation caused by hyperglycemia (30).

In addition to the reduction of plasma/serum total antioxidant capacity and free radical scavenging activity in diabetes, it is also reported that levels of specific antioxidants such as ascorbic acid and vitamin E have been reduced (1, 4, 11, 31). Antioxidant enzyme activities (catalase, superoxide dismutase and glutathione peroxidase) have been reported to decrease in diabetes (4, 34, 57). It has been suggested that there are decreased of vascular antioxidant defense and also deficiency endothelial NO synthesis in patients with type 2 diabetes (23, 28). It has been determined significant reductions in tissue antioxidant enzyme activities [superoxide dismutase (SOD) and catalase (CAT)] in streptozotocin-induced diabetic rats (20). It is suggested that individuals with high levels of serum

antioxidant capacity (especially those with high levels of tocopherol) have lower development risk of type 2 diabetes (47). There are also studies reporting that there is no significant difference between diabetics and healthy controls in terms of antioxidant status (16, 42, 58).

In addition to insulin and other medical applications to prevent diabetes and its complications, alternative strategies should be developed in order to increase the life expectancy and quality of patients (30). Melatonin (N-acetyl-5-methoxy-tryptamine), the main secretory product of the pineal gland, has important roles in the regulation of reproduction and retinal functions in both circadian rhythm and seasonal rhythm in mammals (7, 9). Melatonin has been noted to show antioxidant activity in cell membrane, mitochondria and nuclei in the study conducted as in vivo and in vitro (45). It has been stated that melatonin and its metabolites exhibit redox properties in the presence of electron rich molecules that act as electron donors (3, 56). Assessments of the effects of melatonin on glucose metabolism in diabetes have recently aroused great interest (13). It has been reported that long-term administration of melatonin to diabetic rats reduces hyperinsulinemia and hyperlipidemia and improves the rate of changing polyunsaturated fatty acids in serum and tissues (36). It has been claimed that melatonin affects diabetes and diabetes-related metabolic disorders by protection against reactive oxygen species and regulating insulin secretion, as pancreatic β-cells have low antioxidant capacity and are therefore susceptible to oxidative stress (15). It was reported that the melatonin directly affected insulin secretion by its receptors (MT1 and MT2) found in pancreatic islet cells (15, 21, 40, 41).

This study was planned to determine the effects of melatonin on antioxidant enzymes in streptozotocin-induced diabetic rats.

MATERIAL AND METHOD

Thirty two adult male Wistar Albino rats were used in the study. Properly living conditions (heat, humidity and light) for rats were provided during the study period. The animals were divided into four groups. Animals in all groups were fed ad libitum with standard rat feed for 8 weeks. The Ethical Committee of Selcuk University Experimental Medicine Research and Application Center approved the study protocol (Report no. 2017-15).

Group I (K) (n=6): No application was made.

Group II (M) (n=6): 50 mg/kg melatonin (Sigma-Aldrich, St. Louis, MO, USA) was intraperitoneally administered daily for 8 weeks.

Group III (D) (n=9): Diabetes was induced by administering 40 mg/kg streptozotocin (Sigma-Aldrich, St. Louis, MO, USA) in a single dose subcutaneous in 0.1 M citrate buffer (pH 4.5) for the first two days of the study.

Group IV (DM) (n=10): Diabetes was induced by administering 40 mg/kg streptozotocin (Sigma-Aldrich, St. Louis, MO, USA) in a single dose subcutaneous in 0.1 M citrate buffer (pH 4.5) for the first two days of the study and then rats with diabetes were given 50 mg/kg melatonin intraperitoneally every day for 8 weeks.

Diabetic rats were given orally 5% dextrose solution 6 hours after streptozotocin application to prevent hypoglycemia for 3 days. One week after streptozotocin injection, diabetes formation (group D and DM) was checked by measuring plasma glucose levels with glycometer (PlusMED Accuro, Taiwan). Rats which have 250 mg/dl or high blood glucose levels were included in the diabetic groups. One animal from the diabetes group died due to hypoglycemia during the study. At the end of 8th weeks, blood samples was collected from animals in all groups. MDA, GSH and SOD level were determined with ELISA (Biotek ELx800, Biotek Instrumentations, Inc, Winooski, VT, USA) using sandwich enzyme-linked immunosorbent method via commercial kits (Elabscience), while Insülin, Glikoz and HbA1c levels were determined the Abbott C8200 autoanalyzer using Abbott kits.

The data obtained from the study were analyzed by one-way ANOVA (SPSS 19). Differences among the groups were determined by Duncan's multiple range test. Differences were considered significant at $p<0.05$.

CONCLUSION AND EVALUATION

Result

In the study, the changes in insulin, glucose and HbA1c levels with melatonin treatments to diabetic rats were presented in Table 1 and its effects on oxidative status markers are given in Table 2.

In the study, insulin level significantly decreased and blood glucose level significantly increased in the diabetes group compared to the control group (Table 1, $p<0.05$). The application of

melatonin to diabetic rats caused significant changes in these parameters compared to diabetes group (Table 1, $p<0.05$). In the study, HbA1c levels in diabetic rats significantly increased compared to the control group (Table 1, $p<0.05$), while HbA1c level was significantly decreased with melatonin application to diabetic rats compared to the control group (Table 1, $p<0.05$). GSH and SOD levels were significantly lower in experimental diabetic rats compared to the control group (Table 2, $p<0.05$). MDA, a lipid peroxidation product, increased significantly compared to the control group (Table 2, $p<0.05$). The melatonin application to diabetic rats significantly decreased MDA level compared to diabetes group (Table 2, $p<0.05$).

Discussion

Diabetes is a chronic metabolic disease characterized by hyperglycemia or insufficiency of insulin secretion (6, 48). This disease brings with it multifunctional insufficiencies including many tissue and organ disorders due to long-term hyperglycemia (6, 22, 29, 48, 60). Antioxidant applications against diabetes complications are considered as an option in preventing various tissue damage and metabolic disorders (8). Melatonin, which is mainly produced in the pineal gland and released from many tissues including the gastrointestinal system, is an interesting hormone in recent studies due to its antioxidant effects (49, 59). Melatonin regulating circadian and seasonal rhythm manages reproduction and retinal function in mammals through its many membrane receptors (7, 9). Further, melatonin and its metabolites show redox properties in the presence of electron-rich systems in the base of cell energy function (3, 54).

The blood glucose level exhibits circadian rhythm like melatonin. Evaluation of the relationships between glucose metabolism and melatonin has been considered important in respect of diabetes (13, 54). In the study, experimental diabetes led to decrement in insulin level and increment in blood glucose level compared to the control group in the diabetes group (Table 1, $p<0.05$). The application of melatonin to diabetic rats caused significant improvement in both parameters compared to diabetes group (Table 1, $p<0.05$). Melatonin possess membrane receptors called MT1 and MT2. It has been reported to regulate secretion of glucagon from α-cells and secretion of insulin from β-cells via these membrane receptors (21, 24, 39). Activation of MT1 and MT2 receptors has been reported to suppress cyclic adenosine monophosphate (cAMP) or cyclic guanosine monophosphate (cGMP) secondary messenger systems, which reduce insulin secretion and therefore lead to an increase in blood glucose level (27, 51, 55). Diabetes-induced hyperglycemia causes glycation of proteins (35, 38, 54). One of the most important results of protein glycation is the increase in the amount of HbA1c, which is called oxidized hemoglobin. In parallel with the above information, HbA1c level in diabetes group significantly increased compared to the control group (Table 1, $p<0.05$). With melatonin administration to diabetic rats, it has been shown statistically significant decrease in HbA1c level compared to the diabetes group (Table 1, $p<0.05$).

GSH and SOD levels in experimental diabetic rats were significantly lower than the control group's level (Table 2, $p<0.05$). MDA, a lipid peroxidation product, significantly increased compared to the control group (Table 2, $p<0.05$). The changes determined in MDA, GSH and SOD levels support the findings of increased oxidative stress in diabetes as expected (2, 22, 59). Although it was determined a little increase in the levels of GSH and SOD, there was no significantly changes in these enzymes levels with melatonin application to diabetic animals. The application of melatonin to diabetic animals showed a significant decrease in MDA level compared to diabetes group (Table 2, $p<0.05$). In the study, significant changes in MDA and HbA1c levels as a result of melatonin administration to diabetic animals support the results of various investigators in diabetic rats by melatonin application (2, 22, 26).

The positive effects of melatonin on total antioxidant capacity and various antioxidant enzymes are based on the strong scavenger of hydroxyl and peroxyl radicals and the regulation of the activities of antioxidant enzymes (43). The reducing effect of melatonin on lipid peroxidation has been attributed to the membrane protective effect by reducing free radicals (46, 61). The decrement in NO levels with its scavenging activity of melatonin is regarded as its another antioxidative property in diabetes (54). The effects of melatonin on insulin secretion might be explained with protection of β-cell integrity or prevention of damage, while its effect on glucose level is explained by increased insulin level and increased glucose transport to muscle. It is reported that melatonin activates the phosphoinositide-3-kinase pathway related to

glucose transport to muscles. This effect is considered to be a positive effect of melatonin on insulin-independent glucose homeostasis (17, 38). In the presence of melatonin in cell cultures, it is reported that SOD mRNA expression is increased, whereas the administration of melatonin to diabetic rats strongly increased GSH-Px and SOD enzyme activities (2, 14, 22, 44, 49). Although the positive effects of melatonin on enzymes such as GSH and SOD are based on strong free radical scavenging properties, the reason for the limited effects of melatonin on these enzymes in this study is due to the dose of melatonin administered in the study.

Conclusion

Based on the findings obtained in the study, it was concluded that melatonin administration significantly improved the impaired metabolic parameters on rats with streptozotocin induced experimental diabetes. Nevertheless, further studies are needed to be conducted with different dose and duration.

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Examination of the Resilience Levels of Women and Men Do Sport in Gyms

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Abstract

The aim of this study is to examine the resilience levels of women and men do sports in gyms. In line with this purpose, it was aimed to compare the resilience levels of men and women do sports in gyms by gender, age, educational status and occupational status variables. A total of 432 members, 229 women and 203 men, participated to the study voluntarily. The short resilience scale used in the study was developed by Smith et al. (2008) and adapted into Turkish by Doğan (2015). Variance and homogeneity of data were tested by using descriptive statistics in capturing of data. In the case of pairwise comparisons, independent sample t test, One-way Anova test in multiple comparisons and Tukey HSD test in determination of source of variance were used Cronbach's Alpha value for this study was set to 78. While there was no statistical significance observed in the resilience mean values of the members depending on the age, education and profession factors, it was found to be the average value of men members was statistically higher than women members (Table 1, $p<0.05$).

As a conclusion; the reason why men members have more positive resilience values compared to women members can be explained to be eventuated due to socio-cultural structure, social roles and statuses, and social understanding and privilege given to men.

Key words: Resilience, Women, Sports, Men

INTRODUCTION

Fraser et al. (17) describe resilience as "the ability to achieve positive and unexpected success under enduring conditions and adjustment to unusual conditions and situations".

In general, resilience is defined as "the adjustment capacity of the individual and sustain the development process against negative experiences"(3).

Resilience is being in harmony with the negative situations caused by the risk event and struggling to reach positive results (23).

Risk is defined as a key factor for the emergence of resilience. Individuals who are not exposed to any traumatic life experiences but who are successful in various fields of life are considered to be successful or competent individuals rather than resilient ones (29).

In the definition of resilience concept, three main points are defined in common. These are; a) risk and/or difficulty, b) positive adjustment, coping, competence and c) protective factors. In this case, resilience is defined as "a phenomenon associated with a healthy adjustment and resulting from the significant interaction of protective factors with existing risk factors that contribute to the adjustment process" Windle (44).

In this case, "high risk" environments or conditions addressed in resilience researches and have significant negative impacts on individuals and individuals who demonstrate a healthy adjustment under "high risk" conditions should be clearly defined. Risk refers to difficulty, distress or disaster (adversity) and is a statistical concept. In general, the risk is used to identify specific groups instead of individuals. Risk factors are defined as "effects that will increase the likelihood of emergence of a negative situation or cause a potential problem to persist" Kirby and Fraser (26).

Resilience is not a personality characteristic that protects the individual from the negative effects of the environment. The real reasons that lead the individual to success are protective factors such as individuals' having attitudes and skills to reduce the impact of environmental risk factors Beauvais and Qetting (7) psychosocial resources that are associated with competence Caffo and Belaise (9).

Psychologically resilient children and adolescents are considered as happier individuals Kumpfer (28), and their sense of humor and are at the highest level (33). In addition, resilient children and adolescents have been found to be healthier, have fewer childhood diseases, physically stronger, and having more regular sleep and eating patterns (28, 30).

In The gaining recognition of children or adolescents from their peers and being supported by their peers are also important environmental factors that influence resilience Werner and Smith (42), Criss et al. (11) and most of the adolescents who were known to have resilience were friends and confidants among their peers (34).

For this reason, the fact that the factors or conditions that affect psychological strength are formed within the family, school, environment and society as well as the individual's own personality or internal features constitute a sense that this concept can be discussed and understood from the ecological perspective (16, 19). Therefore, from perspective of an ecological approach, it may not be the right approach to assume that all the individual and environmental protective factors (or risk factors) mentioned are the reasons for the resilience of children or adolescents alone and directly (16).

The sport, which dates back to centuries, has become a significant part of social life since its emergence. As well as provides making use of leisure time, self-confidence,socializing and solidarity, the sport concept has gained a different meaning with researching and revealing its role in development of physical and mental health of individuals (2, 27).

Sports and physical activities as protective factors in the development of resilience were investigated and tried to be revealed in resilience studies as factors that have impacts on the development of resilience, and these factors were determined as “protective factors”. Benard (8) mentioned four factors related to resilience, social competence, problem solving skills, autonomy, purpose and future perception. Masten and Coastworth (32) emphasized the importance of self-regulation and self-control skills.

Whitehead et al. (43) stated that sports and physical activities can affect the physical self-esteem as in a positive manner as a protective factor in the development of resilience and can increase the motivation of the individual.

The aim of this study is to examine the resilience levels of women and men do sports in gyms.

MATERIAL AND METHOD

Research Model

The research was supported in a descriptive screening model. The screening model is a research approach that aims to describe a situation that exists in the past or the present as it is (25). One of the most important features of the surveys figured in the screening model is the high level of validity due to the collection of the data of this type of research from different sources, having detailed information on the subject researched and collecting the data from great number of individuals (24).

Research Group

The sample group of the study consisted of 432 volunteer members, 229 women and 203 men members subscribed in gyms in Konya province.

Data Collection Tools

The datawere obtained within scope of the study by using the “Personal Information Form” and “Resilience Scale”.

Personal Information Form

This form is designed to provide information about the gender, age, educational status and occupational status of the individuals who constitute the research group.

Short Resilience Scale (SRS)

SRS was developed in order to measure individuals' potentials of pulling themselves together and their resilience level. The scale was developed by Smith et al. (39) and adapted to Turkish by Doğan (12). This 5-point Likert-type scale consists of 6 items is a measurement tool in form of self-statement. It is planned as “not appropriate at all” (1), “not appropriate” (2), “slightly appropriate” (3), “appropriate” (4) and “completely appropriate” (5). The articles 2, 4 and 6 of these 6 items are coded in reverse but must be translated in the scoring key in the first place. The high scores obtained after this procedure show high levels of resilience and low scores show low levels of resilience. An exploratory factor analysis has been carried out in order to determine what kind of the structure of the

university students exhibit in Turkey. As a result of the analysis, a single factor structure was obtained which explained 54% of the total variance. These results prove that PSÖ-K is sufficiently valid (1).

Statistical Analysis

SPSS 25 package program was used to analyze the data. By using descriptive statistics of the obtained data, variance and homogeneity of data were tested. In the case of pairwise comparisons, independent sample t test, One-way anova test in multiple comparisons and Tukey HSD test in determination of source of variance were used Cronbach's Alpha value for this study was set to 78.

RESULTS

Table 1. Resilience changes by gender factor

Gender	N	x̄	Ss	Min	Maks	t	p
Women	229	18.76	4.23	6.00	30.00	-4.251	.000*
Men	203	20.33	3.33	12.00	29.00		
Total	432	19.50	3.91	6.00	30.00		

* Significant difference between groups (p<0.05).

When Table 1 is examined, it was found that the resilience mean values of men members (20.33 ± 3.33) were statistically higher than Women members (18.76 ± 4.23) (p<0.05).

Table 2. Resilience changes by age factor

Age	N	$\bar{x}$	Ss	Min	Maks	F	p
15-18 years old	25	19.96	3.46	13.00	26.00	.216	.885
19-22 years old	62	19.71	3.82	6.00	29.00		
23-26 years old	118	19.44	3.74	10.00	29.00		
27 and older	227	19.42	4.08	6.00	30.00		

As can be seen in Table 2, there was no statistically significant difference between the mean values of resilience changes depending on age factor.

Table 3. Resilience changes by education factor

Education:	N	$\bar{x}$	Ss	Min	Maks	F	p
Elementary-secondary school	28	19.00	3.23	11.00	28.00	1.631	.181
High school	115	18.91	3.85	6.00	27.00		
Undergraduate	241	19.72	4.03	6.00	30.00		
Postgraduate	48	20.08	3.65	13.00	27.00		

When Table 3 is examined, no statistical change in psychological resilience mean values was determined due to education factor.

Table 4. Resilience changes by occupation factor

Occupation	N	$\bar{x}$	Ss	Min	Maks	F	p
Unemployed	185	19.50	3.58	6.00	29.00	.530	.662
Government officer	92	19.89	4.32	10.00	30.00		
Private sector	117	19.21	3.79	6.00	27.00		
Self-employed	38	19.45	4.72	10.00	29.00		

As can be seen in Table 4, there was no statistically significant difference between the mean values of resilience changes depending on occupation factor.

DISCUSSION

The aim of this study is to examine the resilience levels of women and men do sports in gyms. In line with this purpose, it was aimed to compare the resilience levels of men and women do sports in gyms by gender, age, educational status and occupational status variables.

In this study, it was found that the resilience mean values of men members (20.33 ± 3.33) were statistically higher than women members (18.76 ± 4.23) (p<0.05). Aslan (4) reported that, according to

the research carried out on university students, resilience levels were statistically differentiated according to their gender and the resilience levels of the men participants was higher than the women participants ($p<0.05$). Similarly, Erdoğan (14), in his study carried out on university students, found that men students had high resilience levels compared to women students. In a similar study carried out by Bahadir (6), it was aimed to examine the resilience levels of the students studying in health-related faculties of universities (dentistry, pharmacy, health sciences faculties and medical faculties) according to some demographic variables. And it was reported that level of resilience of men students found to be higher when it is considered in respect of gender factor. In a study carried out by Sezgin (38) it was reported that the level of resilience in university students was high in favor of men students. These values are similar to our study.

However, the results related to the gender variable differ in the studies related to resilience.

In studies of Gündaş and Koçak (20) and Oktan (35) it was reported that women's resilience level was higher than men's resilience level. Oktan et al. (36) reported that the level of resilience was high in favor of women students in the study conducted on the faculty of education students. Gender seems to be is associated with resilience and it is stated that the resilience of girls is higher in children at risk (28). The results of this study differ from our study.

Aydoğdu (5), Gürgan (22), Özcan (37), Tösten (40) concluded that the resilience levels of men and women did not differ significantly. In the study conducted by Eryilmaz (15), it was reported that resilience levels of university students did not show a significant difference according to their gender.

In these years when university students are prepared for life and profession, they are expected to be individuals who are able to cope with their problems, have active participation, able to communicate positively, aware of the factors that protect internal and environmental psychological health and can use them for their purposes (22).

In this study, there was no statistically significant difference between the mean values of resilience changes depending on age factor ($p>0,05$). Aslan (4) reported in his study carried out on university students, reported that the level of resilience of the participants was not statistically different according to age groups ($p>0.05$). In the research carried out by Gündüz Algünerhan (21) it was reported that the age group variable does not have significant effect on the resilience. In the study conducted by Eryılmaz (15) on the university it was found that the age factor does not cause any change in resilience changes, and these values are similar to our research results.

Individuals with a high level of resilience can easily cope with the negative situations and events they encounter in their lives and can overcome these problems very easily (41).

In our study, no statistical change in psychological resilience mean values was determined due to education factor ($p>0,05$). Elif Selçuklu (13) reported that there was no difference between the resilience and education level of teachers in a study conducted on the resilience of pre-school teachers. These values are similar to our study.

In our study, there was no statistically significant difference between the mean values of resilience changes depending on profession factor ($p>0,05$).

Gilligan (18) stated that sport activities are very important as well as social and cultural activities in the development of resilience in young people.

Martinek and Hellison (31) stated that physical activities and sport is a very suitable tool for improving the resilience of young people and that they improve their social competence and autonomy and instill hope and optimism in them.

In addition to the direct effect of sport and physical activity on the development of resilience, there is also an important role in the development of the above-mentioned protective factors. It is stated that physical health plays an important role in terms of the individual's ability to cope with and overcome stressful experiences and that being unhealthy is an important risk factor (10).

Sports and physical activity serve as an important tool in the development of the resilience of the individual. Sports appeal to individuals of all ages. On the other hand, stress affects individuals of all ages and jeopardizes the harmony of the individual. In particular, it may be advisable to organize physical activity programs for individuals living under intense stress and to encourage them to participate in sports. The effect of the programs prepared in this way on the development of

resilience can be demonstrated by experimental studies.

Resilience development projects can be organized for children, young people and adults at risk, and the impact of participation in sports can be tested by directing them to sports branches appropriate for their abilities.

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Comparison of the Static Balance, Strength and Flexibility Characteristics of the University Students Who Taken Artistic Gymnastic Lesson

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Abstract

The aim of this study is to examine the effects of a training program specific to Artistic Gymnastics branch on the performance of university students. 72 university student studying in the School of Physical Education and Sports were participated in the study voluntarily as a control and experiment group. The experimental group was given artistic gymnastics training program for 12 weeks, 2 days a week and 60 minutes. For the data obtained, the homogeneity of the normality variance was tested and then the mixed ANOVA analysis was used to determine the difference in the pretest and posttest. When the flamingo balance values were examined, a significant difference was found between the groups ($F(1, 71)=4.93$, $\eta 2 =.07$, $p<.05$). A difference in post-test flexibility scores and pre-test scores ($F(1, 71)=7.81$,$\eta 2 =.10$, $p<.05$), a significant difference was found between the posttest scores and the pretest scores in strength values ($F(1.34, 95.46) =40.69$,$\eta 2= .36$, $p<.05$). As a result, it is thought that the extra training done in gymnastics lesson increases the success of the lesson and it is thought that this type of training will increase the success level in all applied lessons, not only for the gymnastics class.

Keywords: Gymnastics, balance, flexibility, strength, plank.

INTRODUCTION

The human body is in physical, physiological, biomotoric and psycho-mental forms with a great balance (homeostasis) and adaptation (8, 25, 28). Artistic Gymnastics (AC) requires a combination of flexibility, strength, speed, anaerobic endurance, coordination and anthropometric characteristics specific to the branch (3, 31). Artistic gymnastics has 6 different (parallel, ring, pull-up, handle horses, ground and jump table) tools for men and 4 (asymmetric parallel, balance, place and jump table) for a woman (3, 5, 14). Gymnastics is a sports branch with specific competition rules consisting of periodic and compulsory movements on instruments standardized (3,5).

According to Major (20), AC which is being in a complex sports branch requires a high level of biomotor properties. In order to perform AC techniques, a strong skeleton, nerve-muscle, force, connective tissue and appropriate flexibility should be provided (22). Each movement technique requires the coordination of different balance, strength and flexibility with each other (5). Even though it varies according to the instruments, it should be durable, suspended, jumping, rotating, and contains many movement groups (27). AC is taught to students in compulsory lessons in the departments of Physical Education and Sports in the departments of Physical Education and Sports, and in elective lessons in some universities (15). Students generally come from different sports branches but they are required to show and teach techniques specific to AC branch. The absence of any physical preparation of the students causes them to fail the techniques and cause them to be disabled (19).

When the literature is examined, there are not enough studies about the pre-qualification and lesson performance of the students taking AC lesson. The aim of this study is to investigate the effect of 12 weeks AC branch training program on AC lesson performance of university students.

MATERIAL AND METHOD

A total of 72 student volunteers participated in the study at the School of Physical Education and Sports. The participants were randomly divided into two groups: 36 (22 males and 14 females) and 36 (22 males and 14 females). The mean age of the experimental group was 20.49 ±.99 years, their height was 171± cm and their weight was 66.41± kg. The mean of control group age was 22.36±1.15 years, height was 172±8 cm and weight was 64.58±10.25 kg.

Training program

AC training program was applied to the experimental group for 2 weeks and 60 minutes for 12 weeks. 1-week adaptation training was applied prior to the start of the training for correcting their fails and mistakes.

Data collection tool

Exercises	1.set	2.set	3.set	4.set
Push up	30 sec	30 sec	30 sec	30 sec
Sit up	30 sec	30 sec	30 sec	30 sec
Squat	30 sec	30 sec	30 sec	30 sec
Right leg Squat	30 sec	30 sec	30 sec	30 sec
Left leg Squat	30 sec	30 sec	30 sec	30 sec

Flamingo Balance Test: The subjects stood on the beam which was 50 cm long, 5 cm height and 4 cm wide. While balancing on the preferred leg, the free leg was flexed at the knee and the foot of this leg held close to the buttocks. Then the instructor started the stopwatch and the subjects tried to stand in this position for one minute. The stopwatch was stopped each time the subjects lost the balance. It was started again until they lost the balance again. When the time was over, the subjects' attempts after they fell this score was recorded (29).

Sit and Reach test: Flexibility was measured using a sit-and-reach test, using a sit-and-reach box (height 32, length 35 cm.). The subjects sat with their heels firmly against the testing box. Subjects kept their knees extended and placed their right hand over the left, with the long fingers even, and reached forward as far as they could by sliding their hands along the measuring board. A tape measure on top of the measuring board indicated in centimeters how far beyond the toes each individual reached. The score (in centimeters) is the greatest distance contacted by the fingertips past the toes. 3 trials were performed, and the average was used for data analysis (4, 21).

Plank test: The subjects were instructed to assume a position with the shoulders and elbows flexed at 90° with only the forearms and toes in contact with the ground. The subjects had to maintain a straight, strong line from the head to the toes with an extended leg position, keeping the head and spine in a neutral position. The distance between the big toes was maintained at hip width to prevent inducing hip adduction force. With the start of the period, the time until the subject was exhausted and / or until he had disrupted his posture was recorded in seconds. Straight, right arm and left arm plank test was applied to the participants (26).

Statistical Analysis

SPSS 23 package program was used for statistical calculations of the obtained data. For the data obtained, the homogeneity of the normality variance was tested and then the mixed ANOVA analysis was used to determine the difference in the pretest and posttest.

RESULT

Variables	*Balance*	*N*	*Pre-test*	*Post-test*
Experiment group	Right Flamingo	36	6.05±3.52	3.22±3.07*
	Left Flamingo		6.19±4.00	4.05±3.48*
Control group	Right Flamingo	36	5.47±3.38	6.36±3.74
	Left Flamingo		6.14±4.05	8.44±5.33

When the flamingo balance values were examined, a significant difference was found between the groups ($F(1, 71)=4.93$, $\eta 2 =.07$, $p<.05$). There were statistically significant differences between post flamingo balance scores and control group flamingo balance scores.

Table 2. Flexibility Values of Participants

Variables	*N*	*Pre test (cm)*	*Post test (cm)*
Experiment group	36	37.12±5.85	39.69±6.17*
Control group		31.83±6.58	30.91±6.87

Experimental group posttest elasticity scores were significantly different compared to pre-test scores ($F(1, 71)=7.81$, $\eta 2 =.10$, $p<.05$). In addition, experimental group posttest scores differed significantly from the control group posttest scores ($p<.05$).

Table 3. Strength Values of Participants

Variables	*Strength*	*N*	*Pre-test (sec)*	*Post-test (sec)*
Experiment group	Plank	36	137.76±99.96	167.35±116.96*
	Right Plank		68.46±30.63	83.62±26.85*
	Left Plank		67.86±31.17	78.00±22.55*
Control group	Plank	36	130.05±92.80	126.42±95.88
	Right Plank		61.86±22.09	57.94±15.85
	Left Plank		61.39±20.30	59.28±17.97

A significant difference was found between the experimental group of posttest scores and the pretest scores (F(1.34, 95.46) =40.69,η2= .36, p<.05). There was a statistically significant difference between the experimental and posttest strength scores of the experimental and control group (F(1, 71)=3.38, η2 =.05, p>.05).

Table 4. Lessons achievement point values of the participants

Variables	*N*	*Midterms*	*Final*
Experiment group	36	55±12.30	72.63±9.21*
Control group		43.42±10.61	43.05±12.55

It is determined that the final test values of the experimental group have improved according to the pre-test values (F(1.70) =102.59,η2= .36, p<.05). There were statistically significant differences between the experimental and post-test scores and the control group (F(1, 70)= 66.94, η2 =.49, p<.05).

CONCLUSION AND EVALUATION

Success in the implementation of the movements depends on the basic motoric features in AC (2, 9, 10). According to Daly, the strength has a significant effect on the performance of the AC (10). Particularly in artistic gymnastics, the development of different types of force causes significant effects in the implementation of movements in ground, balance and jumping table tools (17). However, coordinating their movement requires a certain balance system (30, 32). The ability to balance is also an important factor in gaining skills such as walking, running and jumping (13).

There are many studies investigating the motoric components of gymnasts. Çoknaz et al. (9) in gymnastics of the different stretching exercises flexibility values, Savucu et al. (24) found a statistically significant difference in flexibility and strength parameters of the gymnastics-specific training program. Vandorpe et al. (31) 168 compared the strength and elasticity parameters of the gymnast and found a significant difference in strength and elasticity parameters. Delas et al. (11) found a statistically significant difference in the balance, flexibility and strength parameters of gymnasts. While Alpkaya (2), in his work, integrated gymnastics branch with the specific training program of 7-year-old gymnastics balance, flexibility and strength have provided improvements. Kesilmiş (18) determined that there is a statistically significant difference in balance and force parameters applied to a gymnastics training program for preschool children. Durukan et al. (13), in their study on the motor development of basic gymnastics training, found a statistically significant difference in both parameters after the strength and balance tests applied before and after basic gymnastics training. In Bayraktar, (13) study flexibility, balance, and shuttle tests were applied to 11-12 age group gymnastics, swimming and athletics and gymnastics flexibility, balance and shuttle parameters were better than swimmers and athletes. In the study of Demirel et al. (12), pre-school students who took gymnastics training in summer school had an 8-week training program and found a statistically significant difference in balance and flexibility parameters. In our study, the strength, balance and flexible properties of basic motoric components are parallel to the literature. In particular, it is thought that strength exercise have an effect on balance and flexibility studies have positive effects on maintaining joint space angle.

When the literature is examined, there are not many studies examining the effect of basic motoric properties on gymnastics performance in schools. Agopyan (1) investigated the effect of 8-week training program on rhythmic gymnastics competition series on the competition. Before and after training, there were significant differences in the force parameters in the experimental group. Although, Berisha and Çilli (7) evaluated the force parameters of 90 male students in 15 and 16 age group who had taken gymnastics training in the

school curriculum for 5 years and found that students with more successful values in the force tests had higher technical scores, In Atılgan et al (3) study, they found a statistically significant negative difference between the equilibrium instrument of the gymnasts and the balance tests performed by the laboratory. In our study, it was found that the test grade of the experimental group was higher than the midterm and the final average compared to the control group. İn addition that experiment group strength, flexibility and balance were affected in a positive way.

As a result, it can be said that the extra training done in the lesson of gymnastics increases the success of the lesson and not only for the gymnastics lesson but also for all the applied lessons.

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Genderwise Investigation of Empahty Skills in Child Athletes

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Abstract

This study intends to investigate the empathy skills in child athletes with regard to gender. The study group comprises 226 children selected randomly from various clubs in Ankara. 56.7% of the total number is female and 40.3% is male. When the sports age of the group with a mean age of 12.16 is examined, it can be seen that 40.7% have been doing sports for 1-2 years, 42.0% have been doing sports for 3-4 years and 17.3% have been doing sports for 5-6 years. The study group is distributed into branches, with 29.2% pertaining to volleyball, 42% to handball, and 28.8% to basketball. In the study, 'Empathy Scale for Children' developed by Bryant (3) and adapted to Turkish by Yüksel (23) was used as data collection tool. The frequency, percentage distributions and the mean values of the sub-dimensions of the scales were calculated. Independent Samples T-test was used to determine the empathy levels of the child athletes. When the findings were examined, it was seen that the empathy levels of the child athletes differed according to gender and this difference was statistically significant in favor of girls (p=.00). As a result, the activities aiming to improve the sportspeople's taking roles and perspectives along with empathetic thinking skills should be included in the process of creating empathetic people thus empathetic sensitivity should be increased.

Keywords: Children, Child athletes, Empathy, Gender, Sports

INTRODUCTION

Empathy is a concept that we use widely in human relationships and interactions. Affecting many positive behaviors of people such as morality, prosocial behaviors, understanding and quality communication, empathy is a skill that is being researched and tried to be developed. Usually studied in adults, empathy should be gained at an early age.

When the definitions of empathy are examined in the literature, it is seen that different dimensions of empathy have been emphasized. However, the most commonly agreed issue is that empathy is a multidimensional structure (5), which defines empathy as the reaction of one person to another's observed experiences. According to Davis, empathy has both affective and cognitive elements (5). According to the definition of Rogers who characterizes empathy as a process, it is the process whereby people take their counterpart's perspective by putting themselves in his or her position, understand and feel that person's feelings and thoughts correctly and communicate this state to him or her (13).

Empathy is known to have very clear positive results. The results are always the same for a wide range of people from a schizophrenic patient to students in a regular classroom, from counselors in a counseling center to teachers in education, from German neuroscientists to American neuroscientists. These results show that being sensitive as a consultant or teacher is closely related to the formation of constructivist learning and change. Empathy is defined as a skill and thought to be gained through education. From this point, parents and teachers can help children become empathetic people (13). Kohlberg states that the ability to take another person's role has started to develop from the age of six, and the development of this ability is a turning point in the development of moral ability because moral judgment is the individual's weighing the rights of others against their own rights, which necessitates the ability to take roles (1).

When the factors affecting empathy skills are examined, it is seen that sport is also among these factors. In particular, the interactions in team sports are built on coordinating the game, which requires the ability to understand the game. Sportspeople need to anticipate which behaviors each individual team member might exhibit in different situations, which allows them to improve their perspectives. While it is possible to talk about empathy education that can be gained through sports, it is seen in the literature that especially the competition-oriented sports environment reduces empathy (22). However, the studies on the relationship between sports and empathy, especially with children, appear to be inadequate (6, 12, 19, 17, 14, 18, 15). Although empathy has positive effects on many issues such as solidarity, morality,

prosocial behaviors, and healthy communication, it is thought that there is a negative relationship between empathy and competition. When the literature is examined, it is understood that children, sports and empathy triangle do not have available information and the relationship between sports and empathy in children arouses curiosity. From this point of view, the aim of the study is to determine the empathy levels of child athletes and examine them in terms of gender.

MATERIAL & METHOD

Study Group

The study group comprises children selected randomly from various clubs in Ankara. With 56.7% of the group being female and 40.3% male, the total number of child athletes in the study are 226. The group's mean age is 12.16. When the sports age of the group is examined, it is seen that 40.7% have been doing sports for 1-2 years, 42.0% have been doing sports for 3-4 years and 17.3% have been doing sports for 5-6 years. The distribution of the sportspeople by branch is as follows: 29.2 % volleyball, 42.0 % handball, and 28.8 % basketball (Table 1).

Data Collection Tool

In this study, 'Empathy Scale for Children' was used to determine the empathy levels of children.

Empathy Scale for Children

The Empathy Scale for Children was developed by Bryant (3). As a result of the adaptation study conducted by Yüksel (23), the Turkish version of the scale, which was originally 22 items, had 20 items and a single factor structure. The Empathy Scale for Children was calculated by repeating the test and its reliability coefficient was r = .69. The internal consistency (Cronbach Alpha) coefficient of the scale was found to be .70. Items were marked as True or False (i.e. I get upset when I see a girl who can't find friends to play with; I cannot understand people in society who show their joy by hugging each other). A higher score from the scale reflects more empathy.

Data Analysis

After checking the scales collected by the researchers, the missing or incorrect ones were excluded from the research. The valid and acceptable ones were transferred to the computer for evaluation in SPSS package program. The frequency, percentage distributions and mean values of the sub-dimensions of the scales were calculated. Independent Samples T-test was used to determine the empathy levels of the sport people.

FINDINGS

Table 1. Information about the Study Group (N=226)

Variables		%
Gender	Female	59.7
	Male	40.3
Age		M=12.16
Sports Branch	Volleyball	29.2
	Handball	42.0
	Basketball	28.8
Sports Age	1-2 yrs.	40.7
	3-4 yrs.	42.0
	5-6 yrs.	17.3

According to the data in Table 1, 59.7% of the child athletes are female and 40.3% are male with a mean age of 12.16. When the sports branches are examined, it is seen that 29.2% belong to volleyball branch, 42% to handball and 28.8% to basketball. With regard to the sports age of the sports people, 40.7 % have 1-2 years, 42 % have 3-4 years and 17.3% have 5-6 years of sports experience.

Table 2. Item Score Averages by Gender

		FEMALE (N=135)					
Items	Response	%	M	SD	%	M	S.D
1- I get upset when I see girl crying to play.	True	91.9	.92	.27	57.1	.57	.50
	False	8.1			42.9		
2- I cannot understand people who show their joy by hugging each other in public.	True	86.7	.87	.34	75.8	.76	.43
	False	13.3			24.2		
3- I cannot understand a boy crying when he is happy.	True	63.0	.63	.48	38.5	.38	.49
	False	37.0			61.5		
4- It pleases me to watch a friend open a gift package at his/her birthday party.	True	85.2	.85	.36	68.1	.68	.47
	False	14.8			31.9		

5- When I see a boy crying, I get watery eyes.	True	43.7	.44	.50	44.0	.44	.50
	False	56.3			56.0		
6- I get watery eyes when I see a girl fall and injure herself while playing.	True	73.3	.73	.44	25.3	.25	.44
	False	26.7			74.7		
7- I sometimes cry when I watch TV.	True	48.9	.49	.50	24.2	.24	.43
	False	51.1			75.8		
8- I cannot understand a girl crying when she is happy.	True	74.8	.75	.44	36.3	.36	.48
	False	25.2			63.7		
9- I get very sad when I see an animal being harmed.	True	96.3	.96	.19	93.4	.93	.25
	False	3.7			6.6		
10- I get upset when I see a boy who can't find friends to play with.	True	58.5	.59	.49	70.3	.70	.46
	False	41.5			29.7		
11- My eyes fill with tears when I listen to some songs.	True	65.9	.66	.48	31.9	.32	.47
	False	34.1			68.1		
12- I feel like crying when I see a boy hurt himself while playing.	True	31.9	.32	.47	28.6	.29	.45
	False	68.1			71.4		
13- Seniors sometimes cry when there's nothing to worry about.	True	34.1	.34	.48	54.9	.55	.50
	False	65.9			45.1		
14- I think it's ridiculous to treat cats and dogs like people.	True	71.9	.72	.45	73.6	.74	.44
	False	28.1			26.4		
15- It makes me angry when a friend always asks for help from the teacher	True	58.5	.59	.49	42.9	.43	.50
	False	41.5			57.1		
16- Children without friends probably never want to have friends.	True	84.4	.84	.36	82.4	.82	.38
	False	15.6			17.6		
17- My eyes get watery when I see a girl crying.	True	58.5	.59	.49	11.0	.11	.31
	False	41.5			89.0		
18- I find it funny that some people cry while watching a sad movie or reading a sad novel.	True	68.9	.69	.46	47.3	.47	.50
	False	31.1			52.7		
19- When my friends have nothing to eat, I can easily eat my cookies while they are nearby.	True	87.4	.87	.33	76.9	.77	.42
	False	12.6			23.1		
20- I don't get upset when a friend gets punished for misbehavior.	True	54.8	.55	.50	61.5	.62	.49
	False	45.2			38.5		

When the genderwise responses given to the items are examined, it is seen that girls are more empathetic than boys. It is also seen that the empathetic behaviors of the child athletes towards their fellow child athletes also change. More than half of the females (%58.5) marked *Item 17* as *True* while this was 11.0 % in male participants. When the "*girl*" (in *Item 17*) was changed into "*boy*" in the statement (*Item 5*), %43.7 of the females marked it as *True* while it was 44.0% in males. 34.1% of the girls marked Item 13 as *True* while this percentage went up to 54.9% in boys.

Table 3. Results of Independent Samples T-test on Empathy Levels of Child Athletes According to Gender Variable

		N	M.	SD	df	t	p
EMPATHY SCALE FOR CHILDREN	Female	135	.67	.17	224	6.193	.00
	Male	91	.52	.18			

When Table 3 is examined, it is seen that the empathy levels of child athletes differed according to gender and this difference was statistically significant in favor of females. (p=.00).

DISCUSSION & CONCLUSION

The studies on the relationship between empathy and gender revealed that women are more empathetic than men. It is possible to explain this situation according to two theories as social and psychological. For example, according to sociologists, this difference is explained in relation to the social roles that men and women have, while psychoanalysts explain this difference with the emotional capacity women have (8). When the literature was examined, it was concluded that the relationship between affective and cognitive empathy and gender was investigated in women aged between 12 and 18 years, and women were more empathetic than men (2). In another study, Klein and Hodges found that women were more empathetic than men in their study of gender differences (16). In studies of sports and empathy, it is seen that there was differentiation in regard to gender. Studies show that female sportspeople are more empathetic than male sportspeople. Sezen-Balçıkanlı and Yıldıran's (2018) study on elite inline hockey players showed that empathetic skills are higher in women than men. In the study conducted by Sezen-Balçıkanlı and Sezen (2019) on young hockey players, the difference between the genders was in favor of women. In Aktaş and Sezen-Balçıkanlı's study (2018), which examined the relationship between physical education

teachers' empathy and social problem solving skills, it was seen that women had more empathetic thoughts than men. Similarly, the studies on empathy in children showed that girls are more empathetic than boys (4, 7, 11).

When the findings of the study were examined, it is seen that there was a difference between the genders in sports people and this difference was in favor of girls (Table 3). However, it is also known that empathy education and empathetic model for children can reduce this gap between genders (9). The findings show that children take a more empathetic attitude towards children of the same gender. For instance, more than half of the girls (58.5%) marked the statement that "My eyes get watery when I see a girl crying" as True while this was 11.0 % in males. When the "girl" was changed into "boy" in the statement (Item 5), the percentage went down to 43.7% in girls and went up to 44.0% in boys. Social roles are thought to be effective in the emergence of these ratios. Another item included the behavior that "I feel like crying when I see a boy hurt his knee while playing" (Item 12). This behavior was marked as True by 31.9% of the girls and 28.6 of the boys. Item 17, stating that "My eyes get watery when I see a girl crying" was marked as True by 58.5% of the girls and 11% of the boys. While evaluating the effect of gender in these results, it is thought that sport also has an effect on these low percentages. As a matter of fact, research shows that competition affects empathetic skills negatively (22, 19, 21, 16, 17, 20, 14, 18, 15).

As a result, the activities aiming to improve the sportspeople's taking roles and perspectives along with empathetic thinking skills should be included in the process of creating empathetic people thus empathetic sensitivity should be increased. In particular, coaches whose target audience are children should take an empathetic attitude towards coaches and athletes, model them, solve problems from an empathetic point of view and support empathy education through sports.

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The Effect of Theraband Exercises on Motor Performance and Swimming Degree of Young Swimmers

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Abstract

Different training methods are used to improve children's swimming degrees and motor performance. There are a limited number of studies examining the effects of therabands, which are portable and available everywhere, on swimmers. The aim of this study was to investigate the effect of 8 weeks of theraband exercises on motor performance and 50 m freestyle swimming degree. 45 voluntary children (male = 27, female = 18) participated in the study. The children were divided into three groups; control group (CG), swimming group (SG) and theraband group (TG), each consisting of 15 people. SG did swimming training only three times a week for eight weeks. In addition to swimming exercises, TG did theraband exercises consisting of 8 movements to the lower and upper extremities. The motor performances of the swimmers were determined by the Dordel Koch Test (DKT), which consists of 7 subtests, and swimming degrees were determined by the stopwatch. Wilcoxon Signed Ranks Test was used to determine the difference between pre-tests and post-tests following 8-weeks of exercise. According to the results, it was determined that in SG, 50 m swimming degree and DKTsideward jump performances increased in the posttest, while in TG, 50 m swimming degree, DKTsideward jump, DKTflexibility, DKT standing long jump, DKTsit-up, DKTbalance and DKTpush-up performances improved significantly in the post-test ($p < 0.05$). As a result, in addition to in-water training to improve swimming performance, it can be stated that land training has positive effects on swimming degrees and theraband exercises increase motor performance. It can be recommended that swimming coaches incorporate theraband exercises into the content of training programs to improve both swimming and motor performance of children.

Key words: Swimmer, motor performance, DKT

INTRODUCTION

Motor performance, which is defined as the act of performing a movement skill, (7) is an important indicator that shows the healthy status and technical success of children (2,21,27). Increasing the level of physical activity and doing a sport branch have positive effects on motor performance (6). One of these sports branches is swimming.

Swimming is a sports branch which is a combination of several factors such as high-level muscle strength, technical skills, rhythm requiring coordination, speed, explosive strenght and correct technique (8,18,29). When the factors affecting the performance in swimming and the changes that the swimmers show according to age groups, it is seen that muscle strength is extremely effective (28). In swimming, strength is the most important factor that enables to move forward in water (11). Swimmers need to develop muscle strength in order to increase their swimming speed (16). In addition to in-water exercises, land trainings are also applied to improve strength and other motoric features required in swimming (8,23). In land training, different materials and training methods are used to increase the strength and swimming performance of swimmers. Some coaches use resistance machines to increase the strength performance of swimmers, while others prefer body weight, medicine ball, and core exercises (22). Recently, theraband (resistance rubber) exercises have been used extensively to increase muscle strength and endurance (12,17).

It is a well-known fact that that the exercises performed with theraband increase the strength and mass of the muscles to which they are applied (20). Guex et al. (10) found that maximal muscle strength, muscle endurance can be improved and muscle hypertrophy can be achieved by using theraband. Therabands can be used as an alternative to other strength training sessions since they can be used in all age groups due to their low cost and extensive availability as well as operating more than one region at the same time; (20) moreover, they can be applied anywhere without any difficulties (13).

In the light of this knowledge, the aim of this study was to investigate the effects of 8-weeks theraband exercises on swimmer children on motor performance and swimming degree. Our hypothesis is that theraband exercises performed by child swimmers will have positive effects on their motor performance and swimming degree.

MATERIAL AND METHOD

Forty-five voluntary children (male = 27, female = 18) with a mean age of 11.67 ± 1.41 participated in the study. The children were divided into three goups; the children in the control group (CG) did not do any exercises, the children in the swimming group (SG) did swimming 3 days a week for 8 weeks, and along with swimming exercises, the children in the theraband group (TG) did exercises related to the lower and upper extremities 3 days a week for 8 weeks. Children's height were measured using a standard steel stadiometer, with a barefoot accuracy of 0.1 cm, and with no metal on the Tanita BC-418 Segmental Body Analysis System (Tanita Corporation, Tokyo, Japan). The BMI of children was calculated using the formula [body weight (kg) / height (m2)]. Children's sit-up, push-up, balance, standing long jump, flexibility, sideward jump and 6 min running motor performances were determined by Dordel Koch Test and 50 m freestyle swimming was determined by stopwatch. Children with TG were given theraband exercise, which consisted of 8 movements 3 times a week for 8 weeks and each session lasted approximately 35-40 minutes.

Dordel Koch Test

The Dordel Koch Test (4), developed by Dordel and Koch in 2004, is specifically designed for the determination of motor performance and basic functions of children and adolescents aged 6-16 years. The Dordel-Koch Test consists of 7 different tests. While 6 of them are performed individually at the established stations (sideward jump, balance, standing long jump, sit-up, push-ups flexibility), the 6-minute running test which is the last test is performed in a group. The best degree of measurement is included in the study.

DKTsideward jump test; the child jumped over the rope which was folded four times and fixed at the ground in 15 seconds at the highest speed with double feet and without touching the rope. The test was performed twice and the average of two tests was included in the study.

DKTflexibility test; it is a test that measures the flexibility of the waist and especially the hamstring muscles. The soles of the children are measured on the base of the flexibility table, with the knees reaching straight to the last point they can reach with their hands. The point at which the sole of the foot rests is zero (0), the side on which the feet lie is positive (+), and the side of the calf is negative (-). The test was performed twice and the best value was recorded in cm.

DKTstanding long jump test; the child was taken from the back of the line determined as zero by taking strenght from the arms, the legs adjacent to the farthest point can be reached as a double leg jump. The degree at the end point of the child's heel was recorded in cm. 2 trials were granted and the best rating was included in the study.

DKTsit-up test; the child was measured with the hands behind the head, elbows to the side, with the leg bent from the knees and the body closer to the knees. Each full movement performed within 40 seconds was accepted as 1 and recorded as pieces.

DKTbalance test; the children were measured as one leg standing on the rope fixed to the ground in pairs for 60 seconds. The number of contact of the foot which is not on the rope to the ground was recorded in units.

DKTpush-up test; the children started the push-up test with their hands on the hips, when the face is down. With the start of the time, the body was lifted by pushing the hands under the untied shoulders and the movement was completed by returning to the starting position after one hand touched the other hand. The number of push-ups that the child could do in 40 seconds was recorded in units.

DKT6-min running test; the children ran around the area of the volleyball court (54m) as fast as possible for 6 minutes. The children completed this distance in 6 minutes by running or walking when they felt tired. The total distance was recorded in metre.

Each of the sub-dimensions of DKT was scored and evaluated separately, and no general score and assessment were conducted in DKT. DKT sub-dimension performances were indicated by scores from 1 to 6: 1 = very good, 2 = good, 3 = moderate, 4 = adequate, 5 = poor, 6 = very poor.

50 m Freestyle Swimming Performance Measurement

The 50 m freestyle swimming performances of the swimmers were measured with a hand stopwatch (Casio, Japan) measuring 0.01 seconds. The swimmers were warmed for 5 minutes on land and 10 minutes in water. 50 m freestyle swimming test started with ready-exit command by pushing the wall of the pool with its feet and when the 50 m distance was completed, the test was terminated. Two swimmers were taken from each swimmer and 30 minutes rest was given between 2 measurements. The best value was included in the study.

Theraband Exercises

The training program with theraband consists of 8 exercises to improve upper and lower extremity strength. These movements are: a) sit-up, b) front raise, c) squat and bench press, d) lut pull down back, e) lateral raise, f) leg press, g) scapular retraction, h) lunge. All movements were performed 3 days a week for 8 weeks. The children were given rest 1 minute between each set and 2 minutes between each new exercise. Therabands have different colors and the tire resistance of each color changes. The blue colored therabands, which are the intermediate level, were preferred considering the educational status and the children who participated in the study. The starting and ending positions of the movements are shown in the following figures. Set and in-set numbers of the exercise program are as follows: 1st and 2nd week 10x2, 3rd and 4th week 10x3, 5th and 6th week 12x3, 7th and 8th week 15x3.

Statistical Analysis

SPSS 24 package program was used for data analysis. The difference between pre-post tests and sub-dimensions of DKT the groups was determined by Wilcoxon Signed Ranks Test, which is one of the nonparametric tests. Significance level was accepted as $p < 0.05$.

INTERPRETATION OF ANALYSIS AND FINDINGS

Table 1. Physical feature of the groups

		Height	Weight	BMI
		$\overline{x}$ ±Sd	$\overline{x}$ ±Sd	$\overline{x}$ ±Sd
Control Group	Pre Test	1.54±0.05	42.66±7.65	17.84±2.43
	Post Test	1.57±0.05	42.33±8.35	17.03±3.01
Swimming Group	Pre Test	1.51±0.11	45.46±11.08	19.71±3.63
	Post Test	1.55±0.11	46.6±9.88	19.28±3.25
Theraband Group	Pre Test	1.55±0.11	46.73±12.27	19±3.55
	Post Test	1.59±0.01	47.4±12.3	18±3.38

Table 2. The comparison of pre and post-test results of sub-dimensions of DKT of the groups

		Control Group		Swimming Group		Theraband Group	
		$\overline{x}$ ±Sd	p	$\overline{x}$ ±Sd	p	$\overline{x}$ ±Sd	p
DKTsideward jump	Pre Test	3.13±1.06	0.13	5.60±1.12	0.00*	5.53±0.83	0.00*
	Post Test	2.80±1.08		3.53±1.68		1.93±0.79	
DKTflexibility	Pre Test	3.40±0.63	0.02*	380±1.26	1.00	3.06±0.79	0.02*
	Post Test	2.80±0.77		3.80±1.2		2.27±0.70	
DKT standing long jump	Pre Test	4.33±1.04	0.48	4.20±0.94	0.058	3.66±1.17	0.03*
	Post Test	4.47±0.91		3.80±1.14		2.60±0.28	
DKTsit-up	Pre Test	3.8±1.08	0.41	3.40±0.82	0.15	3.53±0.91	0.00*
	Post Test	3.93±0.96		3.27±0.7		2.20±0.56	
DKTbalance	Pre Test	4.93±1.16	0.38	4.66±1.11	0.49	4.33±0.72	0.00*
	Post Test	5.27±0.59		4.80±1.2		2.60±1.12	
DKTpush-up	Pre Test	2.33±0.97	0.10	1.73±0.88	0.65	3.20±1.14	0.00*
	Post Test	1.93±0.96		1.80±0.77		1.67±0.48	
DKT6 min running	Pre Test	5.66±0.48	0.08	3.33±0.97	0.81	3.66±1.04	0.29
	Post Test	5.47±0.51		3.53±1.64		3.13±1.12	

p<0,05

When the table is examined, it is seen that while the DKTflexibility performance of the control group increased, the DKTsideward jump of the swimming group increased statisticaly significantly in the post-test. In addition, it was found that theraband group had statistically significant improvements in the performances of DKTsideward jump, DKTflexibility, DKTstanding long jump, DKTsirt-up, DKTbalance and DKTpush-up test.

Table 3. Comparison of pre-test and post-test of 50 m freestyle swimming degrees of the groups

		Control Group		Swimming Group		Theraband Group	
		$\overline{x}$ ±Sd	p	$\overline{x}$ ±Sd	p	$\overline{x}$ ±Sd	p
50 m Swimming	**Pre Test**			44.48±6.52	0.00	40.51±7.00	0.00
	Post Test			42.71±6.29		37.48±6.91	

p<0,05

As it is clearly seen in the table that it was found that swimming degrees of both swimming and theraband group improved statistically significant in the posttest.

CONCLUSION AND EVALUATION

It is necessary to apply technical exercises in order to form the basis of high-level training in swimming and to apply strength training in order to show high performance in competitions (23). Strength training is always necessary to improve the performance of swimmers and ensure continued success in competitions (5) and should be planned according to the strengths and weaknesses of the athletes (19).

In the study, it was determined that 8-week theraband exercises increased motor performance (DKTsideward jump, DKTflexibility, DKTstanding long jump, DKTsit-up, DKTbalance and DKTpush-up) and 50 m freestyle swimming performance, but no effect on DKT6-minute running performance was found.

In the strength training program of swimmers, land and water trainings are applied together. The aim is to transfer the strenght gained by the swimmer to the water. For land training, including strength and flexibility training, swimmers are required to spend for 3 hours or more per week (16).

There are a number of studies in the literature examining the effects of different land training on swimming performance and motor performance. Bıyıklı (1) stated that the 10-week core training applied to 11-13 age group swimmers with improved speed, vertical jump, balance, sit-up, right-left hand grip and flexibility performance, and stated that core training would contribute to the physical performance of children. In a similar study, Yapıcı et al. (29) investigated the effect of 6-week land and resistance training on lower extremity isokinetic strength values and swimming performance in 22 swimmers in the 13-16 age group. As a result of the study, it was determined that knee extensor and flexor muscle strength increased at 60 °/s, 180 °/s and 240 °/s after 6 weeks of training and 25 m, 50 m and 100 m freestyle swimming degrees improved.

Yapıcı et al. (29) reported that land and resistance training for swimmers in this age group made a significant contribution to strength and swimming performance. In another study, Şenol and Gülmez (26) divided 21 child swimmers aged 13 into 3 groups as strength training with functional exercise band, strength training with their own body weight and swimming training only. As a result of the study, it was determined that the performances of push-ups, sit-ups, medicine ball throwing, vertical jump, leg strength, 50 m, 150 m and 200 m swimming performances of the strength training swimmers with functional exercise band increased statistically significantly. Karakuş et al. (14) reported that 12 weeks of swimming training increased leg, back and hand strength in the study, which included 14 children aged 7-9 years.

In a study conducted on students between the ages of 9 and 13, the swimmer group received a total of 60 training sessions per week for 12 weeks, including 4 swimming training sessions and 1 land training training. At the end of the program, there was a significant improvement in the 25 m freestyle swimming performance of both boys and girls (3). Santana (24) conducted a study on competitor male swimmers applied to the core training of young

swimmers found that the increase in strength parameters.

Theraband training program was applied to increase the swimming and motor performances of the children who participated in our study. There are some studies with therabands in the literature. Selcuk and Karacan (25) at least two years of swimming training applied to boys aged 11-13 years to determine the effects of theraband training swimming performance of children divided into two groups. The first group is the experimental group that performs theraband training in addition to swimming (swimming 2 days a week for 12 weeks, and strength training with theraband in addition to swimming for 3 days). The second group is the control group that only swims (5 days a week only swimming training). As a result of the study, it was determined that both the theraband group and the swimming group had better performance in the 25 m, 50 m, 100 m and 200 m swimming performances, yet theraband group had better performances in 25 m and 50 rather than swimming group. Selcuk and Karacan (25) interpreted this as the positive effect of theraband streght studies on short distance swimming performance. In another study, Gönener et al. (9) divided 20 adolescent children into swimming as a control group and theraband training group for at least 3 years. Theraband training group received 12 different theraband training sessions 3 times a week for 8 weeks. It was determined that theraband training is an effective method to improve swimming performance in swimmers between the ages of 13-15. In a similar study, Kilinc et al. (15) examined the effect of swimming exercise and theraband studies on dynamic and static balance in children aged 7-12 years who have been interested in swimming for at least 2 years and who regularly train swimming 5 days a week while dividing the whole participants into 3 groups. As a result of the study, it was determined that theraband group was more successful in balance performance.

The studies mentioned above support the findings of our study and show that land trainings have important contributions on motor and swimming performance. It can be said that the theraband training program used in our study can be used as an alternative to other strength training equipment and programs to improve the motor and swimming performance of children. As a result, it can be said that in order to improve the swimming performance of young swimmers, it is necessary to increase the motor performance and the motor performance can be provided by therabands which can be used everywhere, can operate many regions at the same time, and is easy to carry and cost effective.

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Anthropometric and Hematological Profile of Some Selected Ethiopian Sremier Seague Male Soccer Players in the Final Competitive Season

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Abstract

The purpose of the study to determine anthropometric and hematological profile of some selected Ethiopian premier league male soccer players according to playing position. Descriptive cross-sectional study was employed on purposely selected twenty eighty premier league soccer players from (14) Sidama Coffee and from (14) Hawassa Town soccer club from all positions (GK, DF, MD, SK). Anthropometric, speed, agility and seventeen hematological parameters (WBC, RBC, Lymph, HGB, HCT, MCV, MCH, MCHC, PLT, RDW-CV, RDW-SD, PLT, MPV, PDW, PCT, P-LCC, and P-LCR) were measured. The obtained quantitative data was analyzed by one way analysis of variance (ANOVA) ($p<0.05$) with the help of SPSS version 20.00 software. The study found mean scores of anthropometric, performance and hematological parameter among soccer players. Further a statistically significant change was observed is only WBC, RBC and MCH hematological variables were observed when compared among the different playing positions (goalkeepers, defenders, midfielders and attackers). It was concluded that no significant difference in anthropometric and hematological variables except (WBC, RBC and MCH) soccer players between playing position, although the values of the measured hematological parameters fell within the reference range ($P>0.05$). It could be considered that regular monitoring of the anthropometric and hematological parameters is fundamental for the identification of a health status and related optimal performances by sport medicine specialist, nutritionist, trainers and selection of adequate training intensity by trainers. From a practical point of view, the clinician has to take into account not only age, but also training status of individuals when evaluating their blood tests.

Key words: Ethiopian premier league, Hawassa Town, Hematological profile, , Sidama Coffee

INTRODUCTION

Soccer is a multiple sport that requires high intensity, intermittent activity, to be undertaken over an extended period of time. In addition to intensive daily training session players are involved additional commitment such as national cup and other matches. In most research studies, soccer players are classified into four groups: forwards or attackers, midfielders, defenders, and goalkeepers. Players of different positions have a very different workload during a game: midfielders run the longest distances (up to 11–11.5 km) compared to forwards or defenders whereas goalkeepers run around 4 km (10). Previous studies have reported that each specific playing position may have unique physical and physiological requirements (29). Morphological characteristics, tactical, physical and technical skills successfully discriminate soccer players by competitive level and position (15). Besides fitness and the technical skills of the footballers, anthropometric indicators and body composition play an important role in successful performance (24). Anthropometry is the study of the measurement of the human body in terms of the dimensions of bone, muscle, and adipose (fat) tissue. Anthropometric and physical fitness characteristics provide important information about normality of body size, health condition, and body shape (5).

Hematological parameters may also play a crucial role in predicting optimal physical performance. But, unfortunately, very little attention has been given to the assessment and monitoring of hematological parameters in professional soccer players. It is possible that the stability of the players' hematologic status that associates with good health may be considered as key determinants of athletic performance. The competitive demand of soccer game may impose strain various physiological systems including the musculoskeletal, nervous and immune and metabolic, which may be reflected in

changes in biochemical and hematological parameters (3). Soccer is an endurance-based sport during which athletes require large amounts of oxygen within the different systems of the body in order for them to function (20). Endurance training, like in soccer, may bring about a decrease in erythrocyte, hemoglobin, hematocrit, iron and ferritin concentration, and may lead to changes in the health status of athletes (2). The measurement of hematological and biochemical data provides many answers about how training is being interpreted by the various systems. In addition endurance-trained athlete's also hematological parameters such as hematocrit, hemoglobin concentration, and red blood cell count are reduced, mainly due to exercise-induced plasma volume expansion, which sets in within a few days of exercise training. Hematological parameters and biochemical characteristics which can be crucial for predicting optimal physical performance have been scarcely examined in elite soccer players, who are involved in very demanding competitive seasons. Knowing the biochemical and hematological parameters of the athletes; assist the coaches and sports scientists in identifying energy needs and preparing training programs in this direction (25). The reference values in hematological laboratory reports have been calculated on sedentary people and may not be useful for sports people. Athletes are by definition, healthy and "normal" subjects, but they often show – owing to physical exercise, training, psychophysical stress, and peculiar environmental conditions – some biochemical, hormonal, and hematological values that are out of range. This particular behavior of laboratory values must be properly interpreted to avoid incorrect treatment, expensive examinations, and possible cessation of training and competition (6). However the effect of different level of physical fitness variable on the levels of many routinely measured variables seems to be not clear. It is also unclear whether age and playing position of players affect the hematological profile of elite Soccer players. Since there is limited studies have been done comparing different playing position(22). Hematological parameters are influenced by several factors within the apparently healthy population. These factors include training, age, sex, ethnicity, nutrition, and altitude. Any one or all of these factors can have a positive or negative influence on hematological variable (26). As a result, in Ethiopian, professional soccer club players are practiced in various towns important towns are located in low and moderate altitude zones. Some of these Towns include: Yirgalem (1776m) in and Hawassa (1708m), Arba Minch (1285), Wolaita Sodo (1600m) Addis Ababa (2,355), Bahir Dar (1800m) above sea level.

Hematological profile of athlete especially Ethiopian Premier League soccer players are no system of reference values for players or a lack of data in this field. There are few studies on hematological values in football players and modern reference values for biochemical and hematological parameters are available (9, 17)

Objectives

The aim of the present study was to determine anthropometric and hematological profile of some selected Ethiopian premier league male soccer players and to compare the values of seventeen hematological parameters between playing position.

MATERIAL AND METHODS

Subjects

Twenty eight male soccer players purposely selected from Southern part of Ethiopian premier league male soccer club players (Hawassa Town and Sidama coffee) to participate in this study. The selection criteria included: (1) they have been members of the club and best players (from all position, GK, DF, MD, SK) (2) all players participated in at least 75% training sessions per week. (3). the participants were instructed to abstain from vitamin and mineral supplementation, ergogenic aid or any medications in general. Subjects were also advised not to make any drastic changes in their diet during the study period. The physicians of the outpatient hospitals evaluated the physical performance of all participants, and sport injury rates and incidence were recorded. The soccer players were instructed not to change their normal eating habits and to refrain from drinking beverages containing caffeine or alcohol and from consuming food 24 h before testing.

The study was undertaken in compliance with the Arba Minch University Medical School and approved by Arba Minch University Ethical Committee (No, RCP/1234/09 and date 2/23/2018). The soccer players gave written informed consent after having been explained the procedures, benefits and possible risks of participation in the study. We followed the club soccer players during a competitive final season, over a three-month period (March, April and May). During the study, the

soccer players were engaged in their designed training programme that consisted of 7–8 training sessions per week and a weekly match. There was no training program before a day of hematological measurement day.

Inclusive and Exclusive Criteria

The study subject recruited apparently well healthy footballers deemed fit and best to carry out the coach`s scheduled training exercises. That they are no recent history of febrile illness, muscle lesions, lower limb trauma, and metabolic diseases. Unwell and injured footballers of the team were excluded.

Procedures

Anthropometric Measures

The anthropometric data included age, body mass, standing height, body mass index measurements. Speed and agility test also measured to assess the current performance of players. Each subject was measured in accordance with the standard methods proposed by the international society for the advancement of kinanthropometry (11). Height and body mass were measured using calibrated digital stadiometer and weighing machine, body mass was measured to the nearest 0.1 kilogram and height was measured to the nearest of 0.001 meter. Body mass index is calculated using body mass index formula, i.e. weight (kg) divided by height (m^2).

Blood Collection and Analysis

Blood samples were collected in to plain evacuated tubes from a forearm vain after an overnight before the taking the meal at morning 6:00-6:30 Pm, 20º C -25º C and at least 24 hour from the last training session. All blood samples were collected by using sterile plastic heparin vacutainer tubes (Greiner Bioone, Kremsmünster, Austria), Plasma and serum were separated by centrifugation and multiple aliquots of each sample were stored at –80 °C until analysis. K-EDTA and immediately mixed with EDTA solution to prevent clotting for hematology. EDTA blood samples were sent for immediate analysis of leukocytes (WBC) red blood cell concentration (RBC), Hemoglobin (HB), platelets (PLT), Hematocrit (Htc), mean corpuscular volume (MCV), mean corpuscular Hemoglobin (MCH), mean corpuscular Hemoglobin concentration (MCHC), lymphocytes, RDW-CV, RDW-SD, PLT, MPV, PDW, PCT, P-LCC, P-LCR on automatic analyzer (Dimension Xp and Plus Analyzer, Siemens, Munich, Germany).

Statistical Analysis

Anthropometric, speed, agility and hematological parameters were analyzed using the one way analysis of variance (ANOVA) *with the help of SPSS version 20.00 software.* To examine changes in the mean values for each specific position of players P values ≤ 0.05 were considered statistically significant.

RESULTS

Table 1. Anthropometric, speed and agility characteristics of the Subjects.

	GK		DF		MD		SK		Total	
	N	M	N	M	N	M	N	M	N	M
Age	2	20.50±.707	9	23.555±3.844	11	22.545±3.045	6	24.333±5.785	28	23.107±3.881
Height	2	183.25±4.596	9	176.277±4.309	11	173.418±4.522	6	178.161±3.828	28	176.056±4.923
Body mass	2	71.0±1.414	9	68.300±6.064	11	67.363±4.791	6	74.650±8.609	28	69.485±6.449
Body Mass Index	2	21.15±.636	9	21.672±1.783	11	22.408±1.513	6	23.483±2.172	28	22.312±1.795
30 meter speed	2	4.37±.028	9	4.346±.094	11	4.338±.186	6	4.325±.242	28	4.340±.161
Illinois's agility test	2	16.39±.190	9	16.326±.489	11	16.260±.419	6	15.911±.535	28	16.214±.469

N = number of players, M=mean value, GK = goal keeper, DF= Defender, MD = mid field, SK = Striker players

The players had as characteristic: age, body mass, height, Body mass index, 30 meter and Illinois's agility parameters of 28 football players sampled were shown in table 1.

Table 2. Hematological Parameter of Elite Professional Soccer Players as a Function of Playing Position

	GK		DF		MD		SK		Total	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
WBC (10^9/L)	2	4.9±.565	9	5.45±1.494	11	6.79±1.386	6	4.82±1.570	28	5.80±1.598
Lymph(10^9/L)	2	2.2±.282	9	2.09±.635	11	2.35±.555	6	2.07±.436	28	2.19±.538
HGB (g/dL)	2	15.25±.212	9	14.99±.711	11	15.63±.490	6	15.22±.611	28	15.30±.622
RBC(10^12/L)	2	5.22±.466	9	5.43±.300	11	5.45±.246	6	5.04±.186	28	5.34±.304
HCT (%)	2	45.75±.495	9	46.55±1.856	11	48.12±2.337	6	46.02±.934	28	46.99±2.030
MCV(FL)	2	87.95±6.85	9	85.95±4.809	11	88.25±2.012	6	91.39±3.228	28	88.16±3.995
MCH(Pg)	2	29.3±2.262	9	27.67±1.686	11	28.67±1.046	6	30.22±1.142	28	28.72±1.604
MCHC(g/dL)	2	33.35±.070	9	32.2±1.166	11	32.52±1.264	6	33.10±1.293	28	32.60±1.207
PLT(10^9/L)	2	296.5±62.933	9	220.67±50.371	11	197.36±55.813	6	215.33±41.903	28	215.79±54.829
PDW	2	15.65±.495	9	15.81±.306	11	15.99±.413	6	15.9±.275	28	15.89±.353
RDW-CV (%)	2	13.8±.141	9	13.98±.489	11	14.14±.358	6	13.72±.685	28	13.97±.485
RDW-SD(fL)	2	44.5±.989	9	46.61±2.419	11	48.44±2.584	6	47.51±3.110	28	47.37±2.704
MPV(fL)	2	8.85±1.484	9	9.53±1.162	11	10.263+1.690	6	10.45+.697	28	9.968+1.368
PCT(mL/L)	2	2.19±.417	9	2.25±.336	11	2.00+.502	6	2.17+.409	28	2.129+.420
P-LCC(10^9/L)	2	65.5±34.648	9	77.33±15.676	11	72.2727+19.100	6	84.66+17.648	28	76.071+18.471
P-LCR (%)	2	26.1±13.435	9	33.71±10.041	11	38.2636+12.388	6	40.866+4.381	28	36.489+10.633

HGB= Hemoglobin, RBC= Number of red Blood Cells, HCT= Hematocrit, MCV =Mean corpuscle volume (Average Size of red blood cells), MCH = Mean corpuscle hemoglobin (Average no of hemoglobin in each red blood cells), MCHC= Mean corpuscle hemoglobin concentration (Average amount of hemoglobin in the red blood cells compared to average size of red blood cells), PLT= Platelet (Cell helping for blood clot), PDW = Platelet distribution width (Uniformity of platelets in size), RDW-CV = Red cell distribution width-coefficient of variation, RDW-SD = Red cell distribution width-standard deviation, MPV = mean platelet volume, PCT = procalcitnin (conditions associated with mildly elevated serum procalcitonin), P-LCC = Platelet large cell count, P-LCR = Platelet large cell ratio.

The players from all position had seventeen hematological variable were tested and clearly indicate their current profile of hematological variable in the above table 2.

Table 3. Univariate differences between GK, DF, MD, SK Soccer players

		Sum of Squares	df	Mean Square	F	Sig.
WBC (10^9/L)	Between Groups	19.290	3	6.430	3.104	**.045**
	Within Groups	49.720	24	2.072		
	Total	69.010	27			
Lymph(10^9/L)	Between Groups	.480	3	.160	.523	.671
	Within Groups	7.349	24	.306		
	Total	7.830	27			
HGB (g/dL)	Between Groups	2.095	3	.698	2.003	.140
	Within Groups	8.364	24	.349		
	Total	10.459	27			
RBC(10^12/L)	Between Groups	.780	3	.260	3.627	**.027**
	Within Groups	1.721	24	.072		
	Total	2.501	27			
HCT (%)	Between Groups	24.458	3	8.153	2.253	.108
	Within Groups	86.832	24	3.618		
	Total	111.290	27			
MCV(FL)	Between Groups	106.244	3	35.415	2.618	.074
	Within Groups	324.683	24	13.528		
	Total	430.927	27			
MCH(pg.)	Between Groups	24.133	3	8.044	4.259	**.015**
	Within Groups	45.334	24	1.889		
	Total	69.467	27			
MCHC(g/dL)	Between Groups	4.139	3	1.380	.939	.437
	Within Groups	35.241	24	1.468		
	Total	39.380	27			
PLT(10^9/L)	Between Groups	16978.335	3	5659.445	2.116	.125
	Within Groups	64188.379	24	2674.516		
	Total	81166.714	27			
PDW	Between Groups	.284	3	.095	.736	.541
	Within Groups	3.083	24	.128		

	Total	3.367	27			
RDW_C (%)	Between Groups	.781	3	.260	1.122	.360
	Within Groups	5.571	24	.232		
	Total	6.352	27			
RDW_SD(	Between Groups	34.508	3	11.503	1.693	.195
	Within Groups	163.024	24	6.793		
	Total	197.532	27			
MPV(FL)	Between Groups	6.556	3	2.185	1.191	.334
	Within Groups	44.025	24	1.834		
	Total	50.581	27			
PCT(mL/L	Between Groups	.324	3	.108	.583	.632
	Within Groups	4.446	24	.185		
	Total	4.770	27			
P_LCC(10^9/L)	Between Groups	839.842	3	279.947	.803	.505
	Within Groups	8372.015	24	348.834		
	Total	9211.857	27			
P_LCR (%)	Between Groups	434.939	3	144.980	1.329	.288
	Within Groups	2617.788	24	109.074		
	Total	3052.727	27			

*Significant at .05 level of Confidence, GK = goal keeper, DF= Defender, MD = mid field, SK = Striker players, WBC=Number of white blood cells, Lymph= Lymphocytes, HGB= Hemoglobin, RBC= Number of red Blood Cells, HCT= Hematocrit, MCV =Mean corpuscle volume (Average Size of red blood cells), MCH = Mean corpuscle hemoglobin (Average no of hemoglobin in each red blood cells), MCHC= Mean corpuscle hemoglobin concentration (Average amount of hemoglobin in the red blood cells compared to average size of red blood cells), PLT= Platelet (Cell helping for blood clot), PDW = Platelet distribution width (Uniformity of platelets in size), RDW-CV = Red cell distribution width-coefficient of variation, RDW-SD = Red cell distribution width-standard deviation, MPV = mean platelet volume, PCT = procalcitnin (conditions associated with mildly elevated serum procalcitonin), P-LCC = Platelet large cell count, P-LCR = Platelet large cell ratio

In table 2 and 3 are observed variables of seventeen hematological parameters of WBC, RBC, Lymph, HGB, HCT, MCV, MCH, MCHC, PLT, RDW-CV, RDW-SD, PLT, MPV, PDW, PCT, P-LCC, P-LCR. The results in present study show us statistically significant difference in only white blood cell (WBC) red blood cells (RBC) and Mean Corpuscle Hemoglobin (MCH) or Average no of HG in each RBC hematological variables between different playing positions of soccer players. However, Striker players show slightly higher mean values of MCV (Mean Corpuscle Volume or Average Size of RCBs) parameters in relation to the other positions of players. In addition to this Strikers shown less mean value in Red blood cell (RBC) parameters when compared to other playing position. Higher mean value of Hematocrit (HCT) variable also shown midfield players than the rest of other positional players, although not significantly different.

DISCUSSION

The purpose of this study was to determine Anthropometric and Hematological profile of some selected Ethiopian premier league male soccer players and to compare the value of hematological variables in related to different playing position. Sport and exercise scientists engaged in soccer research are interested in a multitude of factors that determine the performance of a player as well as the related underlying phenomena that explain how each factor influences that performance. The knowledge of the correct morphological and hematological parameters is an important indicator of health status, body condition. These studies revealed that specific anthropometric characters could play a momentous role in contributing to achievement in soccer sports and it offers certain type of natural advantages. The age of the football players in the study covers a wide range (23.107±3.881) of mean age in both Hawassa Town and in Sidama Coffee soccer players. Jasimina PL et al., (13) showed on the mean age of players was similar to Turkey (24.1 years) and South America (24.2 years), the mean age (26.4 years) of soccer players in four high level European Leagues (English, Italian, German and Spanish League). Height could be useful and which an important parameter in the selection process of the players (22, 27). Body composition is an important aspect of fitness for soccer players. An excess body fat acts as dead mass in activities when body mass is lifted repeatedly against gravity in running and jumping

during play (16). In competitive sports, as soccer, players with a lower body fat percentage have better performance because low body fat is a direct measure of the intensity of training (14). In our study, Hawassa Town and Sidama coffee club players showed healthy, normal BMI with a mean of 22.312±1.795 and statically no significant different in different playing position in accordance with the BMI classification made by the World Health Organization (30). Speed and explosive power were considered prerequisites for the success of youth soccer players. Elite players perform approximately 30 –40 sprints of various lengths during a match and more than 700 turns (18). However, mean value of 30m speed in according to 30m dash standard made by Davis, B (8) all positional players were shown on average level standard although not significantly different. Agility-is an important physical fitness component necessary for successful performance in soccer game (4).The average mean value of Illinois's agility of both club (Hawassa Town and Sidama Coffee) players were found to be on average level to compare with the standard made by McKenzie, B (7).But the mean value of Illinois's agility result showed strikers had better performance than other positional difference.

Hematological tests are used widely to access health and fitness of the intensively training athlete. Hematological means is fundamental to identifying good health, and it may be critically important in predicting optimum physical performance. The results in present study show us statistically significant difference in only white blood cell (WBC) red blood cells (RBC) and Mean Corpuscle Hemoglobin (Average no of HG in each RBC) (MCH) between different playing position, although all the values of the measured hematological parameters fell within the reference range. A study done by Thiago S et al (28) regarding hematological parameters during the period of competition relative to playing position no significant differences in RBC, HCT, and HB were observed. Several studies have reported that the decrease in hemoglobin and hematocrit is a sign of physical exertion and heavy participation (19). A low hematocrit indicate anemia, blood loss, bone marrow failure, leukemia, nutritional deficiency, over – hydration or rheumatoid arthritis. The normal hematocrit range for adult male is 40 – 54 percent (12). In addition to this, indicators of white blood cells, red blood cells, hemoglobin and hematocrit are the variables that are directly related to the volume and intensity of training (23). Abnormally high levels of white blood cells may indicate infections, tissue damage, and inflammatory diseases (21). In related to physical excretion mid fielders show slightly higher mean value than other playing position. Thus, physical exercise/training plays a fundamental role in the immune system, health, and physical performance of athletes (1)

In the present study we observed that hemoglobin, hematocrit and MCHC diminished in the Goal keeper players in relation to other position of soccer players. In this study soccer players had significantly lower Mean Corpuscle Hemoglobin (MCH) level in Defensive players than other playing position. Concerning the effect of high intensity physical activity, Schumacher YO et al. (26) found a slightly lower HGB, HCT, MCH, MCHC profile in soccer player after high intensity training. This finding suggests that the players were subjected to an appropriate level of training intensity and duration while developing the technical, tactical, and physical skills to improve their performance. In addition, it is likely that the players' diet and extra supplementation of nutrients helped to improve some hematological value.

CONCLUSION

The present study was to determine Anthropometric and hematological profile of some selected Ethiopian premier league male soccer players and to compare the value of hematological variables as well as anthropometric and performance variables between playing position. The knowledge of differences in hematological variable parameters between different playing positions in players should provide useful information for the clinical assessment of soccer players. There was a lack of information regarding hematological parameters during the period of competition relative to playing position. In this sense, there are significant differences in only WBC, RBC and MCH hematological variables were observed when compared among the four playing positions (goalkeepers, defenders, midfielders and attackers). In conclusion, Hematological parameters can be crucial for predicting optimal physical performances have been scarcely examined in professional soccer players. Therefore, from a practical point of view, the clinician has to take into account playing position of soccer players. Because training intensity, type of training and energy system may

affect players when evaluating their blood samples. Adequate and timely monitoring of blood parameters represents one of the most important measurements for controlling training intensity and preventing overtraining state in endurance sport like soccer and by considering different playing position.

Limitations

It is important to point out that this study did not attempt to control the type of food that contains essential nutrient and the degree of hydration of the players. These variables may have led to a bias or lack of reliability in the results. In fact, we suggest that in future studies the assessment of hematological parameters should take place from a longitudinal perspective that should enable more specific and tighter control of the variables.

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A Study Upon the Courage Perception Of Athletes Who Participated to the Elections for National Team

(The Case of East Anatolia Region)

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Abstract

ABSTRACT

The aim of this research is to compare sub-dimensions of courage scale in sports which are competence-proficiency, determination, boldness, taking risk and being self-sacrificing in sports according to various demographic values of boxers participating in senior national team selections held in Eastern Anatolia. Sample group of the study consists of 61 boxers participating in national team selections. In the research, personal information form for participants and scale of courage in sports developed by Konter and Johan (10) were used. Boxers' ages, types of residences where they live, educational status, occupations of their parents, income levels, sport ages and athlete status were compared with the sub-dimensions of the scale. SPSS 22.0 Windows program was used to analyze data obtained. As a result of normality tests, it was determined that the data were not distributed normally. Because of this reason, while non-parametric Kruskal Wallis H test was used in the study, Mann Whitney U test was used to compare sub-dimension scores of scale according to mother's educational status. Significance level was accepted as <0,05. As a result, for boxers participating in the selection, there was no significant difference between sub-dimensions of courage scale in sports and their ages, types of residences where they live, educational status, occupations of their parents, income levels, sport ages, athlete status.

Key words: Sports, courage in sports, courage perception, boxing, boxer

INTRODUCTION

Sports that is considered as one of the preconditions for being healthy in today's life, is found as an important factor that millions of people attanded in various branches for the purpose of both sportive performance and lifelong sport (10). Boxing is one of these sports branches. The best, effective aspect and the most important feature of boxing that distinguishes it from other sports are its ability to enable the body to work in combination during boxing, to enable people to keep themselves under control and to develop self-confidence (3). Within this perspective, the study aims to compare the boxers who participated to the national team elections which was held in Ağrı province with the sub-dimensions of various courage scale in sports according to the demographic features. Boxing sport has a combined structure because its dynamic and static properties are high during bout and it is among fighting sports requiring high degree of athlete strength(14).

Various researchers have suggested a series of different definitions for courage concept (13). Courage means "to feel confident enough while doing a very challenging and dangerous work, bravery, valiantness" (http://www.tdk.gov.tr). An athlete must also have a sense of courage like other feelings in order to cover a distance fearlessly without falling down and to reach targeted point finally (2). When courage concept is examined pedagogically, it might be one of the important feelings that an athlete will have while coping up with fear in sports environment (5). When courage concept is examined again, it is nothing but a feeling. Courage is defined as adopting an attitude against events encountered, not being overwhelmed with fear and important choices made by athletes for themselves. In other words; instead of holding no fear, it can be accepted as ability and belief to do something despite fear (1). Courage which is defined (16) as a will to act voluntarily with or without fear

against a threat in order to reach an important and may be a moral goal, is a part of strong personality according(15). In this respect, athletes should act determinedly and bravely being conscious of their abilities in order to reach a goal and they shouldn't compromise on their persistence and sportsmanship. They should be able to move forward despite obstacles they encounter. (11). Another definition of courage concept can be made as high risk taking behavior of athletes within their owm limits in sports environment (4). If an athlete is not brave in front of his opponent, it means that he has already started the bout disadvantageously. Therefore, it can be said that courage is a prerequisite for a successful sports life (2). In addition, Kilmann et al. (9) emphasizes that courage may have a remarkable effect on long term success. All of these findings relating to courage and success might be important to study courage in sports.

It is an undeniable fact that boxing is sport that requires courage since it is a traumatic sport in which a superiority should be gained against the opponent.

MATERIAL AND METHOD

Descriptive Study; in a universe consisting of a large number of elements, it is a scanning arrangement made on all universe or on a group to be obtained from the universe with the aim of making a general judgment about the universe. The main purpose of such researches is to describe and explain the situation thoroughly.

Study Group

The nature of the study is constituted by 24 sport clubs and 87 athletes that came to Ağrı province to participate to the national team elections that was held in the East Anatolia region in 2018. The sample of the study consists of 61 athletes.

Data Collection Tool

In this research, personal information form which was prepared by the researcher were utilized as data collection tool and scale of courage in sports which was developed by Konter and Johan (2012), were used to determine the sense of courage in athletes.

5 point likert type scale was utilized in the study and it consists of 5 sub-dimensions. (1= Totally agree, 5= Totally disagree) **Competence-proficiency** (self-confidence) (Items 1-6-11-16-21-24-27, a=0,82); **Consistency** (Items 2-7-12-17- 20-22-25-28-30, a=0,82); Boldness (Items 3-8-13-18-23-26-29, a=0,72); Taking risk (Dealing with anxiety) (Items 4-9-14-19, a=0,72); Being self-sacrificing (Items 5-10-15-31, a=0,61). The minimum score is 33 while it is 155 in maximum in the scale

Data Collection and Analysis

Boxers who were present in hall for national team selections were asked to fill the scales on voluntary basis before participating in selection. Normality test was performed for the data that was gathered and it was determined that data is not distributed normally. Therefore, non-parametric Kruskal Wallis H was used in the study while Mann Whitney U tests was performed in the comparisons of the scores of sub-dimensions in the scale that are related with mothers' educational level.

FINDINGS

Table 1. Frequency and Percentage Distributions Regarding Demographic Values and Sports Knowledge of Participants

Variables	Age group	f	%
Age group	18 -19 years	16	26.2
	20 -21 years	21	34.4
	22 -23 years	8	13.1
	23+ years	16	26.2
Place of residence where they live	Village	3	4.9
	District	10	16.4
	City Center	48	78.7
Educational status	Primary School	5	8.2
	High School	35	57.4
	University	21	34.4
Occupation of his/her father	Worker	14	23.0
	Civil Servant	12	19.7

	Tradesman	24	39.3
	Retired	4	6.6
	Farmer	7	11.5
Occupation of his/her mother	Housewife	50	8.0
	Other	11	18.0
The category in which he/she represents the country	Not national team member	23	37.7
	Youth Setup	14	23.0
	Young National Team	8	13.1
	National Team A	16	26.2
Has he/she experienced trauma before bout?	Yes	4	6.6
	No	57	93.4
Financial Status	Low	17	27.9
	Middle	23	37.7
	Upper Middle	7	11.5
	High	11	18.0
	Very High	3	4.9
For how many years has he/she been boxing?	1 -3 years	12	19.7
	4 -6 years	18	29.5
	7 -9 years	12	19.7
	9+ years	19	31.1

When table is examined, it is seen that 26,2% of the participants are in age group 18-19, 34,4% are in age group 20-21, 13,1% are in age group 22-23 and 26,2% are in age group 23+, and 4,9% of them live in village, 16,4% live in district and 78,7% live in city center. 8,2% of the participants are primary school graduate, 57,4% are high school graduate and 34,4% are university graduate. It is seen that fathers of 23% of the participants are worker, fathers of 19,7% of them are civil servant, fathers of 39,3% of them are tradesman, fathers of 6,6% of them are retired, fathers of 11,5% of them are farmer and mothers of 82% of them are housewife and mothers of 18% of them are in other occupational group. 37,7% of the participants do not represent the country, 23% are in youth setup, 13,1% are in young national team and 26,2% are in national team. 6,6% of the participants experienced severe trauma before the bout and 93,4% did not experienced severe trauma before the bout. Financial status of 27,9% of the participant is low, financial status of 37,7% is upper middle, financial status of 18% is high and financial status of 4,9% is very high. 19,7% of the participants have been boxing for 1-3 years, 29,5% have been boxing for 4-6 years, 19,7% have been boxing for 7-9 years and 31,1% have been boxing for 9+ years.

Table 2. *Descriptive Statistics Regarding Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing*

Sub-dimensions	**N**	**Minimum**	**Maximum**	**X**	**Ss**
Competence-proficiency	61	8	35	23.36	6.189
Determination	61	14	45	37.67	7.215
Boldness	61	15	35	28.59	5.248
Taking risk	61	6	20	15.72	4.050
Being self-sacrificing	61	6	20	15.93	3.799

When table is examined, it is seen that participants' levels of competence-proficiency are above medium and their levels of determination, boldness, taking risk and being self-sacrificing are high

Table 3. *Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Age Groups*

Sub-dimensions	**Age groups**	**N**	**X**	**Ss**	**Mean rank**	**x^2**	**p**
Competence-proficiency	**18 -19 years**	16	22.63	6.174	29.91	2.862	.413
	20 -21 years	21	22.10	6.395	27.38		
	22 -23 years	8	23.75	6.692	30.44		
	23+ years	16	25.56	5.621	37.13		
Determination	**18 -19 years**	16	38..4	4.258	29.78	.573	.903
	20 -21 years	21	38.10	5.957	30.64		
	22 -23 years	8	36.13	12.789	35.31		
	23+ years	16	37.13	7.999	30.53		
Boldness	**18 -19 years**	16	28.63	3.914	29.41	.793	.851
	20 -21 years	21	29.57	4.611	33.76		
	22 -23 years	8	27.13	7.699	29.13		
	23+ years	16	28.00	6.000	29.91		
Taking risk	**18 -19 years**	16	14.13	4.272	23.94	4.011	.260

	20 -21 years	21	16.10	3.208	31.60		
	22 -23 years	8	16.00	5.477	34.81		
	23+ years	16	16.69	3.962	35.38		
Being self-sacrificing	**18 -19 years**	16	16.38	2.825	31.75	1.349	.717
	20 -21 years	21	16.57	3.501	33.67		
	22 -23 years	8	15.13	5.566	30.50		
	23+ years	16	15.06	4.123	27.00		

When table is examined, it is seen that age group 23+ has the highest average in competence - proficiency and taking risk sub-dimensions, and participants in age group 18-19 have the highest average in determination sub-dimension. Again, it is seen that participants in age group 20-21 have the highest average in boldness and being self-sacrificing sub-dimensions however, there is no statistically significant difference between averages of participants in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions in terms of age groups (p>0,05).

Table 4. *Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Type of Place of Residence Where They Live*

Sub-dimensions	**Type of Place of Residence**	**N**	**X**	**Ss**	**Mean rank**	**x^2**	**p**
Competence-proficiency	**Village**	3	20.33	13.051	25.00	1.491	.475
	District	10	21.60	4.248	25.90		
	City Center	48	23.92	6.052	32.44		
Determination	**Village**	3	39.00	6.245	32.33	.848	.654
	District	10	36.00	7.916	26.30		
	City Center	48	37.94	7.212	31.90		
Boldness	**Village**	3	29.00	7.000	32.67	.780	.677
	District	10	27.40	5.400	26.50		
	City Center	48	28.81	5.209	31.83		
Taking risk	**Village**	3	14.67	5.859	26.17	1.523	.467
	District	10	14.50	3.894	25.55		
	City Center	48	16.04	4.010	32.44		
Being self-sacrificing	**Village**	3	16.00	4.000	31.17	1.887	.389
	District	10	14.60	3.950	24.05		
	City Center	48	16.21	3.781	32.44		

When table has been examined, it has been found that participants living in city center have the highest average in competence -proficiency, taking risk and being self-sacrificing sub-dimensions and participants living in village have the highest average in determination and boldness sub-dimensions. However, it is seen that there is no statistically significant difference between averages of participants in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions in terms of places where participants live (p>0,05).

Table 5. *Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Educational Status*

Sub-dimensions	**Educational status**	**N**	**X**	**Ss**	**Mean rank**	**x^2**	**p**
Competence-proficiency	**Primary School**	5	26.40	4.879	40.30	1.541	.463
	High School	35	23.40	6.908	30.53		
	University	21	22.57	5.105	29.57		
Determination	**Primary School**	5	40.60	5.128	38.90	3.516	.172
	High School	35	38.14	7.777	33.14		
	University	21	36.19	6.577	25.55		
Boldness	**Primary School**	5	32.60	2.074	45.10	5.569	.062
	High School	35	28.91	5.495	32.40		
	University	21	27.10	4.888	25.31		
Taking risk	**Primary School**	5	17.00	4.123	37.90	1.063	.588
	High School	35	15.34	4.284	29.54		
	University	21	16.05	3.721	31.79		
Being self-sacrificing	**Primary School**	5	17.20	3.564	36.80	4.904	.086
	High School	35	16.49	3.883	34.26		

	University	21	14.71	3.552	24.19		

When table has been examined, it has been found that participants who are primary school graduates, have the highest average in competence -proficiency, determination, boldness taking risk and being self-sacrificing sub-dimensions. However, it is seen that there is no statistically significant difference between averages of participants in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions in terms of their educational status (p>0,05).

Table 6. *Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Their Fathers' Occupations*

Sub-dimensions	Occupation	N	X	Ss	Mean rank	x^2	p
Competence-proficiency	**Worker**	14	25.14	5.696	36.07	3.317	.506
	Civil Servant	12	24.75	5.910	34.79		
	Tradesman	24	22.63	6.128	28.52		
	Retired	4	19.00	8.367	22.63		
	Farmer	7	22.43	6.528	27.64		
Determination	**Worker**	14	39.93	4.446	35.79	4.028	.402
	Civil Servant	12	36.50	8.765	29.17		
	Tradesman	24	37.08	7.378	29.27		
	Retired	4	42.50	1.915	42.13		
	Farmer	7	34.43	9.090	24.14		
Boldness	**Worker**	14	29.57	4.502	33.61	3.418	.490
	Civil Servant	12	27.92	5.915	29.58		
	Tradesman	24	28.33	5.027	29.52		
	Retired	4	32.50	2.646	44.25		
	Farmer	7	26.43	6.925	25.71		
Taking risk	**Worker**	14	16.43	5.140	35.93	2.429	.657
	Civil Servant	12	16.25	3.934	33.50		
	Tradesman	24	15.29	3.432	27.90		
	Retired	4	16.00	4.082	31.38		
	Farmer	7	14.71	4.608	27.29		
Being self-sacrificing	**Worker**	14	16.93	2.786	34.46	1.234	.872
	Civil Servant	12	16.17	4.130	32.50		
	Tradesman	24	15.75	3.698	29.71		
	Retired	4	16.25	2.500	30.00		
	Farmer	7	14.00	5.802	26.50		

When table has been examined, it has been found that participants whose fathers are worker, have the highest average in competence -proficiency and being self-sacrificing sub-dimensions. It has been determined that participants whose fathers are retired, have the highest average in determination and boldness sub-dimensions and participants whose fathers are civil servant, have the highest average in taking risk sub-dimension. However, it is seen that there is no statistically significant difference between averages of participants in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions in terms of their fathers' occupations (p>0,05).

Table 7. Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Their Mothers' Occupations

Sub-dimensions	Occupation	N	X	Ss	Mean rank	Rank sum	U	p
Competence-proficiency	**Housewife**	50	23.72	6.034	31.89	1594.50	230.5	.403
	Other	11	21.73	6.915	26.95	296.50		
Determination	**Housewife**	50	38.62	6.240	32.85	1642.50	182.5	.081
	Other	11	33.36	9.831	22.59	248.50		
Boldness	**Housewife**	50	28.84	4.782	31.27	1563.50	261.5	.799
	Other	11	27.45	7.174	29.77	327.50		
Taking risk	**Housewife**	50	15.76	3.931	31.03	1551.50	273.5	.977
	Other	11	15.55	4.762	30.86	339.50		

Being self-sacrificing	**Housewife**	50	16.10	3.727	31.71	1585.50	239.5	.501
	Other	11	15.18	4.215	27.77	305.50		

When table has been examined, it has been found that participants whose mothers are housewife, have the highest average in competence -proficiency, determination, boldness taking risk and being self-sacrificing sub-dimensions. However, it is seen that there is no statistically significant difference between averages of participants in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions in terms of their mothers' occupations (p>0,05).

Table 8. Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Category in Which They Represent The Country

Sub-dimensions	Category	N	X	Ss	Mean rank	x^2	p
Competence-proficiency	**Not national team member**	23	22.70	6.505	29.37	1.513	.679
	Youth Setup	14	22.43	4.292	28.25		
	Young National Team	8	23.13	7.434	31.81		
	National Team A	16	25.25	6.638	35.34		
Determination	**Not national team member**	23	38.39	6.638	32.39	1.765	.623
	Youth Setup	14	36.00	7.483	25.93		
	Young National Team	8	37.50	7.010	30.00		
	National Team A	16	38.19	8.272	33.94		
Boldness	**Not national team member**	23	29.00	5.135	32.17	2.531	.470
	Youth Setup	14	26.93	5.413	25.25		
	Young National Team	8	28.38	4.926	29.38		
	National Team A	16	29.56	5.561	35.16		
Taking risk	**Not national team member**	23	15.74	3.922	30.54	1.680	.641
	Youth Setup	14	15.79	3.332	30.14		
	Young National Team	8	14.25	4.683	25.63		
	National Team A	16	16.38	4.646	35.09		
Being self-sacrificing	**Not national team member**	23	16.17	3.025	30.80	.024	.999
	Youth Setup	14	15.86	4.258	31.43		
	Young National Team	8	16.00	3.928	31.50		
	National Team A	16	15.63	4.603	30.66		

When table has been examined, it has been found that participants who are national team A members, have the highest average in competence -proficiency, boldness and taking risk sub-dimensions and participants who are not national team members, have the highest average in determination and being self-sacrificing sub-dimensions. However, it is seen that there is no statistically significant difference between averages of participants in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions in terms of their status of representing the country (p>0,05).

Table 9. Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Their Financial Status

Sub-dimensions	Financial Status	N	X	Ss	Mean rank	x^2	p
Competence-proficiency	**Low**	17	24.88	6.373	34.71	1.302	.861
	Middle	23	22.91	6.119	29.93		
	Upper Middle	7	23.14	4.670	30.57		
	High	11	22.09	7.765	27.41		
	Very High	3	23.33	3.786	32.33		
Determination	**Low**	17	40.47	4.230	37.15	3.507	.477
	Middle	23	37.17	6.386	28.30		
	Upper Middle	7	36.43	5.593	24.71		
	High	11	36.45	9.832	31.50		
	Very High	3	33.00	16.643	29.67		
Boldness	**Low**	17	29.71	4.469	34.03	.989	.911
	Middle	23	28.13	4.911	28.93		
	Upper Middle	7	29.57	2.370	32.07		
	High	11	27.55	6.977	29.32		
	Very High	3	27.33	10.786	33.33		
Taking risk	**Low**	17	16.71	4.165	35.32	3.083	.544

	Middle	23	15.17	3.688	28.04		
	Upper Middle	7	17.14	2.410	36.29		
	High	11	15.18	4.729	29.36		
	Very High	3	13.00	6.557	22.83		
Being self-sacrificing	**Low**	17	16.94	3.071	35.32	2.627	.622
	Middle	23	15.87	3.900	30.76		
	Upper Middle	7	16.43	2.149	29.71		
	High	11	15.09	4.742	28.91		
	Very High	3	12.67	5.859	19.00		

When table has been examined, it has been found that participants whose financial status is low income, have the highest average in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions. However, it is seen that there is no statistically significant difference between averages of participants in competence-proficiency, determination, boldness, taking risk and being self-sacrificing sub-dimensions in terms of their financial status (p>0,05).

Table 10. *Comparison of Participants' Status of Competence-Proficiency, Determination, Boldness, Taking Risk and Being Self-Sacrificing According to Years of Boxing*

Sub-dimensions	Year	N	X	Ss	Mean rank	x^2	p
Competence-proficiency	**1 -3 years**	12	21.25	3.361	25.17	3.390	.335
	4 -6 years	18	23.56	6.022	32.28		
	7 -9 years	12	25.83	5.750	37.83		
	9+ years	19	22.95	7.685	29.16		
Determination	**1 -3 years**	12	37.58	4.481	27.75	2.394	.495
	4 -6 years	18	37.44	6.671	29.31		
	7 -9 years	12	40.00	6.836	37.83		
	9+ years	19	36.47	9.246	30.34		
Boldness	**1 -3 years**	12	28.92	4.441	30.83	2.134	.545
	4 -6 years	18	27.78	4.236	26.83		
	7 -9 years	12	30.00	5.410	36.38		
	9+ years	19	28.26	6.539	31.66		
Taking risk	**1 -3 years**	12	14.58	3.423	24.83	3.551	.314
	4 -6 years	18	15.17	4.134	28.44		
	7 -9 years	12	16.33	3.651	33.29		
	9+ years	19	16.58	4.586	35.87		
Being self-sacrificing	**1 -3 years**	12	16.50	2.939	32.33	.116	.990
	4 -6 years	18	16.28	3.025	31.14		
	7 -9 years	12	15.75	4.181	30.79		
	9+ years	19	15.37	4.775	30.16		

When table has been examined. it has been found that participants who have been boxing for 7-9 years. have the highest average in competence-proficiency. determination and boldness sub-dimensions and participants who who have been boxing for 9+ years. have the highest average in taking risk sub-dimension. It is seen that participants who have been boxing for 1-3 years. have the highest average in being self-sacrificing sub-dimension however. there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of years of boxing (p>0.05)

DISCUSSION AND CONCLUSION

When we analyze findings of the study which has been carried out in order to analyze courage levels of boxers according to some independent variables and to reveal relationship between them. it is seen that age group 23+ has the highest average in competence - proficiency and taking risk sub-dimensions. participants in age group 18-19 have the highest average in determination sub-dimension. participants in age group 20-21 have the highest average in boldness and being self-sacrificing sub-dimensions however. there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-

sacrificing sub-dimensions in terms of age groups. When literature is reviewed. it is seen that different results that are not parallel with our study have been obtained. When we review results of the study carried out by Güvendi et al. relating to wrestlers' mental endurance and courage levels. it is seen that there is no significant difference in terms of age variable (8). However. it has been concluded that age is positively related to sportive courage when study. Again. in the thesis of (12) named Comparison of courage levels of individual and team athletes in sports. it has been concluded that age causes significant difference in terms of sportive courage.

According to the results of analysis. it is seen that there is no statistically significant difference between averages of participants of the study in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of places where participants live. When literature was reviewed. no comparison could be made since there were not many studies found in this field. It is thought that the reason of the result obtained from our study is the fact that working environments of the athletes are same although their living environments are different.

As a result of findings obtained in the study. it is seen that there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of their educational status. When literature has been reviewed. it has been stated that there is no difference in elite athletes' scores obtained from sportive self-confidence scale in terms of educational status according to results of the study carried out by (7) relating to contribution of self-confidence to performances of elite athletes fighting in the field of boxing

It is seen from study findings that there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of their fathers' occupations. When literature was reviewed. no comparison could be made since there were not many studies found in this field. It is thought that the reason of the result obtained from our study is the fact that athletes focus on only this area in order to improve themselves in this area they fight and they don't consider some factors such as their fathers' occupations to ensure that these factors do not affect them.

As a result of findings obtained. it is seen that there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of their mothers' occupations. When literature was reviewed. no comparison could be made since there was not any study found in this field. It is thought that the reason of the result obtained from our study is the fact that athletes focus on only this area in order to improve themselves in this area they fight and they don't consider some other factors such as their mothers' occupations to ensure that these factors do not affect them.

According to the results of analysis. it is seen that there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of their status of representing the country. İnterpreted courage perception as dealing with and overcoming individual's fear of physically overwhelming harm or death. Starting from this point. it can be said that national boxers can take more risks because of psychological motivation resulting from feeling of representing the country and they don't stop fighting with their opponents to reach the result even in difficult situations (13).

According to the results of analysis. it is seen that there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of participants' financial status. According to information obtained from literature reviews. Have stated in their study that there is no difference in elite athletes' scores obtained from sportive self-confidence scale in terms of educational status (7).

According to the results of analysis. it is seen that there is no statistically significant difference between averages of participants in competence-proficiency. determination. boldness. taking risk and being self-sacrificing sub-dimensions in terms of years of boxing. When literature is

review. same results are found again. When the sport times are associated. there are no significant differences. State that they cannot find a significant difference between sports time and courage. According to the results of this research. we can conclude that boxers who have less experience than the experienced ones. despite all kinds of difficulties. continue their struggle by forcing their limits and are more determined than the experienced ones(2).

Suggestions

Since there are not many studies relating to the subject in the literature. Studies to be carried out on courage perceptions by adding other demographic values will contribute to the field.

It is thought that new studies to be conducted by adding self-confidence which is one of the sub-dimensions of courage perception to the subject. will contribute to the related literature.

It is thought that new studies to be conducted in this field and investigation on how it will affect courage perception by adding psychological factors to courage perception. will contribute to the relevant literature and field.

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Renin-Angiotensin-Aldosterone System and Exercise

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Abstract

In this review, it is aimed to discuss the possible interactions between renin-angiotensin-aldosterone system and exercise for health and performance and to present new literature on this subject. From this point of view, an analysis of the experimental and clinical studies on this subject has been made. Physical exercise leads to a number of changes in the plasma levels of renin, angiotensin, and aldosterone, which represent the adaptation of the human body to a new biological environment. Significant ($P < 0.05$) increases occur in the levels of plasma renin, angiotensin and aldosterone especially in submaximal and maximal exercise intensity. Hormone levels return to normal with the end of the exercise. Factors such as age and gender, menstrual cycle, salt intake, posture, thermal tension, elevation, training, type of exercise have a major impact on the response of the RAA system to exercise. A relationship between physical activity and permanent endocrine changes could not be demonstrated.

Key Words: Renin-angiotensin-aldosterone system

INTRODUCTION

The RAA system is an endocrine system that plays an important role in many hemostatic events in the body. In particular, fluid-electrolyte balance, blood volume, and arterial blood pressure regulation and maintains the basic task of maintaining the physiological level (12, 17, 24, 39)

Research on this topic shows that the RAA system is immediately activated, especially with the loss of sodium and water in the body during exercise, and an increase in renin-angiotensin-aldosterone levels occurs. Some authors observed that renin and aldosterone levels increased during and after exercise, returned to pre-exercise levels during a rest period of 6-12 hours, and sodium and water excretion remained suppressed for up to 48 hours (10, 13). Staessen et al. (50) stated that plasma levels of angiotensin and aldosterone increased at similar rates in mild to moderate exercise (30% and 60%) or angiotensin II increased significantly more than PRA and aldosterone in maximal (above anaerobic threshold) exercises. However, it is hard to interpret hormonal changes because of the variety of environmental changes, the exercise protocol, and the characteristics of different subjects. Therefore, new research is needed.

The aim of this review is to discuss the possible interactions between RAA system and exercise for health and performance and to present new literature on this topic.

1. Renin

Renin is a proteolytic enzyme with glycoprotein structure and molecular weight of approximately 36000 daltons. However, some publications have reported that it is an (atypical) hormone. (15, 61).

1.1. Oscillation and Regulation

Juxtaglomerular cells in the kidney are the most important formations that release renin and are the major source of renin in plasma. However, in some tissues other than the kidney (salivary glands, vascular beds) renin is produced and released. The decrease in arterial pressure (hypotension), decreases tension (tonus) in renal arterioles and narrowing of renal arteries as a result of the decrease in pressure within the lumen and excessive decrease in circulating blood amount (hypovolemia) increases renin release (23, 41).

Catecholamines released by stimulation of the central nervous system and increased sympathetic activity greatly increase the release of renin in juxtaglomerular cells via sAMP and ◎-adrenergic receptors.

There is an inverse relationship between the concentration of Na and Cl passing through these

cells and the release of renin. Macular densa contains chemical receptors that are sensitive to sodium and chlorine ions in the filtrate. in the concentration of sodium and chlorine ions in the filtrate leads to the stimulation of the receptors in question. These stimulated receptors also increase the release of renin by affecting the adjacent juxtaglomerular cells (18, 41, 61).

2. Angiotensin

2.1. Oscillation and Regulation

Angiotensin is a plasma glycoprotein formed in the liver with a molecular weight of 55000 daltons. The renin enzyme released from the kidneys has an enzymatic effect on this angiotensinogen in the α2-globulin structure in plasma. As a result of this effect, renin angiotensinogen converts to angiotensin I. Renin remains in circulation for 30 minutes and during this time angiotensin, I continue to form. Angiotensin I is a peptide containing 10 amino acids and has a moderate vasoconstrictive effect. Therefore, it is not sufficient to make significant changes in blood circulation alone (15).

Angiotensin I, a few seconds after its formation, loses 2 amino acids with the effect of kininase II which exists mostly in the lungs, blood and organs (adrenal shell, kidney, liver, posterior pituitary, pancreas, spleen). and an angiotensin II, an 8-amino acid peptide, occurs. Angiotensin II is the most potent vasoconstrictive hormone known and has effects outside circulation (12).

2.2. The Effect

Angiotensins have two major effects. They are vasoconstriction and the increase of the release of aldosterone. Furthermore, thirst increases the release of antidiuretic hormones and reduces the formation of urine by stimulation of the central nervous system and the heart

3. Aldosterone

Three different mineralocorticoid hormones, aldosterone, deoxycosterone (DOC) and corticosterone, are released from the zona glomerulus of the adrenal gland cortex. These hormones are called mineralocorticoids because they act on electrolytes such as sodium, potassium, and chlorine, especially in extracellular fluids. Glucocorticoids are oxygen-free corticoids at carbon atom number 11. In a healthy person, about 50-250 mg of aldosterone and deoxycorticosterone are released per day. Therefore, plasma aldosterone level is very low (0.01μg / 100 ml). On the other hand, aldosterone provides 95% of the mineralocorticoid activity. The remaining 5% activity is also fulfilled by the other two mineralocorticoid hormones (41, 61)

3.1. The Structure

Aldosterone is similar in structure to corticosterone. However, the carbon atom number 18 of corticosterone has been replaced by an aldehyde group instead of the methyl group. Since this aldehyde group is adjacent to the hydroxyl (-OH) group at carbon atom number 1 in space, it allows the formation of the hemiacetal form of aldosterone. For this reason, aldosterone is present in the form of aldehyde and hemiacetal and is in equilibrium.

3.2. Oscillation and Regulation

A very small proportion of aldosterone that passes into the blood is bound to plasma proteins. The rest is free. The amount released is very small and the total plasma aldosterone level in humans is about 0.006 μg / dl. Aldosterone secretion is regulated by the following changes, particularly plasma potassium and angiotensin levels.

1. One of the most powerful stimulises that increase aldosterone secretion is potassium ions. Indeed, when potassium ions increase in extracellular fluids, the release of aldosterone increases. An increase in potassium ions up to 1 meq / L in the extracellular fluid leads to a threefold increase in aldosterone release. This potent effect of potassium ions is very important.

2. One of the important stimuluses that increase aldosterone secretion is the decrease in blood volume due to various reasons. Hemorrhage, use of diuretics, ganglion blockade in the case of low salt intake and the decrease of the extracellular fluid volume in some important chronic diseases cause to the reduction in the bloodstream and arterial pressure.

3. Aldosterone secretion is not as sensitive to plasma sodium as it is at the potassium level. Therefore, the reduction of sodium ions (hyponatremia) in extracellular fluid or blood is a weak stimulus that causes aldosterone release. A decrease in plasma sodium level of up to 20 meq / L may indirectly increase aldosterone release.

4. The effect of sodium level and ACTH in the control and regulation of aldosterone release is not

as potent as potassium ions and angiotensin, in other words, it is insignificant. Indeed, as a result of ACTH injection, aldosterone secretion initially increases for several days, but the effect then disappears. While ACTH increases the release of glucocorticoids, it also plays a role in preparing for the partial release of aldosterone if even it is for a short while(61).

3.3. The Effect

The most important effect of aldosterone is on renal distal tubules and collector channels. It acts on sodium, potassium and water metabolism and regulates the concentration of these substances in intercellular fluids and blood. While Aldosterone provides the absorption of sodium ions from the renal tubules, on the other hand, it increases the urine extraction of potassium ions and, to a lesser extent, hydrogen ions (18).

4. Physiology of Renin-Angiotensin-Aldosterone System

The RAA system is an endocrine system that plays an important role in many homeostatic events in the body. In particular, it takes on a basic task in the regulation of fluid-electrolyte balance, blood volume, and arterial blood pressure and maintaining at the physiological levels (12, 17, 24, 39). Following bleeding, loss of sodium or fluid, systemic blood pressure decreases. This decrease leads to a decrease in intrarenal perfusion pressure. This leads to an increase of renin secretion by juxtaglomerular cells. Major signals leading to juxtaglomerular cells and causing renin secretion are; the reduction of tension of renal afferent arteriole wall (vascular baroreceptor), the decrease in the concentration of NaCl in macula densa and stimulation of juxtaglomerular adrenergic receptors.

In plasma, renin hydrolyzes angiotensinogen, an ot2 globulin, which is mainly synthesized by the liver, to angiotensin I (a decapeptide). In angiotensin I ACE (angiotensin-converting enzyme) produced by the lungs is converted to angiotensin II (octapeptide). Angiotensin II initiates some biological events by being bound to specific receptors in the target organs. Its main effects are; increase in vascular tone and increase of aldosterone secretion in adrenal zona glomerulosa. Aldosterone results in sodium retention and potassium excretion by increasing the activity of the sodium-potassium pump in the distal tubule cells. Positive sodium balance reduces renin secretion through negative feedback by leading to an increase in plasma volume with fluid retention (12, 13).

Circulating angiotensin II also directly inhibits renin secretion. Thus, angiotensin II and aldosterone cooperate to revitalize renal perfusion and increase blood pressure.

Since the repressive effect of angiotensin II is increased by sodium uptake and reduced by sodium loss, the amount of angiotensin II and plasma sodium are in an interaction in the regulation of systemic blood pressure. The RAA system also controls potassium balance. Hyperkalemia stimulates aldosterone secretion and aldosterone increases potassium excretion by activating the renal Na / K pump. Aldosterone secretion also decreases with the decrease of potassium level (13, 18).

5. Effect of Physical Exercise on the Renin-Angiotensin-Aldosterone System

In many studies in the 1950s, a decrease in renal perfusion pressure was mentioned during physical exercise. In studies using renal clearance measurement techniques with para-amino hippuric acid (PAH), a decrease in renal plasma flow was associated with the intensity of the study and it has been shown that a decrease in exercise in the hot environment increases further (21). In the following years, with the development of radioimmunoassays (IUD) system, renal ischemia has been defined as the main stimulant of the mechanisms regulating renin secretion.

Studies on the effect of physical activity in animals and humans have shown significant increases in plasma renin level or activity (14). The magnitude of the renin increase was found to be related to the severity of exercise (28).

Subsequent studies have confirmed these observations, and renal hypoperfusion is now considered to be the physiological mechanism of renin stimulation (3, 50)a However, there are other possible factors and other stimuluses to the juxtaglomerular cells for renin secretion. With this in mind, valid hypotheses can be summarized as follows:

1. Exercise causes a significant loss of sodium and water through perspiration if performed in a heavy and hot environment. This leads to the reduction of extracellular fluid and thus renal perfusion decreases. While Physical exercise also causes more blood to be delivered to muscle tissue,

which requires more oxygen consumption and reduces renal perfusion further. As a result, sodium loss stimulates renin secretion by reducing sodium filtration from glomeruluses and decreasing sodium levels in macula densa.

2. Physical activity increases renal sympathetic tone by activating adrenoreceptors on juxtaglomerular cells. This leads to an increase of renin secretion. Increase of sympathetic tone leads to vasoconstriction of the afferent arteriole, thus causes to renal hypoperfusion and renin secretion. Catecholamines in circulation, mainly norepinephrine, which stimulate adrenoreceptors in vessels and at the level of juxtaglomerular cells increase during physical stress. the activation of the adrenergic system generating with some hemodynamic changes in working muscles, such as increases in peripheral vascular resistance caused by reflexes generated by afferent impulses, are mainly related to response to the isometric exercise (29).

3. The increase of blood flowing from the Splanchnic circulation to the muscles during exercise decreases hepatic blood circulation and reduces the metabolic clearance of renin (44).

In recent studies, after it was shown that angiotensin II is the main regulator of steroid production in adrenal zona glomerulose, the renin-angiotensin response was started to be investigated together with aldosterone response. This event helped explain the physiological meaning of the increase in renin.

Costill et al (10) first emphasized the role of aldosterone as the sodium-retaining hormone, which is controlled by angiotensin II and prevents sodium loss bond up with long-term exercise perspiration. Some authors observed that renin and aldosterone levels increased during and after exercise, returned to pre-exercise levels during a rest period of 6-12 hours, and sodium and water excretion remained suppressed for up to 48 hours.

Many investigators have suggested that this observation may explain edema in the lower parts of the leg that is frequently reported after prolonged exercises (35, 58). Alterations in the RAA system against various types of exercise have been handled in other studies demonstrating parallel increases in renin, angiotensin II, and aldosterone levels (8, 27).

Staessen et al (50) found that plasma levels of angiotensin and aldosterone increased with similar rates of PRA in mild and moderate exercise (30% and 60%), or that angiotensin II increased significantly more than PRA and aldosterone in maximal (above anaerobic threshold) exercises.

These authors hypothesize that metabolic acidosis due to excessive anaerobic exercise inhibits the breakdown of angiotensin II, or that adrenal glomerulosa may have a delayed response to a sudden increase in angiotensin II. However, There are different judgments between the response of aldosterone to exercise and the response of PRA and angiotensin II. Because it is possible that other mechanisms interfere in aldosterone regulation (13).

Bonelli et al (5) Reported that the administration of propranolol, a beta-adrenergic blocker, in humans may suppress renin release during exercise but does not affect the increase in aldosterone levels. This disclosure brings to mind that an increase in serum potassium level may directly stimulate aldosterone release. Evidence supporting this concept is the increase in intra- and extracellular potassium levels due to physical exercise shown in many studies (13, 57). Similarly, the ACE inhibitor which blocks the formation of angiotensin II had no effect on the aldosterone response to captopril, maximal exercise (53). Furthermore, since potassium level drops during exercise after captopril administration, ACTH may act as an aldosterone stimulant. Recently, it was found that an increase in aldosterone was associated with an increase in ACTH in submaximal exercise and it was interesting that cortisol, mainly regulated by ACTH increased only in maximal exercise (100% Max VO2). Thus, it is clear that aldosterone secretion during exercise can be regulated by many factors that may be dependent or independent of each other. Whether or not any of these factors is dominant may also depend on the working conditions. Whether endogenous or exogenous, all of these factors potentially affect the response of RAA such in other hormonal responses. Some of these are explained below.

5.1. Age and Gender

According to current information, there are no specific findings to demonstrate age-related differences in response to exercise in the RAA system. However, resting levels of renin and aldosterone are known to decrease with age. Maresh et al (33) report that maximal exercise causes a higher increase in plasma renin activity and aldosterone levels in women than in men.

Kinugawa et al (25) applied to the subjects 15-minute submaximal treadmill test in their study on 20 men (31.9 ± 1.3 years) and 15 women (29.2 ± 2.5 years) without voluntary training.

Plasma renin activity during rest and exercise was found to be higher in males than females. In plasma aldosterone level, Although the resting value was higher in men, no difference was found between the two groups during and after exercise. When basal and peak renin-angiotensin-aldosterone system activities of all subjects were examined, a positive correlation was found between pre- and post-exercise measurements.

The response of the renin-angiotensin and aldosterone system to maximal and submaximal exercises in sedentary people is significantly higher. However, it was reported that there was no significant difference in the terms of gender in other parameters except plasma renin activity (25)

5.2. Menstrual Cycle

Hormones that balance the body's water sodium levels vary considerably throughout the menstrual cycle. In eumenorrheic athletes, pre-exercise levels of renin and aldosterone were found to be higher in the mid-luteal phase of the menstrual cycle than in the follicular phase. While the increase in PRA was similar in both of these menstrual phases during submaximal exercise (80% Max VO2), aldosterone response was reported to be greater during the mid-luteal phase than during the follicular phase (51).

High levels of aldosterone after rest and exercise may be due to the high level of progesterone (56). This may lead to a decrease in the sodium-potassium ratio and a reduction in the sodium-potassium loss by sweating. however, in amenorrheic athletes, the resting level of aldosterone is higher than in eumenorrheic athletes, progesterone levels are lower in amenorrheic athletes, and the aldosterone response to exercise is similar to that of eumenorrheic athletes during the follicular phase. In this case, high aldosterone level is seen to be consistent with the overall increase in adrenal cortical activity (11).

5.3. Posture

In a study by Wolf et al (60) who examine the effect of posture on the renin-angiotensin-aldosterone system in moderate exercise and rest on 5 healthy male subjects, the subjects were rested in a supine position for 15 minutes in water and then in a sitting position outside the pool. The decrease in plasma renin activity between the two conditions was insignificant according to the blood samples taken from the subjects. Aldosterone levels were found to be lower and insignificant in the supine resting position in the water than in the normal sitting position.

Afterward, Cycling ergometer test in the supine position with loading intensity and freestyle swimming in the water were done by subjects (40-50% Max VO2). Plasma renin activity and aldosterone levels significantly increased according to blood samples taken 15 minutes after exercise. No difference was found between the two exercises in terms of plasma renin activity and aldosterone levels. Moderate and short-term exercises stimulate renin and aldosterone production. It was emphasized that the increase in renin and aldosterone levels were lower in moderate exercise (40-50% Max VO2) in horizontal position than standing exercise (59).

It has been reported that the inhibitory effects of extraneous effects on renin-angiotensin and aldosterone on the aldosterone system are at a negligible level during exercises such as moderate swimming and staying supine in water (60).

5.4 Salt Intake

During the implementation of diets containing normal and high sodium, short-term exercise leads to a marked increase in renin level. However, there was no increase in renin level in long-term exercise in the case of salt loading (3).

Morgan and ark. (38) divided 8 male subjects into two groups and subjected them to a 2-hour exercise (Max VO2) at 38 ± 0.0 C and in a 60 ± 1.1% humid room. During exercise, one group did not take any liquid (dehydration), the other received 20 mmol L sodium chloride solution before and after every 15 minutes of exercise. Blood samples and each amount of perspiration lost were taken just before the exercise and at the 60th and 120th minutes of the exercise. According to the results obtained, plasma aldosterone (Dehydration: 53.8 ± 3.8, Euydration: 40.0 ± 4.3 ng/dl) level was found to be more significant in the dehydration trial than the Euydration trial ($P < 0.05$).

A large amount of perspiration (Na) and Cl loss can occur in acute exercise in a warm environment without taking fluid. This is potentially related to

the amount of Na in the extracellular fluid, plasma aldosterone secretion and sympathetic nerve activity (38)

5.5. Thermal Tension

Following prolonged exposure to heat stress, The reduction in sodium output by sweat glands as an adaptation is a well-known mechanism. At rest, there is also a decrease in sodium secretion as an effect of an increase in aldosterone and renin (16). While the increase in aldosterone is significantly suppressed in parallel with the period of adaptation to the environment, after adaptation to a warm environment, a further reduction in sodium concentration occurs with sweat during exercise. This is interpreted as an increase in the response of eccrine sweat glands to aldosterone (16).

In a study conducted by Armstrong et al (2) on 13 healthy men who were not acclimatized to the heat, subjects exercised for 8 days in a room at 41.2ºC and rested for 44 minutes. The 1st, 4th. On the 8th days of the study, blood samples were taken from the subjects before and after training and plasma renin, angiotensin and aldosterone values were evaluated. According to this, significant increases in renin, angiotensin and aldosterone values occurred in the measurements on the 1st and 8th days.

5.6. The Elevation

Many observations show abnormal RAA response to exercise during hypoxemia (non-hypobaric) or high altitude exposure. While some authors report that renin values are low and high after rest or exercise, the majority of studies show that elevation has a suppressive effect on aldosterone levels in both conditions (36, 49). Furthermore, the difference between renin and aldosterone response during hypoxemic exercise is widely accepted (6, 31, 48). As a possible explanation of this phenomenon, several different mechanisms have been proposed, such as the reduction in the conversion of angiotensin I to angiotensin II, and the effect of an angiotensin II inhibitor mediating aldosterone secretion, reducing the time of pulmonary passage limiting contact between angiotensin I and membrane-bound ACE. (9, 36). Although there is no evidence of a-adrenergic inhibitor mechanism, recent studies have shown that ANP and digoxin-like factors are likely aldosterone inhibitors (6). The difference between renin and aldosterone response during height exposure disappears over time. This shows that there is an adaptation mechanism.

Suppression of aldosterone response to increased PRA after rest or exercise may have an important role in preventing pulmonary edema and excessive sodium retention in acute mountain disease during rapid ascent to over-elevation (30). Bocqueraz et al (4) subjected 13 male subjects to 60-minute cycling exercise in the four cases, in normoxia and hypoxia (PB = 594 hPa), 55% and 75% of maximal aerobic power. Before exercise, Plasma renin and aldosterone levels were measured from blood samples taken at 15, 30, 45 and 60th minutes of exercise. A significant variation in plasma renin and aldosterone levels did not occur in exercise in 55% of maximal aerobic power in hypoxia and normoxia, whereas a significant increase in plasma renin and aldosterone levels occurred in exercise in 75% of maximal aerobic power in hypoxia and normoxia.

5.7. Training

Although there is no evidence that training affects resting levels of renin and aldosterone, renin and aldosterone levels after exercise showed less increase in trained people than untrained (19, 34). This indicates that the fluid transfer from the extravascular space to the intracellular compartment is less during exercise.

Differently, some authors state that the increase in renin and angiotensin II levels is similar between trained and untrained individuals in studies where hormone values are kept close to each other by minimizing differences such as age, gender and body weight. Studies in which the same group of subjects as female basketball players are used show that the increase in renin and aldosterone after maximal exercise is significantly different according to before and after the basketball season (33)

Patlar (42) had seven healthy sedentary men performed exhaustion exercise on an acute cycling ergometer. At the end of the study, before and after exercise, the measured plasma renin, and aldosterone levels 2 and 24 hours after exercise. Plasma renin and aldosterone levels significantly increased immediately after exercise. It was reported that renin and aldosterone levels 2 hours after

exercise decreased to pre-exercise level and also decreased to below rest level 24 hours after exercise.

Mannix and et al (32) subjected 10 healthy sedentary men to exercise on a bicycle ergometer with a load gradually increased until the fatigue occurs. When the blood samples taken from the subjects were evaluated, it was stated there was a significant increase in plasma renin and aldosterone concentrations during exercise (from Ald 11.2 ± 2.2 18.8 ± 3.4 ng/dl; Ren 5.1 ± 1.1 to 8.2 ± 1.6 ng/ml) ($P < 0.05$). And there was a positive correlation between plasma renin and aldosterone concentrations ($r = 0.80$; $P < 0.001$). Altenkirch et al (1) checked the subjects' renin and aldosterone levels after a testing marathon (42.195m.) applied to 16 well-trained men. Before and after training, blood samples were taken from the subjects after 3 hours and after 31 hours. According to this example, significant increases in renin-aldosterone concentrations occurred before and after training. Hormones that regulate fluid play an important role in providing fluid regulation during and immediately after long-term physical exercises. However, they do not show the same effect in later periods (1).

5.8.The Type of Exercise

Intense physical exercise completely disrupts body homeostasis. It causes metabolic and hemodynamic changes not only in skeletal muscles but also in distant organs. In response to acute physical exercise, a reduction in glomerular filtration occurs with stimulation of the renin-angiotensin-aldosterone system (45). Patlar (43) reported that acute and 4-week chronic submaximal exercise applied to football players caused significant changes in plasma renin and aldosterone levels. Accordingly, acute and chronic exercise increases plasma renin and aldosterone levels significantly. Two hours of rest and fluid intake after exercise reduces plasma renin and aldosterone levels to pre-exercise level. In the male runners who participated in long-distance running races, aldosterone levels gradually increased (500 km race of 18 laps over 20 days), accordingly, sodium excretion decreased with urine and it was reported that aldosterone and sodium excretion levels returned to normal after 70 hours of rest (52). In marathon runners, it was determined that aldosterone secretion increased significantly after completion of the race and returned to normal after 22 hours (40, 47).

Increases in PRA and aldosterone after maximal exercise based on swimming were determined lower than those observed after maximal exercise during running (22). This phenomenon is linked to different hemodynamic conditions between running and swimming. As a matter of fact, the fluid change and the water pressure caused by the horizontal position can reduce the PRA response to exercise. While Some other studies have confirmed that PRA and aldosterone levels are lower after immersion, there is no report of changes in renin and aldosterone levels after maximal or submaximal exercise during swimming (52). Ghaemmaghami et al (20) , in a study performed on rats doing swimming exercise, found a significant increase in plasma renin activity after training in which maximal VO2 consumption of rats increased by 10% and plasma osmolality increased by 2%. After the training, While a 10% decrease in body weight of rats and a 6% in blood pressure occurs, a 10% significant decrease in plasma osmolality and a 4% in Na concentrations occur. According to these results, it can not be said that swimming exercises lower blood pressure. In another study, Warburton et al (54) randomly divided 20 sedentary (30 years ± 4) men into 3 groups (Control group, continuous running group, interval training group). The exercise group subjects followed their unique training program for 12 weeks. In the measurements after exercise, significant variations were provided in Max VO2, throb volume and blood pressures of the exercise groups. While, in angiotensin II concentration, A significant improvement was being obtained in both groups 1 week after the start of exercise, but this value returned to its normal level in the following weeks. In addition, no significant difference was found between the groups that were subjected to different training programs in terms of hormones providing fluid regulation.

CONCLUSION

Studies over the last 20 years have tried to explain the role of the RAA system in the physiological response to physical exercise.

In this review, an analysis of experimental and clinical studies on this subject has been made. Physical exercise leads to a number of changes in the plasma levels of renin, angiotensin and aldosterone, which represent the adaptation of the human body to a new biological environment. In particular, significant increases in plasma renin, angiotensin and aldosterone levels occur in submaximal and

maximal exercise intensity. Hormone levels return to normal with the end of the exercise. Factors such as age and gender, menstrual cycle, salt intake, posture, thermal tension, elevation, training, type of exercise have a major impact on the response of RAA system to exercise. A relationship between physical activity and enduring endocrine changes could not be demonstrated.

In addition, many studies are needed to demonstrate the behavior of the hormonal system both during exercise and during the normalization process after different conditions. New hormone regulation mechanisms such as susceptibility to aldosterone and angiotensin II and changes in receptor number should also be investigated.

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Determination of the Physical Activity Levels of Taekwondo Coaches

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Abstract

The aim of this study is to determine the physical activity levels of taekwondo trainers. The total of 544 (132 women, 412 men) coaches participated in the trainer development seminars organized by Turkey Taekwondo Federation participated as volunteers in this research. The physical activity levels of the participants were determined with the short form of the International Physical Activity Questionnaire (UFAA). SPSS 22.0 statistical package program was used to evaluate the data obtained within the scope of the research. The data were analyzed by Kolmogorov-Smirnov test for normality. The Mann-Whitney U test was used because the data were not distributed normally and the significance level was accepted as 0.05. According to the research findings, 3.2% of the trainers had low physical activity level, 61.4% had moderate and 35.5% had high physical activity level. There were statistically significant differences in mean age, height and body weight ($p < 0,05$), no significant difference was found between male and female trainers in sitting, walking, moderate physical activity, high intensity physical activity and total physical activity scores ($p > 0.05$). It can be said that most of the taekwondo coaches have moderate physical activity levels.

Key words: Taekwondo, Coache, International Physical Activity Questionnaire

INTRODUCTION

Extreme sedentary behavior became a dominant and common feature of modern life. As chronic diseases and premature mortality rates increase, the negative effects of increasing sedentary lifestyle on public health increase (1). In adults, there is strong evidence that there is a relationship between mortality rate due to sedentary or inactive life, fatal and non-fatal cardiovascular diseases, type 2 diabetes, and metabolic syndrome, as well as there is evidence of a moderate association with ovarian, colon and intrauterine cancers (5,14). The World Health Organization (WHO) has reported that inadequate physical activity is one of the most important risk factors for death worldwide, globally, one in four adults are not sufficiently active, and more than 80% of the world's adolescent population is physically inactive (34).

Physical activity levels are often monitored to assess the health attitudes of the population and their relationship to health status, including mortality and disease rates. It is required to assess physical activities accurately to determine current activity levels and changes in the population and to determine the effectiveness of interventions designed to increase activity levels (26).

Physical activity surveys have practical value to identify conditions in which increase in physical activity would be beneficial and to monitor changes in population activity. However, this use may be made possible by the development of standard tools to record low-intensity activities specific to sedentary populations and bring consistent biological meanings to terms such as light, moderate and heavy exercise (29). The short form of the International Physical Activity Questionnaire (IPAQ) is a frequently used method for assessing physical activity in large-scale epidemiological studies (3,25,28).

Regularly performed physical activities are becoming more and more important within the scope of betterment and protection of the health. It is important for the coaches who have undertaken great tasks in improving the performances of their athletes and creating a sports culture to lead a healthy life and to convey this exemplary life to their

athletes. The aim of this study is to determine the physical activity levels of taekwondo coaches.

MATERIAL & METHOD

Population of the study and sample group: While population of the study is consisting of 3500 taekwondo coaches working in Turkey, the sample group is consisting of a total of 544 coaches (132 females, 412 males) who have participated to the Taekwondo Federation of Turkey organized seminars.

Data Collection Tools: In order to obtain personal data, the information form created by the researcher was used, while the physical activity levels of the participants were determined by the International Physical Activity Questionnaire (IPAQ) short form.

International Physical Activity Survey (IPAQ):

IPAQ- short form was used to determine the physical activity level of the subjects. This questionnaire, which was developed to find out the types of physical activity of the individual during daily life, includes questions related with the time spent for physical activity with the last 7 days. It questions how often an individual does sports, exercise or recreational activities in his spare time, at work, at home, and going from one place to another. For this survey, the validity and reliability study in Turkey was conducted on university students by Öztürk (22). Information is obtained about the time spent in sitting, walking, moderate intensity physical activity (MIPA) and high intensity physical activity (HIPA). The evaluation of all activities is based on the fact that each activity is performed at least 10 minutes at a time. A score of "MET-minutes/week is obtained by multiplying the minutes, days and MET value (multiples of rest oxygen consumption). Physical activity levels are classified as low (<600 MET-min/week), moderate (600-3000 MET-min/week) and high (> 3000 MET-min/week) (11).

Statistical Analysis

SPSS 22.0 statistical package program software was used to evaluate the data obtained within the scope of the research. An analysis by Kolmogorov-Smirnov test was conducted to determine whether data has normal distribution. Mann Whitney U test was used because the data did not show normal distribution and significance level was accepted as 0.05.

RESULTS

75.7% (n = 412) of the coaches participated in the study were male and 24.3% (n = 132) were female participants. It was found that 45.6% (n = 248) of the participants were 41 years and older, while 32.5% (n = 177) were between 31-40 years of age. It was observed that the majority of the coaches were mainly consisting of participants graduated from primary, secondary and high schools (Table 1).

Table 1. Distribution of personal information of taekwondo coaches

Variables		f	%
Gender	Male	412	75.7
	Female	132	24.3
Age	20-30 years old	119	21.9
	31-40 years old	177	32.5
	41 and older	248	45.6
Income status	500-1500 TL	96	17.6
	1501-2500 TL	155	28.5
	2501-3500 TL	145	26.7
	3501 TL	148	27.2
Education status	Primary School-Middle School-High School	317	58.3
	Associate Degree-Bachelor's Degree-Postgraduate degree	227	41.7

According to the body mass index values of the participants, it was found that 72% of females were normal, 17.4% were overweight and 3.8% were obese. It was found that 35.7% of the males were normal, 49.5% were overweight and 13.8% were obese (Table 2).

Table 2. Distribution of body mass index values of taekwondo coaches by gender variable

		Body Mass Index				
		Thin	Normal	Over-weight	Obese	Total
Male	f	4	147	204	57	412
	%	1.0 %	35.7 %	49.5 %	13.8 %	100.0 %
	Total %	0.7 %	27.0 %	37.5 %	10.5 %	75.7 %
Female	f	9	95	23	5	132
	%	6.8 %	72.0 %	17.4 %	3.8 %	100.0 %
	Total %	1.7 %	17.5 %	4.2 %	0.9 %	24.3 %

It was found that the majority of both male and female coaches (61.4 %) participated in the study had minimum active physical activity level (Table 3).

Table 3. Physical activity levels of taekwondo coaches by gender variable

		Physical Activity Level			
		Inactive	Minimum Active	Very Active	Total
Male	f	15	253	144	412
	%	3.6 %	61.4 %	35.0 %	100.0 %
	Total %	2.8 %	46.5 %	26.5 %	75.7 %
Female	f	2	81	49	132
	%	1.5 %	61.4 %	37.1 %	100.0 %
	Total %	0.4 %	14.9 %	9.0 %	24.3 %

As a result of examining the coaches by gender variable, a significant difference was observed in the mean of age, height and body weight in favor of male participants ($p<0.05$), but no significant difference was found between the HIPA, MIPA, walking, sitting and total PA averages ($p>0.05$) (Table 4).

Table 4. Mean, standard deviation and mann whitney u test results of taekwondo coaches by gender variable

	Gender	N	Mid.	Z	U	p
Age	Male	412	40.6	-5.449	18633.5	0.000*
	Female	132	35.3			
Height (cm)	Male	412	174.7	-13.653	5792	0.000*
	Female	132	164.4			
Body weight (kg)	Male	412	80.5	-13.482	6020	0.000*
	Female	132	62.3			
HIPA (MET-min/week)	Male	412	914.4	-0.191	26907	0.848
	Female	132	904.5			
MIPA (MET-min/week)	Male	412	877.7	-0.712	26086	0.476
	Female	132	958.6			
Walking (MET-min/week)	Male	412	885	-1.501	24843	0.133
	Female	132	964.9			
Sitting (MET-min/week)	Male	412	544.4	-0.208	26662.5	0.835
	Female	132	546.4			
Total PA (MET-min/week)	Male	412	2677	-1.448	24917	0.148
	Female	132	2828.1			

*($p<0.05$), HIPA: High intensity physical activity, MIPA: Moderate intensity physical activity, PA: Physical activity, Total PA = HIPA + MIPA + Walking

DISCUSSION & CONCLUSION

In this study conducted to determine the physical activity levels of the Taekwondo coaches, it is found that 3.2% of the participants were inactive, 61.4% were minimum active, 35.5% were very active and there was no significant difference between male and female coaches in respect of high physical activity, moderate physical activity, in walking, sitting and total physical activity scores.

In studies conducted on different occupational groups, Hartung et al. (10) reported that, 62% of adult, male cooks and 58% of office workers were in over weighted/obese group for their body mass index average. In a different study conducted on office workers, 0.4% of the participants were considered to be underweight, 57.3% were normal, 37.3% were overweight and 5.1% were obese (19). Pappas et al. (24) found that the health profiles of nurses in Greece were relatively weak for this occupational group. The researchers also reported that approximately one third of nurses (n= 353, age= 36 ± 5,6) were overweight or obese, which could have a negative impact on their ability to improve health in the patient population. In a study conducted on academic members, 2.8% of the participants were underweight, 44.8% were normal, 41% were overweight and 11.4% were obese (12). When the gender variable is taken into consideration, it is reported that female teachers and academic members in different disciplines were normal weight and male teacher and academic members were overweight (4,21,30). According to World Health Organization data, 39% of adults aged 18 and older are reported to be overweight and 13% are obese (35). In our study, 41.7% of the coaches were found to be overweight and 11.4% were found to be obese. According to gender variable, 17.4% of female coaches were overweight, 3.8% were obese, 49.5% of male coaches were overweight and 13.8% were obese. It was seen that our results matched up with these studies.

Many researchers examined physical activity levels of employees in different occupational groups. Kayapınar (15), in her study determined the healthy lifestyle behaviors and physical fitness levels of football coaches, established that the participants were conscious about healthy lifestyle behaviors, however they were not able to apply them in their social lives and physical activities of those were insufficient, their body composition parameter were at health risks limits, especially obesity is increasing rapidly after their active athletic periods come to the end. Similarly, it was reported that 68.9% of tennis referees had low physical activity levels, 24.4% were adequate and 6.7% were inactive. When physical activity levels were examined according to gender, 70.5% of females have low, 20.7% have adequate and 8.8% have inactive levels and 67.8% of male individuals have low, 26.8% have adequate and 5.4% have inactive levels (18). In our study, 3.2% of the coaches have

inactive level, 61.4% have minimum and 35.5% have very high activity level. According to the gender variable, it was observed that the majority of male and female individuals had minimum activity level.

In a study conducted on teachers from different disciplines, it was reported that 17.1% were not physically active, 63.9% had low physical activity level and 19% had sufficient physical activity level to protect their health (30). It was observed that male physical education teachers had higher levels of physical activity compared to females, whereas moderate physical activity rates were similar in both genders (6).

In a study examining the participation of the academic members serving in different faculties to the physical activity, 57.5% of the faculty members of the Faculty of Theology and Education Faculty, 55% of the academic members of the Faculty of Medicine and 22.5% of the academic members of the Faculty of Agriculture did not have physical activity during the day (31). In a different study, physical activity participation rates of academic members were at 39% inactive, 50% less active, 11% physically active levels (12). Contrary to these studies, Özüdoğru (23) reported that both academic (75.9%) and administrative staff (81.9%) defined themselves as very active.

In the study conducted to determine the healthy lifestyle behaviors of health professional, the lowest score was taken from the exercise sub-dimension, while only 22.8% of the participants were interested in sports and 58.9% did not exercise at all (33). Likewise, it was reported that the lowest score of the nurses was taken from the exercise sub-dimension and only 4.3% of them performed regular physical exercise (20). In a different study, it was determined that 32.1% of the nurses were not physically active, 48% had low physical activity level and 19.9% had sufficient physical activity level (16). In the study conducted on Catalan health personnel, 31.5% of the medical group, 28.1% of the support staff, 24.7% of the nurses and 19% of the administrative staff were reported to have a low activity level (17). In terms of physical activity level, 53.9% of the female individuals working at the hospital desk were not active, 61.4% of the males had low activity and only 5.8% of the whole group had sufficient physical activity. Researchers point out that the study revealed that low level of physical activity leaded to a sedentary lifestyle and increased the risk of obesity (7).

In the research carried out on employees working at desks and working on feet in different occupational groups in public and private organizations, it was reported that the participation of males in sports activities was higher than that of females, there was an accumulation of moderate activities in both female and male individuals and there was no participation in very high levels of physical activities by female individuals (13). Similarly, it is reported that 48.6% of office workers are inactive, 43% have low level and 8.2% have sufficient activity level (19). Esin and Aktaş (8) reported that as a result of the systematic review, the overweight rate of the employees was between 36% -56% and the physical activity level of 42.5% was insufficient. The researchers established that although the health behaviors of individuals working in different business lines differ, the factors related to the individual and working conditions affecting health behaviors are similar and therefore these factors should be taken into consideration when planning occupational health programs to improve the health of the employees.

No significant difference was found between male and female coaches in our study in sitting, walking, moderate physical activity, high physical activity and total physical activity scores according to the results obtained from IPAQ. However, unlike our study, Mutlu et al. (18) concluded that total, highly intense, moderate and moderately intense physical activity levels and walking activities of male tennis referees were higher than female referees. They did not found any significant difference in the sitting time variable. Similarly, in a different study, it was found that intense physical activity, total physical activity score, and walking score averages of male individuals working at a desk had higher values than female individuals. It was found that there was no significant difference in moderate physical activity and sitting time (32). Moreover, while the duration of intense, moderate and total physical activity of young adult males was higher than that of females, no statistically significant difference was found between walking and sitting periods of females and males (9). In addition to assessing physical activity and sedentary behavior, assessing sitting time is a new and important area for preventive medicine. Population surveys that monitor lifestyle behaviors should include sitting time measurements in physical activity screenings. Moreover, particularly low and middle income level countries that initiated

monitoring activities, the use of objective measures to detect sedentary and physical activity behaviors is encouraged (3). Şanlı and Atalay Güzel (30) reported that the sitting time of female teachers (319.6 min) was significantly higher than that of male teachers (278.1 min). Likewise, Arıkan and Revan (2) found that the sitting time of female individuals (409.6 min) was significantly higher than that of male individuals (353.3 min) in their studies investigating the relationship between physical activity levels and body composition of students studying at the faculty of sports sciences. Contrary to these studies, no significant difference was found between male and female individuals in respect of the sitting time variable of Turkish tennis referees (18) and individuals working at desks (32). In our present study, in line with these studies, no significant difference was observed between the sitting time of female (546.4 min) and male (544.4 min) coaches. However, the sitting time of taekwondo coaches is quite high compared to the individuals participating in other studies.

Our study has some limitations. The first is that the study is cross-sectional, and evaluations are performed with the scales that the coaches complete themselves. This circumstance limits the interpretation and generalization of our results. Another limitation is that the physical activity levels of the coaches participating in the research were determined only by the International Physical Activity Questionnaire. Physical activity is a multidimensional behavior and no evaluation method can capture all its dimensions. To obtain a more global estimate of physical activity, multiple assessment methods should be used. The use of multiple methods may contribute to understanding the relationship between different techniques (27).

As a consequence, more than half of the taekwondo coaches were found to be in the over weighted/obese group and the majority of them were at least active level group. The physical activity habits of the coaches, which are expected to form an example to the society and their athletes in every aspect, are also important for social development. It may be suggested that coaches, who will be role models for the society in healthy life, try to be a good role model by correcting their negative or incomplete behaviors.

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The effects of Methenolone Enanthate Supplement with Exercise on Rats' bones

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Abstract

It is known that anabolic steroids are used by athletes to increase their performance and cause many health problems. This study aims to analyze the effects of methenolone enanthate supplement with exercise on rats' bones. The study was conducted with 28 28-day-old Wistar male rats obtained from the Chair of the Experimental Medicine Research and Application Center of Selcuk University. The rats were allocated into four groups: C (control, n:6), E (exercise, n:7), M (methenolone enanthate, n:7) and ME (methenolone enanthate+exercise, n:8). The required doses were arranged weekly depending on the rats' live weight for the groups given methenolone enanthate. The rats' front and back extremity bones were dissected, and the humerus and femur bones were dried. Each bone's length, corpus thickness, cortex thickness and medullary diameter points were determined. The results were presented as mean±SD. ANOVA and Duncan's test were used for inter-group comparison of the data. The threshold for statistical significance was $p<0.05$. The femur length was 32.46±0.29 in the C group, 32.60±0.64 in the E group, 31.37±0.50 in the ME group and 31.67±0.52 in the M group. The humerus length was 26.42±0.28 in the C group,26.23±0.59 in the E group, 25.31±0.40 in the ME group and 25.35±0.45 in the M group. The femur and humerus length was statistically significantly shorter in the groups that received methenolone enanthate supplement (M and ME) than that of the other two groups ($p<0.05$). No statistically significant difference was found between the C, E, M and ME groups in terms of the cortex and corpus thickness and medullary diameter of their femur and humerus bones ($p>0.05$). It was concluded based on the study results that methenolone enanthate supplement causes early epiphyseal closure in rats' femur and humerus bones and stops the increase in these bones' length. In addition, exercise was found not to reduce this negative effect of methenolone enanthate. Although the prohibited substances classified as anabolics are considered to increase performance by some athletes, these substances are not recommended for use due to their negative effects on athletes' health.

Keywords: anabolic steroids, methenolone enanthate, rats, femur, humerus

INTRODUCTION

Anabolic androgenic steroids (AAS) are synthetic derivatives of testosterone. These substances bind similar to the anabolic and androgenic effects of testosterone produced in the body by binding to the androgen receptor in the cells of the tissues to which it will act (15, 23, 28). AASs are often used to increase muscle strength and size (3, 5, 10, 13, 30). AASs show similar effects to the effects of testosterone or dihydrotestosterone in the body, increasing the protein synthesis in cells and helping the development of tissues (9). Anabolic agents that increase muscle mass and muscle strength lead to an increase in endurance, reduce body fat, it is reported that performs faster recovery time after exercise (11, 14, 16).

These substances; bodybuilders to have less fat mass, weightlifters to lift more weight, Athletics provides the hammer, shot, throw away more appliances such as javelin, swimmers are using in order to withstand long-term, and competition in the high density. In addition, these substances are commonly used to correct physical appearance among young people and adults (5, 13, 24).

The strength, stamina and speed used by athletes to increase anabolic agents, cardiovascular system cardiomyopathy (4, 5, 22) and sudden heart attack (17), cerebrovascular diseases in the brain and nervous system (1), impaired immune function in the liver, early use of the epiphyses in the bones with the use of young age (17, 21, 33) impaired immune function in the liver, early use of the epiphyses in the bones with the use of young age (2, 8).

The aim of this study is; to examine the effects of exercise supplementation with methenolone enanthate on some bones of rats.

MATERIAL AND METHOD

The study was carried out on 28 rats (Wistar, Male), 28 days old from Selcuk University Experimental Medicine Research and Application Center. Rats were divided into 4 equal groups: Control (C), Exercise (E), Methenolone enanthate (M), Methenolone enanthate + Exercise (ME). The trial period lasted a total of 5 weeks. The availability of rat, care, feeding and experimental practice was held at Selcuk University Experimental Medicine Research and Application Center. The rats in the experimental animal units, plastic rat cages at 23 ± 2 ° C room temperature, 50 ± 10% relative humidity environment at, 12/12 night / day in photoperiod were housed fed my adlibit. The rats were provided with daily fresh water (~ 50 ml / day / rat) that they could drink at any time. The study was approved by the Ethics Committee of the Center for Experimental Medicine in Selcuk University (number of decisions: 2017-9). The rats were grouped as follows.

Group 1, (Control group, n: 6): Standard rat feeding and drinking water ad libitum were given during the study period.

Group 2, (Exercise group, n: 7): Standard rat feed and drinking water were given adlibitum during the study period. This group of rats during work 5 days a week, was floated 40 min per day.

Group 3, M (Metenolon enantat, n:7): During the study it was given standard rat chow and drinking water as I adlibit. Methenolone enanthate (Rimobolan ampoule 100mg / 1ml) was administered at 10 mg / kg / rat dose (20) in 100 mcl castor oil and was administered intramuscularly for 5 days for 5 weeks.

Group 4, ME (Metenolon Enantat + Exercise group, n:8): During the study, standard rat feed and drinking water were given as ad libitum. Metabolic enanthate (Rimobolan ampoule 100mg / 1ml) was administered to this group at a dose of 10 mg / kg daily for 5 days. It was then incorporated into exercise programs.

Exercise Program: The rats in the swimming exercise group were given swimming training in the swimming tank for 5 weeks, 5 days a week for 40 min. The water tank temperature will be filled with 25 oC water for 1 hour and the water hot water temperature will be 22-25 oC. At the beginning of the exercise, the rats were kept free in the water for 15 minutes to adapt to the water and then the swimming exercise program was applied.

Measurements: At the end of the study, the anterior and posterior extremities of the subjects were dissected and dissected and the required length, corpus thickness, cortex-cortical bone thickness and medullary diameter-cavum medullare measurements were performed for each of the revealed humerus and femur bones with a 0-100 mm caliper.

Statistical Analysis: SPSS 18.0 (SPSS 18.0 for Windows / SPSS® Inc, Chicago, USA) package program was used for statistical evaluation of the data. The results were presented as mean ± SD. ANOVA and Duncan test were used to compare data between groups ($p<0,05$).

RESULTS

Table 1. Comparison of length and thickness of corpus, cortex and medullar diameters of femur bones. (Mean ± SD)

Groups	Height	Cortex	Corpus	Medullar
M	31.67±0.52[a]	0.51±0.03 [a]	2.45±0.12 [a]	1.58±0.93 [a]
ME	31.37±0.50[a]	0.49±0.02 [a]	2.44±0.63 [a]	1.56±0.17 [a]
E	32.60±0.64[b]	0.52±0.07 [a]	2.51±0.34 [a]	1.67±0.19 [a]
C	32.46±0.29[b]	0.49±0.02 [a]	2.37±0.03 [a]	1.51±0.32 [a]
Test value, p	F=9.701 p=0.000*	F=6.476 p=0.40	F=0.456 p=0.47	F=0.014 p=0.25

Different letters in the same column (a, b) are statistically significant (Duncan test, $p<0.05$).

In Table 1, the distribution of femoral height, cortex, corpus and medullar diameter mean of M, ME, E and C rats were investigated. When the intergroup femur height were compared, it was 31.67 ± 0.52 for M group, 31.37 ± 0.50 for ME group, 32.60 ± 0.64 for group E, and 32.46 ± 0.29 for group C. There was a statistically significant difference between the mean of intergroup femur height. To determine which group the difference was caused by the Duncan post hoc test, it was found that the difference was caused by ME and M groups ($F = 9.701$, $p = 0.000$).

The mean femoral bone cortex thickness of the group M rats was 0.51 ± 0.03, the mean femoral bone cortex thickness of the ME group was 0.49 ± 0.02, the mean femoral bone cortex thickness of the group E rats was 0.52 ± 0.07 and the mean femoral bone cortex thickness of the C group was 0.49 ± 0.02. M, ME, E and C groups were not statistically significant difference between femur cortex thickness averages (p>0,05).

Femoral bone corpus thickness of femur bone in group M was 2.45 ± 0.12, femoral bone corpus thickness mean of ME 2.44±0.63, femoral bone corpus thickness of E group was 2.51 ± 0.34 and C group femoral bone corpus thickness was calculated as 2.37 ± 0.03. The difference between femoral corpus averages of M, ME, E and C groups were not statistically significant (p>0.05).

The mean femoral bone medullar diameter of the rats in group M group was 1.58 ± 0.93, the medullar diameter of femoral bone was 1.56 ± 0.17 in the ME group, the medullar diameter of femural bone in group E group was 1.67 ± 0.19 and the C group mean femoral bone medullar diameter of the rats was calculated as 1.51 ± 0.32. M, ME, E and C groups were not statistically significant difference between the mean femur medullar diameter (p>0.05).

Table 2. Comparison of length and thickness of corpus, cortex and medullar diameters of humerus bones (Mean ± SD)

Groups	Height	Cortex	Corpus	Medullar
M	25.35±0.45[a]	0.42±0.07 [a]	2.11±0.75 [a]	1.24±0.24 [a]
ME	25.31±0.40[a]	0.43±0.06 [a]	2.20±0.68 [a]	1.25±0.24 [a]
E	26.23±0.59[b]	0.47±0.04 [a]	2.23±0.07 [a]	1.27±0.33 [a]
C	26.42±0.28[b]	0.46±0.01 [a]	2.22±0.42 [a]	1.30±0.51 [a]
Test value, p	F=11.398 p=0.000*	F=4.601 p=0.24	F=3.024 p=0.63	F=6.024 p=0.17

Different letters in the same column (a, b) are statistically significant (Duncan test, p <0.05).

In Table 2, distribution of humerus height, cortex, corpus and medullar diameter mean of M, ME, E and C rats were examined. The mean height of the intergroup humerus was 25.35 ± 0.45 for M group, 25.31 ± 0.40 for ME group, 26.23 ± 0.59 for group E, and 26.42 ± 0.28 for group C. There was a statistically significant difference between the mean of intergroup humerus height. It was found that the difference was caused by ME and M groups in the Duncan post hoc test to determine which group the difference was caused. (F=11.398, p=0.000).

The mean thickness of the humeral bone cortex of group M rats was 0.42 ± 0.07, the mean humeral bone cortex thickness of the ME group was 0.43 ± 0.06, the mean humeral bone cortex thickness of the group E rats was 0.47 ± 0.04 and C group The mean humeral bone cortex thickness of the rats was 0.46 ± 0.01. M, ME, E and C groups were not statistically significant difference between the mean thickness of humerus cortex. (p>0.05).

The mean thickness of the humeral bone corpus in group M group was 2.11 ± 0.75, the mean of humeral bone corpus thickness ME group was 2.20 ± 0.68, the mean humeral bone corpus thickness E group was 2.23 ± 0.07 and the mean humeral bone corpus thickness of the rats was calculated C group was 2.22 ± 0.42. M, ME, E and C groups were not statistically significant difference between humerus cortex thickness averages (p>0.05).

The mean thickness of the humeral bone medullar diameter in group M group was 1.24±0.24, the mean of humeral bone medullar diameter ME group was 1.25±0.24, the mean humeral bone medullar diameter E group was 1.27±0.33 and the mean humeral bone medullar diameter of the rats was calculated C group was 1.30±0.51. M, ME, E and C groups were not statistically significant difference between humerus medullar diameter averages (p>0.05).

DISCUSSION

Bonnet et al. (7) beta 2 agonists in the study on the effect of bones of female rats, femoral bone length in females in the group given a shorter length of drug administration.

Xiaodong et al. (32) in rats in the study of the effects of nandrolone on bone mass and metabolism in their study; They reported that the humerus bone of the rats given was shorter than the control group.
Prakasam et al. (25) examined the effect of testosterone on the development of cortical bone and bone in rats. They reported that femur length lengths of testosterone treated rats were short.

Kılcı and Lok (18) swimming exercise of testosterone supplementation applied in a study in

male rats examined effects on bone morphometry; reported that early growth of the femur and humerus bones of male rats resulted in an early closure of their length.

Tasgin et al. (29) in women who regularly swimming testosterone supplementation on the humerus and femoral bone morphometric effects of the study examined the humerus and femur bones of the groups in testosterone supplemented rats in the groups reported that they are shorter than the other groups.

Beck et al. (6) testosterone in their study examined the effect of femoral bone; Testosterone applied to the experimental group of femur bones were shorter than stated.

In addition, it was reported that anabolic androgenic steroid administration did not make a significant difference in the corpus thickness (12), cortex thickness (31) and medullar diameters (19, 26, 27).

CONCLUSIONS

The study revealed that methenone enanthate supplementation could stop the growth of these bones by causing early epiphyseal closure in femur and humerus bones of untreated young rats.

As a result; It is thought that athletes and sedentary individuals using anabolic steroids especially at a young age may cause negative effects on bone development.

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Participation Motivation Scale for E-Sports: The Study of Validity and Reliability (PMSES)

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Abstract

Electronic sports appeared in the world in the late 1970s and gained popularity in the 2000s. In Turkey, on the other hand, the popularity and the number of players has increased after 2008. In this study, the Participation Motivation Scale for E-Sports (PMSES) was developed in order to evaluate the motivation for participation of those who do E-Sports. The research included 590 participants that play various E-Sports games. The research was designed as the structural equation and mixed model. Within the scope of the structural validity of the scale, exploratory factor analysis (EFA) was carried out in the SPSS 23, and confirmatory factor analysis (CFA) was applied to the measuring instrument in AMOS Software. The Kaiser-Meyer-Olkin (KMO) value was found to be 0.975 and the sample size was found to be sufficient. As a result of the factor analysis applied regarding the validity of the scale, three factors representing 78.847% of the total variance were obtained. The Cronbach Alpha coefficient was calculated as 0.972 as a result of the reliability analysis of the 22-item scale. It can be said that the Participation Motivation Scale for E-Sports (PMSES) is a valid and reliable data collection tool that can measure the participation motivation of the individuals who do E-Sports.

Keywords: Electronic Sports, Participation Motivation, Structural Equation Model, Mixed Model, Factor Analysis

INTRODUCTION

Motivation, which is also called the motive psychology, is the driving force behind the movements of the individual (31). Besides, motivation means an individual's awareness of their wishes and needs and taking action to realize these. There are some factors that affect motivation positively or negatively (8). Depending on the positive or negative factors in question and the nature and intensity of the motives in our lives, all our behaviors gain direction or change continuously (6). For instance, athlete conducts various behaviors to be successful and to achieve his/her goals (4). It is a fact that the inherent competitiveness of sports is generally considered to stem from motivation (24). Therefore, it is quite clear that motivation is very important especially in sports (28). For this reason, motivation is one of the basic subjects of sports psychology and it has an important role in explaining behaviors in the sports environment. In particular, the efforts to develop explanatory approaches related to reasons for participating in a sports activity, maintaining participation, and quitting are noteworthy (12). If we think that the main motives that affect the participation of individuals in sports activities affect the continuation and termination of participation; determining these motives is going to be an important step in increasing participation.

Electronic sports are a sports branch in which amateur-professional players compete with each other through computer or game consoles. Computer systems mediate the games of players and teams. The game is played on a virtual platform. In other words, the computer system is as much important for Electronic sports as stadiums are for football.

Electronic sports games have become a thriving phenomenon via online media, the world's fastest growing media type. Attracting 70 million spectators in 2013, this sports branch is estimated to have attracted 400 million spectators in 2016 (22; 33).

Some people in the world advocate that electronic sports are not a kind of sports. The main reason for this idea is that electronic athletes do not compete with any physical activity. It is a common belief that sports cannot be done by sitting on an armchair and that there must be physical activity in the sports. However, there is also a physical activity in electronic sports. Athletes are required to optimize their reflexes, brain functions, and hand-eye coordination in order to be successful in the games they perform (34). In addition to this, the competition, teams, fans, sports halls, products etc. necessitate E-Sports being considered a sports branch (10; 27).

As in non-electronic sports, there are various branches in electronic sports as well. Electronic sports are divided into FPS (First-person shooter), RTS (real-time strategy), Sport-Racing Games, MOBA (Massively Online Battle Arena) and other e-sports games (World of Tanks, Hearthstone, etc.). Virtual versions of traditional sports games are also performed as electronic sports (13; 27).

First-Person Shooter Games

First-person shooter games are games that can be played both individually and as a team. The players direct the digital game environment through the virtual characters they create. In this type of game, the age limit is generally determined to be +18. These game types offer a wide range of areas to players from realistic contents like military simulation to fun, exciting and fantastic worlds. The qualifications required to be successful in this type of games for players are reflexes, making quick judgments and team management (E.g. Overwatch, Counter-Strike, Quake, Zula, Crossfire) (27).

The companies operating in Turkey for major games in this genre are as follow:

- Point Blank (*nFinity Games, S. KOREA*)
- Wolfteam (*Netmarble, S. KOREA*)
- Zula (*In Game Group, Madbyte Games*)
- Counter Strike Global Offensive (*Valve, USA*)
- Overwatch (*Blizzard Entertainment, USA*)

Real-Time Strategy

These games are played individually most of the time and sometimes are played as a team. In these games, the players build an army by making use of the available resources. With their army in the virtual environment, the players try to defeat their rivals' armies (E.g. Star Craft) considering many factors simultaneously (timing, land conditions, production timing, and resource management) (27).

Sport-Racing Games

It is an adapted form of traditional sports in the virtual environment. E-Sports companies with the licensing agreements with various sports federations have made famous sports clubs and athletes available to the virtual platform with their realistic features. For instance, a player can choose the latest squads and then play with teams such as Manchester United, Real Madrid or Galatasaray. Virtual motorsports are also considered within this type of game (E.g. Pro Evolution Soccer, FIFA, UFC, Track-mania, Fight-Night, NBA 2K17) (27).

MOBA (Massively Online Battle Arena)

This type of games is played by trying to destroy each other's energy sources on a map of three main roads between two rival teams, usually consisting of five people (27).

It is an electronic sports branch that has a massive group of players, and that is the most popular E-Sports branch not only in Turkey but also in the world today. The fact that the brands such as DOTA II and League of Legends, which can be run on any computer, can be played in fast as a team, has made it easier for such games to become

widespread. Thanks to the offices set up and the investments made by Riot Games in 2012, electronic sports have developed more rapidly in Turkey (27).

The companies operating in Turkey for major games in this genre are as follow:

- League of Legends (*Riot Games, China-USA, Turkey Office available*)
- Strike of Kings (*Tencent, China*)
- DOTA II (*Valve, USA*)
- MMORPG: (Massively Multiplayer Online Role-Playing Game) Role-playing games that can be played connecting to any server (27).

Other E-Sports Games

Popular games out of the category are:

- Hearthstone: The card game that takes the popular game characters as the theme. (Not to be confused with gambling and betting games) (*Blizzard, USA*) (27).
- World of Tanks: An action and strategy game that can be played individually or as a team, on virtual maps with tanks that belong to World War II times. (*Wargaming, White Russia*) (27).

Electronic sports offer an environment where people from the far end of the world meet via the internet or by coming from different parts of the world to meet people in big organizations (3). For this reason, E-Sports spectators and followers show an increase over the years. Award-winning tournaments started to show interest in competitive games increased (19). As a matter of fact, electronic sports have reached a huge budget of $ 905 million and it is predicted to increase to a budget of $ 1.4 billion in the 2020s (23). Therefore, it is important to make a validity and reliability study of Participation Motivation Scale for E-Sports (PMSES) for these sports, which seems to be in the life of many individuals in this generation and the next generations.

MATERIAL and METHOD

In this section, information about the model used in the research, the research group and the development process of the measuring instrument are given.

Research Model

In this study, the mixed model was used to develop a valid and reliable measuring instrument in order to measure the participation motivation of the individuals in electronic sports. Mixed studies are the studies where the qualitative and quantitative data are analyzed in a single study and the different data sources are inter-converted and verified (20).

Research Group

Individuals that are engaged in electronic sports in different branches participated in this study. In the study, the criterion sampling method (25) was used as one of the purposeful sampling methods which provide in-depth research opportunity. In the criterion sampling method, the researcher can set criteria that meet a set of predetermined values (35).The criterion of being actively engaged in various branches of E-sports during at least one year was determined for the athletes participating in the research. (Such as Zula, LoL, Cs-Go, CALL of DUTY, PubG, Wolfteam, FIFA-PES, Formula 1, WORLD of TANKS, etc.) In this context, a total of 590 people that competed in one or several various sports branches participated in the research(365 Zula, 39 LoL, 69 Cs-Go, 28 CALL of DUTY, 56 PubG, 219 Wolfteam, 65 FIFA-PES, 6 Formula 1, 10 WORLD of TANKS). Some researchers state that the size of the study group must be at least five times the number of items in the scale (1; 5; 26; 30; 32). Accordingly, it can be said that the research group, to which the 74-item scale form is administrated, has a sufficient number of participants for the statistical procedures. 8.8% (n = 52) of the participants were female and 91.2% (n = 538) of them were male.

Development Process of Measurement Instrument

In this section, the following processes were followed in order to determine the levels of e-sports participation motivation of the individuals engaged in electronic sports.

Developing an Item Pool

When developing the item pool, the studies on e-sports concept and accessible studies were reviewed. The body of literature was examined paying particular attention to the studies regarding

the motivation level on E-Sports concept. When the literature about e-sports was examined, we found that two scales are available: Kari and Karhulahti's (17) 7-item scale on the physical training in E-Sports and the 12-item scale called "E-Sports Motivation Scale: League of Legends", which was developed by Sun as a part of M.A. thesis (29).

Items from the Literature

In the first stage of developing the item pool, the scientific studies about E-Sport concept and also blog sites where e-athletes shared their views were examined. On the other hand, E-sports studies on motivation in sports, sports media, sports tourism and sports economy related to the concept of E-Sports were examined.

Items based on Focus Group Studies

In the second phase of developing the item pool, two focus group meetings were held. The first focus group meeting consisted of seven men between the ages of 20-35. The participants were university graduate, graduate students and employees. The second focus group meeting was held with a group of eleven students. Firstly, the concept of E-Sports was tried to be expressed clearly to the participants. The concept of E-Sports, its definition and its applications were explained and the participants were fully informed about the concept. The games that are within the scope of electronic sports were mentioned (Zula, LoL, Cs-Go, CALL of DUTY, PubG, Wolfteam, FIFA-PES, Formula 1, WORLD of TANKS, Clash Royal etc.). The participants were then asked for their opinions about the E-Sports games and the E-Sports concept. According to examples given, the opinions of the participants about the concept of E-Sports were asked to find out their attitudes towards the E-Sports concept.

Expert View

In the final stage of developing the item pool, the academicians who were specialized in the areas of Sports Management, Sports Economics, and Sports-Media were interviewed. Their opinions on E-Sports and their ideas about the adaptability of for the scale about the E-Sports concept were taken into consideration. The items gathered in line with the views of academicians were arranged, resulting in a large item pool consisting of 74 questions. Finally, the 74-question item pool was administrated to the individuals that are actively engaged in E-Sports, and statistical evaluations of the scale were made.

RESULTS

Findings of Exploratory Factor Analysis (EFA)

In order to determine the construct validity of the scale, explanatory factor analysis was conducted.

Table 1. Examination of the Suitability of Data for Factor Analysis

Kaiser-Meyer-Olkin (KMO) Sample Measurement Sufficiency		0.975
Bartlett's Test	**Chi-square**	15897.030
	S.d	231
	p (p<0.001)	0.000

Since the KMO coefficient is 0.975, the sample size in the study is sufficient (Table 1).

Since there is significance level (probability) in consequence of Bartlett's Test of Sphericity, the data meets the assumption of multiple normal distributions (1) and confirms the feasibility of factor analysis.

The communality is the variance value that a variable share with other variables, and it is required that each variable takes values between 1 and 0.5 (21). Communality values are given in Table 2 (below).

Table 2. Communality Values for the Items on the Scale

Questions	Communality Value	Questions	Communality Value
s69	.925	s71	.897
s45	.917	s50	.890
s59	.916	s66	.744
s53	.915	s49	.724
s39	.915	s23	.711
s74	.910	s16	.697
s46	.905	s63	.688
s54	.904	s10	.661
s48	.904	s55	.571
s61	.904	s7	.523
s68	.901	s9	.523

As a result of the exploratory factor analysis applied to 22 items remaining in the scale, a three-factor structure emerged (Table 2). The resultant factors of the analysis and the related findings are given in Table 3.

Table 3. Total Variance Explained of the Scale

Sub-dimension of the Scale	Items	Factor Loading	Eigenvalues	Variance (%)	Cumulative Varyans (%)
Intrinsic Motivation for Knowing and Achieving	s53	.893	14.505	65.931	65.931
	s69	.884			
	s71	.878			
	s59	.871			
	s74	.871			
	s68	.860			
	s45	.852			
	s48	.843			
	s39	.848			
	s46	.831			
	s54	.831			
	s61	.815			
	s50	.802			
Extrinsic Regulation	s9	.701	1.839	8.361	74.292
	s16	.655			
	s10	.664			
	s7	.761			
	s23	.604			
Identification	s55	.828	1.002	4.555	78.847
	s63	.734			
	s66	.733			
	s49	.677			

When the results of the exploratory factor analysis of the scale in Table 3 are examined, it is seen that there are 3 factors with an eigenvalue greater than 1. The variance explained by the first factor is 65.931, the variance explained by the second factor is 8.361, and the variance explained by the third factor is 4.555. The total variance explained is 78.847%. The total variance explained is sufficient as it exceeds 60% (Table 3).

Table 4. Rotated Components Matrix for Factor Structure of the Scale

Items	Components		
	1	2	3
s53	.893		
s69	.884		
s71	.878		
s59	.871		
s74	.871		
s68	.860		
s45	.852		
s48	.843		
s39	.848		
s46	.831		
s54	.831		
s61	.815		
s50	.802		
s9		.701	
s16		.655	
s10		.664	
s7		.761	
s23		.604	
s55			.828
s63			.734
s66			.733
s49			.677

In order to do confirmatory factor analysis, there must be at least three variables measuring each latent variable. For this reason, it was ensured that there were at least three variables under each factor. In addition, the items which were either overlapping or had low communality values in two or more factors were excluded from the scale and thus a 22-item scale was obtained. The results of the analysis show that the scale has construct validity (Table 4).

Naming the Factors (Nomenclature)

Since the main reason for the exploratory factor analysis is to reduce a large number of variables to a smaller number of factors, these factors which emerged must be named. This naming process is made in line with the common features of the variables in the factor (21).

The items belonging to the 3 factors obtained from the exploratory factor analysis and the appropriate nomenclature for these items are given below (Table 5).

Table 5. Naming the Factors

Item	FACTORS
First Factor: Intrinsic Motivation for Knowing and Achieving	
s53	It gives me pleasure to discover my talents in E-Sports.
s69	The experiences I discovered in E-Sports give me pleasure.
s71	It makes me happy to show my skills to others in E-Sports.
s59	The competitive environment in E-Sports excites me.
s74	I enjoy the techniques and tactics in E-Sports.
s68	I like to follow professional players and teams in E-Sports.
s45	E-Sports is a passion for me.
s48	I am having a good time with my friends in E-Sports platform.
s39	I think E-sports is exciting in terms of content.
s46	I value the friendship relationships I have established in E-Sports.
s54	I enjoy doing E-Sports in my spare time.
s61	I like to know different people and cultures by doing E-Sports.
s50	I enjoy making friends in the E-Sports platform.
Second Factor: Extrinsic Regulation	
s9	My friends' passion for E-Sports led me to E-Sports.
s16	I think E-Sports has positive effects on my education life.
s10	I feel incomplete unless I do E-Sports.
s7	My family supports my interest in E-Sports and my being an E-Sports athlete.
s23	I got positive feedback from my environment after I started to do E-Sports.
Third Factor: Identification	
s55	I feel more tired while doing E-Sports.
s63	I'm playing E-sports to invest for the future.
s66	I think E-Sport is important for my health.
s49	I think doing e-sports is enough for physical activity.

Intrinsic Motivation for Knowing and Achieving: This title is related to various structures such as explanation, curiosity, learning objectives, competence, task orientation, learning, knowing and understanding. It means that the person participates in the activity as he/she enjoys the pleasure of personal satisfaction while trying to learn, achieve, explain and understand something new (16).

Extrinsic Regulation: It is stated that the behaviors of the individual are controlled by external sources and the reasons for the participation of the person in the sport originate from the desire of earning respect and being rewarded, besides the social pressure (16).

Identification: It is stated that the individual participates in the activity because

he/she considers the behavior as important, and believes that their participation contributes to their personal development (16).

The Findings of the Confirmatory Factor Analysis

Confirmatory factor analysis was carried out in order to examine the goodness of fit and construct validity of the structure, which was determined to be composed of 3 factors by exploratory factor analysis and the following results were obtained.

When testing the compatibility between the model and the data, it may be preferable to use some or all of the goodness of fit tests (20). However, there is no consensus in the literature regarding which of this goodness of fit statistics should be used (15).

Table 6. Fit Indices used in Confirmatory Factor Analysis

Model Compatibility Criteria	Goodness of Fit	Acceptable Fit	Obtained Value
CMIN/SD	χ /sd ≤ 3	χ /sd ≤ 5	4.124
		Comparative Fit Indices	
TLI (NNFI)	0.95 ≤ NNFI	0.90 ≤ NNFI	.954
IFI	0.95 ≤ IFI	0.90 ≤ IFI	.959
CFI	0.97 ≤ CFI	0.95 ≤ CFI	.959
RMSEA	RMSEA ≤ 0.05	RMSEA ≤ 0.08	.073
		Residual Baseline Fit Indices	
RMR	$0 < RMR \leq 0.05$	$0 < RMR \leq 0.08$	.055
		Absolute Fit Indices	
GFI	0.90 ≤ GFI	0.85 ≤ GFI	.883
AGFI	0.90 ≤ AGFI	0.85 ≤ AGFI	.857

As it can be seen in Table 6, $\chi^2/df = 4.124 < 5; 0.912 < IFI = 0.913;$ $0.954 < TLI = 0.955; 0.959 < CFI\ 0.960; RMSEA = 0.073 < 0.08;$ $RMR = 0.055 < 0.08$ the model according to fit values shows an acceptable fit with the data. Therefore, the validity of the 3-factor structure revealed by exploratory factor analysis was confirmed by confirmatory factor analysis as well. In other words, the scale can be used to measure the participation levels of electronic sports athletes in electronic sports (Table 6).

Regression Weights of the Model

The following table shows the regression weights. The regression values show the observed variables' power of estimation about the latent variables, in other words, factor loadings. Since the "p" value for each binary relation below is less than 0.05, the factor loadings are important. The factor loadings that were found important indicate that the items have been properly loaded on the factors.

Table 7. Regression Weights Related to the Model

	Estimate	S.E (Standard Error)	C.R. (Critical Ratio)	P
s50←F1	1.000			
s61←F1	1.011	.030	34.146	***
s54←F1	1.035	.030	34.968	***
s46←F1	1.053	.030	34.731	***
s39←F1	1.059	.029	36.421	***
s48←F1	1.025	.029	35.003	***
s45←F1	1.076	.030	36.453	***
s68←F1	1.043	.029	35.703	***
s74←F1	1.048	.028	36.831	***
s59←F1	1.067	.028	37.504	***
s71←F1	1.048	.029	36.064	***
s69←F1	1.084	.028	38.729	***
s53←F1	1.086	.028	38.303	***
s23←F2	1.000			
s7←F2	.881	.056	15.603	***
s10←F2	.989	.055	18.114	***
s16←F2	1.038	.051	20.513	***
s9←F2	.856	.061	13.993	***
s49←F3	1.000			
s66←F3	1.061	.039	27.357	***

Table 7. Regression Weights Related to the Model

	Estimate	S.E (Standard Error)	C.R. (Critical Ratio)	P
s63←F3	.954	.043	22.306	***
s55←F3	.926	.047	19.593	***

***=p<0.001

Another important case in confirmatory factor analysis is the estimation values of regression weights. The following table provides standardized regression weights coefficients. The regression values show the observed variables' power of estimation about the latent variables, in other words, factor loadings (Table 7).

Table 8. Standardized Regression Coefficients

Relation	Estimate	Relation	Estimate
S50←F1	.887	S69←F1	.946
S61←F1	.903	S53←F1	.943
S54←F1	.911	S23←F2	.790
S46←F1	.909	S7←F2	.636
S39←F1	.926	S10←F2	.723
S48←F1	.912	S16←F2	.804
S45←F1	.926	S23←F2	.578
S68←F1	.919	S49←F3	.838
S74←F1	.930	s66←F3	.904
S59←F1	.936	s63←F3	.786
S71←F1	.922	S55←F3	.717

The AMOS diagram of the model obtained from the confirmatory factor analysis is given in Figure 1.

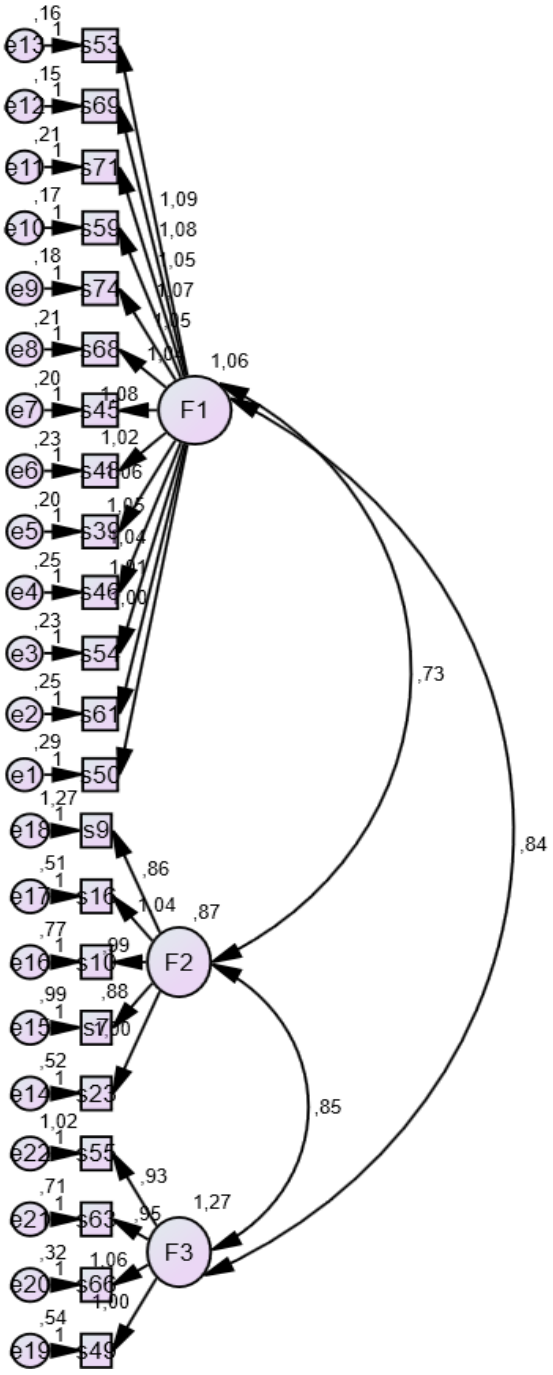

Figure 1. AMOS Diagram of the Model

Normality, Reliability and Validity of Data

The fact that the significance value is found below 0.01 in the wake of the Bartlett Test of Sphericity indicates that multiple normal distribution assumptions of the data are provided (1; 11).

In order to analyze the construct validity of the data, exploratory factor analysis was carried out initially, and then confirmatory factor analysis was used for the discriminant validity (7).

Internal consistency analysis (ICA) was also performed. One of the main assumptions in the Likert-type scale development studies is that there is a monotonic relationship between the attitude to be measured and each item in the scale. In other words, there is an assumption that each item basically measures the same attitude (30). For this reason, it is appropriate to use Cronbach's alpha, which is accepted as the internal consistency

measure (criterion) in order to determine the reliability level when developing a Likert-type scale. The Cronbach's alpha (coefficient a) is between 0 and 1, and the higher the coefficient a, the more the items in the scale are considered to be consistent, which also means that they measure the elements of the same feature (32).

The reliability levels according to Cronbach's alpha values were given below.

- In a condition of $0.00 \leq \alpha < 0.40$ the scale has no reliability,
- In a condition of $0.40 \leq \alpha < 0.60$ the scale has low reliability,
- In a condition of $0.60 \leq \alpha < 0.80$ the scale is quite reliable,
- In a condition of $0.80 \leq \alpha < 1.00$ the scale is highly reliable (32).

The internal consistency of the scale is given in table 9 below, both as factors and as the whole of the scale.

Table 9. Internal Consistency Coefficients of the Scale

Factors	Item Numbers	Cronbach's Alpha Internal Consistency Coefficient
(F1) Intrinsic Motivation for Knowing and Achieving	s39, s45, s46, s48, s50, s53, s54, s59, s61, s68, s69, s71 and s74	.986
(F2) Extrinsic Regulation	s7, s9, s10, s16 and s23	.833
(F3) Identification	s49, s55, s63 and s66	.885

According to the data in Table 9, since the reliability levels of all factors were found to be [F1 α = 0.986; F2 α=0.833; F3 α=0.885], of all items was [α=0.971 – 0.969] and the Cronbach's Alpha Internal Consistency Coefficient of the whole 22-item scale was [α=0.972], it is found to be highly reliable (Table 9).

CONCLUSION

In this study, a valid and reliable measurement tool has been developed in order to measure the participation motivation of the individuals in e-sports.

In order to develop the measuring instrument, a 74-item pool has been created after the literature review, the focus group studies and taking expert advice.

In order to ensure the construct validity of the Participation Motivation Scale for E-Sports in the SPSS 23, alpha factor analysis (AFA), and confirmatory factor analysis (CFA) was performed in AMOS Software. For the exploratory factor analysis, The Kaiser-Meyer-Olkin coefficient and Barlett's test were applied, the KMO coefficient value was found to be 0.975 and with these results, the suitability of the data for factor analysis has been demonstrated. As a result of EFA, 22 items explaining 78.847% of the total variance were obtained. As a result of the rotated principal components analysis, a structure consisting of 3 sub-dimensions was obtained. These are "Intrinsic Motivation for Knowing and Achieving", "Extrinsic Regulation" and "Identification" factors. In the results of the confirmatory factor analysis of the Participation Motivation Scale for Electronic Sports (PMSES), the fit index values related to PMSES were found as: $\chi^2/df = 4.124 < 5$; $0.912 < IFI = 0.913$; $0.954 < TLI = 0.955$; $0.959 < CFI = 0.960$; $RMSEA = 0.073 < 0.08$; $RMR = 0.055 < 0.08$. According to the range of acceptable variance and good variance, three sub-dimensions obtained from the confirmatory factor analysis of the Participation Motivation Scale for E-Sports (PMSES) seem to have adequate fit indices. In order to determine whether the items in the sub-dimensions of the scale measure the desired feature, the test correlations of the items and the lower 27% and higher 27% group were compared. As a result of these analyses, it was detected that the items in the scale were highly discriminant. It is seen that the item-total correlation values ranged between 0.604 and 0.893. These results show that each item is fully compatible with the scale. In order to test the reliability of the scale, Cronbach's Alpha internal consistency coefficient was calculated, thus the internal consistency coefficient in the scale was found to be 0.972. The coefficient was found to be 0.986 in "intrinsic motivation for knowing and achieving" sub-dimension, it was found to be 0.833

in "extrinsic regulation" sub-dimension, and it was found to be 0.885 in the "identification" sub-dimension. This value is higher than 0.60, the lowest acceptable reliability in the literature (18; 14). Alpar (2) stated that the scales that have a Cronbach's Alpha internal consistency coefficient between 0.60 and 0.80 can be called reliable. In this context, based on the reliability analysis of the current scale, the scale and its sub-dimensions have been proven to be highly reliable. As a result, PMSES can be defined as a valid and reliable measurement tool for determining the source of motivations of individuals participating in E-Sports by playing games such as Zula, LoL, Cs-Go, CALL of DUTY, PubG, Wolfteam, FIFA-PES, Formula 1, WORLD of TANKS etc.

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Participation Motivation Scale for E-Sports	I strongly disagree	I disagree	I'm undecided	I agree	I strongly agree
(*F1*)-1	It gives me pleasure to discover my talents in E-Sports.				
(*F1*)-2	The experiences I discovered in E-Sports give me pleasure.				
(*F1*)-3	It makes me happy to show my skills to others in E-Sports.				
(*F2*)-4	My friends' passion for E-Sports led me to E-Sports.				
(*F2*)-5	I got positive feedback from my environment after I started to do E-Sports.				
(*F3*)-6	I think doing E-Sports is enough for physical activity.				
(*F1*)-7	I like to follow professional players and teams in E-Sports.				
(*F1*)-8	E-Sports is a passion for me.				
(*F1*)-9	I am having a good time with my friends in E-Sports platform.				
(*F3*)-10	I'm playing E-sports to invest for the future.				
(*F2*)-11	I feel incomplete unless I do E-Sports.				
(*F1*)-12	The competitive environment in E-Sports excites me.				
(*F3*)-13	I think E-Sport is important for my health.				
(*F1*)-14	I value the friendship relationships I established in E-Sports.				
(*F1*)-15	I enjoy doing E-Sports in my spare time.				
(*F1*)-16	I like to know different people and cultures by doing E-Sports.				
(*F3*)-17	I feel more tired while doing E-Sports.				
(*F2*)-18	My family supports my interest in E-Sports and my being an E-Sports's athlete.				
(*F1*)-19	I enjoy the techniques and tactics in E-Sports.				
(*F2*)-20	I think E-Sports has positive effects on my education life.				
(*F1*)-21	I think E-sports is exciting in terms of content.				
(*F1*)-22	I enjoy making friends in the E-Sports platform.				

E-Spor Katılım Motivasyon Ölçeği	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
(*F1*)-1	E-Sporda yeteneklerimi keşfetmek bana haz veriyor.				
(*F1*)-2	E-Sporda keşfettiğim deneyimler bana haz veriyor.				
(*F1*)-3	E-Sporda yeteneklerimi başkalarına göstermek bana mutluluk veriyor.				
(*F2*)-4	Arkadaşlarımın E-Spor tutkuları beni E-Spora yönlendirdi.				
(*F2*)-5	E-Sporu yapmaya başladıktan sonra çevremden olumlu tepkiler aldım.				
(*F3*)-6	E-Spor yapmak, fiziksel aktivite için yeterli olduğunu düşünüyorum.				
(*F1*)-7	E-Sporda profesyonel seviyedeki oyuncu ve takımları takip etmekten hoşlanırım.				
(*F1*)-8	E-Spor yapmak benim için bir tutkudur.				
(*F1*)-9	E-Spor ortamında arkadaşlarımla iyi vakitler geçiyorum.				
(*F3*)-10	E-Sporu geleceğe yatırım yapmak için oynuyorum.				
(*F2*)-11	E-Spor yapmazsam kendimi eksik hissederim.				
(*F1*)-12	E-Spordaki rekabet ortamı beni heyecanlandırıyor.				
(*F3*)-13	E-Sporun, sağlığım için önemli olduğunu düşünüyorum.				
(*F1*)-14	E-Sporda kurduğum arkadaşlık ilişkilerime değer veriyorum.				
(*F1*)-15	Boş vakitlerimde E-Spor yapmaktan haz alıyorum.				
(*F1*)-16	E-Spor yaparak farklı kişi ve kültürleri tanımaktan haz alıyorum.				

(*F3*)-17	E-Spor yaparken daha fazla yorulduğumu hissediyorum.
(*F2*)-18	Ailem E-Spora ilgimi ve E-Sporcu olmamı destekliyor.
(*F1*)-19	E-Spordaki teknik ve taktiklerden haz alıyorum.
(*F2*)-20	E-Sporun eğitim hayatıma olumlu etkileri olduğunu düşünüyorum.
(*F1*)-21	E-Sporlar içerik bakımından heyecan verici olduğunu düşünüyorum.
(*F1*)-22	E-Spor ortamında arkadaş edinmekten zevk alıyorum.

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Are Sportive Games Affecting the Lipid Profile in Adolescents?

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Abstract

The purpose of this study was to investigate the effects of sportive games on the lipid profile in some selected branches for ten weeks applied to adolescents. 11-14 age range; A total of 52 children, 26 in the study group and 26 in the control group, participated voluntarily in research. While the participants in the control group were only attending physical education lessons, participants in the research group played sport games for ten weeks, three times in a week, 60 minutes in a day different branches. Blood samples were taken from both groups two times before and after ten weeks of the program. Cholesterol, Triglyceride, HDL, LDL and VLDL cholesterol levels of were determined in taken blood samples. The obtained data were analyzed in the SPSS 22.0 Package program. Independent samples t test was used to determine differences between groups, and Paired samples t test was used to determine intra-group differences. When the pretest values of the participants were compared, there was no difference between the groups in the values of Cholesterol, Triglyceride, HDL, LDL and VLDL Cholesterol ($p>0.05$), HDL cholesterol levels were different in favor of the study group when the post test values were compared. In the intra-group evaluations, there was no difference between the pre-post tests values of the control group, it was determined that the research group had differences in the levels of cholesterol and HDL cholesterol ($p<0.05$). As a result, sportive games that applied throughout ten weeks to adolescents had positive effects on lipid profile, it can be said that they may have a health promoting role if they are made permanent.

Keywords: Blood lipids, game, adolescent, health.

INTRODUCTION

Adolescent period is a term when the anatomical and physiological changes and development of the person is at the maximum level and sometimes there are some problems in adaptation to these changes. Childhood and adolescent obesity has become an important health problem in recent years due to decreased physical activity. Obesity in this period is a predictor of adult obesity and this may lead to cardiovascular diseases. The most effective method to prevent excess weight gain is exercise with diet (2). Physical activity is useful especially for healthy development of children. Regular physical activity is important for the healthy development and growth of children and young people, for getting rid of bad habits, socializing and protecting adults from various chronic diseases. In addition, in the treatment of these diseases or to support the treatment, the elderly to spend an active period of life, in other words, to improve the quality of life throughout the entire life can create significant differences (6). Regular exercise programs are known to have a positive effect on the body fat percentage of the respiratory and circulatory system (3). This case, it contributes to the development of physical fitness. Physical fitness included heart breathing resistance, muscular strength, muscle strength, power, speed, flexibility, balance, reaction time and body composition. (16). Body composition generally consists of a proportional combination of fat, bone, muscle cells, other organic substances and extracellular fluids. Although there are similarities in organs and members in the body, each person has a different physical composition. Major factors affecting the body composition of human life are; sex, muscle, physical activity, diseases and nutrition (18). In general, the most noticeable effect of regular physical activity is on body weight. However, the change in weight depends on the continuity of the activity. Weight reduction in the person with exercise, fat cells will shrink. Regular exercise in childhood and adolescence reduces the risk of being overweight or obesity in adulthood (2). However, it is known that children who cannot move sufficiently

are physically hantated. Excessive exercises in teaching some basic sports techniques can be tedious. In order to transform the work from boring repetitions to tasteful, a variety of organized games can be prepared, known as educational games, taking into account the psychological and biological developments of children. In addition these games should not be taken away from the targets planned to be entertained while entertaining individuals. (15) Many different chemical compounds in the body and nutrients are classified in the class of lipids. They are classified according to their increasing density as high density lipoproteins (HDL), low density lipoproteins (LDL), and very low density lipoproteins (VLDL) (9). Recently, it has been the aim of many studies to investigate the effect of regular physical activity on blood lipids and lipoproteins. Regular physical activity can be an important aid in the regulation of fat metabolism and in the treatment of some dyslipoproteinemias without drug (13). In the light of this information, it is thought that educational sportive games, which are applied in a regular manner, will contribute to protecting individuals from obesity and showing their multi-faceted development. Therefore, the aim of this study was to investigate the effect of sporty games which are regularly applied in adolescents on lipid profile which has a significant effect on cardiovascular diseases.

MATERIAL AND METHOD

Participants

The study included 11-14 age group; a total of 52 participants, 26 research groups and 26 control groups, took part. The study, which was conducted on a voluntary basis, included students who wished to participate in the study voluntarily and who did not have any disabilities to participate in sportive games. The study was conducted in accordance with the pre-test post-test model. Before the study, necessary permissions were taken for the study. In addition the ethics committee approval was taken from Firat University Non-Interventional Research. Participants in the control group participated in physical education courses only, while participants in the research group played educational sportive games for 60 min, three days/in a week, 10 weeks in different branches.

Daily Sportive Game plan:

- 10 minutes warm-up and stretching
- Sportive games for 40 minutes
- 10 minutes cool-down and stretching

Branches and Programs in Sportive Game Plan:

- Athletics (1st and 2nd week)
- Volleyball (3rd and 4th week)
- Basketball (5 and 6 weeks)
- Football (7th and 8th week)
- Handball (9th and 10th week)

Determination of Lipid Profile

Blood samples were centrifuged for 10 minutes at 4000 rpm[3] by the Nüve-NF800 device. Cholesterol, Triglyceride, HDL, LDL and VLDL Cholesterol levels were determined by using BT3000 auto analyzer.

Statistical Analysis

SPSS 22.0 package program was used to analyze the data obtained from the study. Arithmetic mean and standard deviation techniques were used as descriptive statistics. The normality analysis was performed for the data obtained before and after the sportive games program. Independent samples t test was used to determine the differences between the groups, and Paired samples t test was used to determine the intra-group differences and significance was accepted as $p<0.05$.

RESULTS

Table 1. Comparison of Pre and Post Test Values between Groups

Tests	Mesaurements	Control			Experimental			t	p
		N	Mean	SD	N	Mean	SD		
Pre Tests	Cholesterol (mg/dL)	26	165.92	30.26	26	165.77	30.29	-0.018	0.985
	HDL Cholesterolmg/dL)	26	49.38	12.07	26	49.27	12.21	-0.034	0.973
	LDL Cholesterol (mg/dL)	26	94.58	25.18	26	94.38	25.10	-0.028	0.978
	VLDL Cholesterol (mg/dL)	26	26.08	16.62	26	28.58	14.61	-0.042	0.967
	Triglycerid (mg/dL)	26	129.62	82.02	26	135.15	58.96	0.002	0.999
Post Tests	Cholesterol (mg/dL)	26	165.77	30.47	26	152.38	32.42	-1.53	0.131
	HDL Cholesterolmg/dL)	26	48.92	11.99	26	35.23	9.36	-4.59	0.000*
	LDL Cholesterol (mg/dL)	26	94.08	24.81	26	90.54	20.25	-0.563	0.576
	VLDL Cholesterol (mg/dL)	26	26.27	16.73	26	25.88	16.34	0.530	0.599
	Triglycerid (mg/dL)	26	129.69	81.88	26	129.65	82.34	0.276	0.784

* There was a significant difference (P <0.05). SD: Standard Deviation

When Table 1 is examined; There was no significant difference between the pre-test values of the research groups (p> 0.05), but statistically there was significant difference between the post-test values only in HDL cholesterol levels (p <0.05).

Table 2. Comparison of pre test- post test of research groups

Groups	Mesaurements	Pre test			Post Test			t	p
		N	Mean	SD	N	Mean	SD		
Control	Cholesterol (mg/dL)	26	165.92	30.26	26	165.77	30.47	0.750	0.461
	HDL Cholesterolmg/dL)	26	49.38	12.07	26	48.92	11.99	1.806	0.083
	LDL Cholesterol (mg/dL)	26	94.58	25.18	26	94.08	24.81	2.003	0.056
	VLDL Cholesterol (mg/dL)	26	26.08	16.62	26	26.27	16.73	-1.30	0.203
	Triglycerid (mg/dL)	26	129.62	82.02	26	129.69	81.88	-0.811	0.425
Experimental	Cholesterol (mg/dL)	26	165.77	30.29	26	152.38	32.42	2.770	0.010*
	HDL Cholesterolmg/dL)	26	49.27	12.21	26	35.23	9.36	8.724	0.000*
	LDL Cholesterol (mg/dL)	26	94.38	25.10	26	90.54	20.25	0.910	0.372
	VLDL Cholesterol (mg/dL)	26	28.58	14.61	26	25.88	16.34	-0.755	0.457
	Triglycerid (mg/dL)	26	135.15	58.96	26	129.65	82.34	-0.338	0.738

* There was a significant difference (P <0.05). SD: Standard Deviation

When Table 2 is examined, it was determined that there was no difference between the pre-post test values of the control group (p>0.05), whereas the experimental group had differentiation in all parameters but only the differences in cholesterol and HDL cholesterol levels was significant statistically (p <0.05).

DISCUSSION

The aim of this study was to investigate the effects of sportive educational games on cholesterol, triglyceride, HDL, LDL and VLDL cholesterol levels in adolescents for 10 weeks. When the results of the study was evaluated, generally it has been shown that the sportive educational games applied for 10 weeks have healing effects on blood lipid values. As known, excessive weight gain during childhood is an important health problem (8) However, physical activity is one of the most effective methods to prevent cardiovascular disease (7).

In a study by Sung et al. (12), the effects of low energy diet and strength exercises on the blood

lipid profile of obese children aged 8-11 were investigated. As in our research results, it was determined that healing effects were observed and especially cholesterol level decreased significantly in exercise group. Rowland et al. (10) have investigated that the effect of aerobic exercise program on lipid profile of children in 10-12 age group for 13 weeks, 3 days a week, 25 minutes per day. They have found that there was no change in lipid profile. It is thought that the difference in this study which has similar and opposite aspects with our research findings. This condition may result from exercise time.

In another study, Zorba et al. (19) have investigated that the effects of 12-week walking and running exercises in obese children with an average age of 11 years. As a result, they showed that the exercise program had a positive effect on lipid profile. Tolfrey et al. (14) stated in their review that HDL cholesterol increase and LDL cholesterol decrease may occur with regular exercise. In another study, Aires et al. (1) developed a group of physical activity with and without diet programs in a long-term study and evaluated the school-related process. They emphasized that there are significant changes in lipid profile, especially in the physical activity class which the diet program is applied. Lee and Kang (5) in their study, control, obese and type 2 diabetic children regularly follow the effects of the exercise program applied for 12 weeks. As a result of the study, they found that the exercise program, which is regularly applied, creates positive changes in the lipid profile. In another study, Zehsaz et al. (17) have investigated the effects of the exercise program, which included aerobic and resistance exercises on lipid profile for 16 weeks on 32 obese boys aged 9-12 years. At the end of the research, this exercise model, which is applied regularly, has positive effects on lipid profile. Son et al. (11) have investigated the effects of combined exercise model administered 3 days a week for 36 weeks in children with developmental disorder and results of study show that there was no change in cholesterol, triglyceride LDL cholesterol, but only differences in HDL cholesterol. In addition, Kumar (4) emphasized that physical exercise significantly improves lipid profile.

As a result, it can be said that every kind of exercise applied regularly can affect the lipid profile of children and adolescents positively. However, it can be said that the sportive educational games program applied to adolescents during the ten weeks had a positive effect on the lipid profile, and they may have a health promoting role if they are made permanent.

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The Effect of Exercise Order on Maximum Strength Development in Resistance Trainings

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Abstract

The aim of this study is to investigate the effect of exercise order on maximum strength development in resistance trainings. Thirty six male wrestlers (age = 21.6 ± 2.0 years; height = 169.8 ± 8.7 cm; body mass = 76.6 ± 11.1 kg) participated in the study. The participants performed two different resistance training programs for 12 weeks. First group (Gr1) performed the exercises involving large muscle groups at initial. The other group (Gr2) performed the same exercises in the opposite order. For the Gr1, the exercise order was bench press (BP), lat pulldown (LPD), shoulder press (SP), biceps curl (BC), triceps extension (TE). For the Gr2, the exercise order was TE, BC, SP, LPD and BP. Before and after the 12-week training period, 1 repeat maximum (1RM) loads were measured in all exercises. According to the results, 1RM loads of all exercises increased significantly in both groups (5.8-16.7%). However, 1RM load increase in the BP and LPD exercises were significantly higher in Gr1 compared to Gr2. No significant difference was found between the groups in 1RM load increase of SP, BC and TE exercises. As a result it is recommended that exercises involving large muscle groups should be performed first.

Keywords: Upper body exercises, Resistance exercises, 1RM strength

INTRODUCTION

Resistance trainings are commonly preferred by both recreational and professional athletes (11, 13, 15). Resistance trainings are considered as a valid method because of the mechanical skills that trained can be tested in the same way (7, 20). Resistance training components can be design in different ways according to desired characteristics such as hypertrophy, power, muscular endurance or maximal strength (1, 4). For example rest periods, weights, exercise types, the number of repetition or set vary in the researches (4, 10, 16).

Exercise order is stated one of the many factors affecting the performance in resistance trainings, and some recommendations have been presented (1, 3). For instance, it was recommended that the exercise order should be performed from multiple joint exercises to single joint exercises (1). Similarly, it was stated that the exercises involving large muscle groups at the beginning of the training and later the exercises involving small muscle groups should be performed to increase performance (1, 3, 12).

Many of the studies investigating the effect of exercise order on performance examined acute responses to training (6, 8, 19). In addition, the researchers investigated mostly on amateur or sedentary individuals (2, 14). Therefore, the aim of this study is to investigate the effect of exercise order on 1RM strength development in resistance training programs in well-trained athletes.

MATERIAL AND METHOD

Participants

Thirty-six well-trained male athletes competing at the highest national level in the Greco-Roman wrestling style participated in the study voluntarily. These athletes have trained regularly for 5 to 10 years. Participants have applied resistance training each year according to the competition calendar, but they have not applied within 6 months prior to this study. Participants were selected from athletes who didn't have current orthopaedic injury and disease. Participants were given detailed explanation about all processes and their informed consent was obtained. For this research, ethics committee approval was obtained from Ethics Committee of Erzurum Atatürk University, Institute of Winter Sports.

1RM test

1RM loads were determined on two different days with 3 days intervals after performing one familiarise training. First day anthropometric characteristics were measured and 1RM loads were determined for barbell bench press (BP), machine lat pulldown (LPD), seated machine shoulder press (SP), free weight seated biceps curl with a straight bar (BC) and machine triceps extension (TE). The same tests were repeated on the second day to ensure test-retest reliability. The greater load between the two test days was considered the valid 1RM load. For each exercise, participants were given three trial with five minutes interval. The other exercise was performed after at least 10 minutes of rest. At the end of the training period, 1RM loads were determined again with the same procedure to examine the change. Test-retest reliability was controlled by intra-class correlation coefficient (ICC). ICC (CI 95%) values in all exercises were determined between 0.94 (0.91-0.96) - 0.97 (0.94-0.99) before training period, between 0.95 (0.93-0.98) - 0.97 (0.96-0.99) after training period.

Resistance Training

The participants applied two training programs which included the same exercises in different order. Gr1 performed the exercises ordered from large muscle groups to the small muscle groups while Gr2 performed the same exercises in opposite order. Both groups trained three days a week for 12 weeks on non-consecutive days. The exercise order for Gr1 was BP, LPD, SP, BC and TE. The exercise order for Gr2 was TE, BC, SP, LPD and BP. All exercises were performed in 3 sets for both groups. All trainings were monitored by at least one researcher. Three-minute rest intervals were used between exercises and sets. The subjects tried to reach the maximum number of repetitions at 70% of 1RM loads while performing the exercises. If the number of repetitions was among 8-12 participants continued the same load; if less than 8 the load was reduced; if more than 12 the load was increased. The subjects performed a warming consist of 15 repetitions at 50% of the load to be applied before the first exercise. Attendance rate of participants in training sessions were recorded: 98.1% for Gr1; 97.7% for Gr2.

Statistical Analysis

All statistical procedures were completed in SPSS 21.0 program. Intra-class correlation coefficient (ICC) was used to ensure reliability in 1RM tests. Shapiro-Wilk test was used to control normality, and Levene's test was used to control homogeneity of variances. The independent sample t-test was used to determine differences between the groups in terms of initial values and in the amount of increase in 1RM loads. The paired sample t-test was used to determine the differences in the 1RM loads between before and after training period. The effect size was calculated to determine the practical importance in cases which there was the significant difference statistically (0.2: small; 0.5: medium; 0.8: high). In all statistical procedures $p \leq 0.05$ was accepted.

RESULT

The descriptive characteristics and 1RM loads were examined (Table 1), and no significant differences were found between the groups in any of the variables.

Table 1. Descriptive characteristics and 1RM loads before training period (N=36)

	Gr1 (n=18)	Gr2 (n=18)	t	p
Age (years)	21.0 ± 1.8	22.1 ± 2.2	1.668	0.104
Height (cm)	170.6 ± 9.6	168.9 ± 7.9	0.569	0.573
BM (kg)	78.7 ± 13.4	74.4 ± 8.6	1.153	0.258
BP (kg)	91.3 ± 18.8	88.3 ± 9.6	0.586	0.563
LPD (kg)	87.5 ± 22.5	85.4 ± 12.9	0.341	0.735
SP (kg)	71.1 ± 13.0	65.1 ± 9.5	1.576	0.124
BC (kg)	35.8 ± 8.0	35.1 ± 8.1	0.260	0.796
TE (kg)	56.7 ± 14.2	50.3 ± 10.9	1.514	0.139

Table 2. 1RM loads of Gr1 before and after the training period (n=18)

	Before	After	t	p	E.S.
BP (kg)	91.3 ± 18.8	105.1 ± 18.1	-27.549	0.0001	0.75
LPD (kg)	87.5 ± 22.5	100.3 ± 26.1	-12.425	0.0001	0.54
SP (kg)	71.1 ± 12.9	79.4 ± 14.3	-13.038	0.0001	0.61
BC (kg)	35.8 ± 8.0	41.8 ± 10.1	-8.152	0.0001	0.66
TE (kg)	56.7 ± 14.2	62.6 ± 15.8	-11.926	0.0001	0.39

The differences between before and after the training period for Gr1 was examined (Table 2). It was found that 1RM loads of all exercises increased significantly after training period compared to

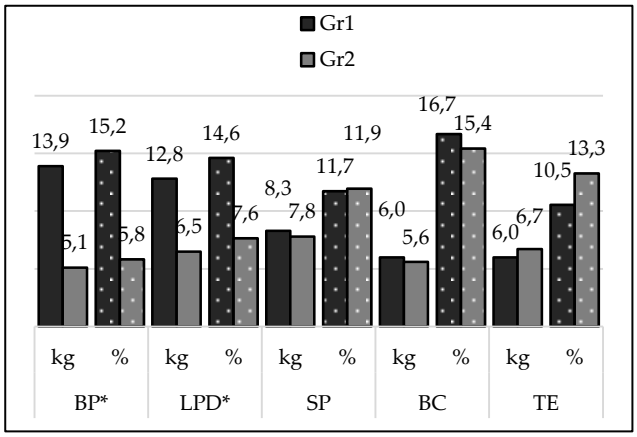
before. The results were evaluated based on practical importance and it was found that BP, LPD, SP and BC exercises had medium effect size (ES= 0.75; 0.54; 0. 61 and 0.66, respectively); TE exercise had low effect size (ES= 0.39).

Table 3. 1RM loads of Gr2 before and after the training period (n=18)

	Before	After	t	p	E.S.
BP (kg)	88.3 ± 9.6	93.5 ± 10.4	-16.171	0.0001	0.52
LPD (kg)	85.4 ± 12.8	91.9 ± 12.6	-18.230	0.0001	0.51
SP (kg)	65.1 ± 9.5	70.4 ± 10.0	-13.701	0.0001	0.54
BC (kg)	35.1 ± 8.0	40.6 ± 8.9	-17.867	0.0001	0.65
TE (kg)	50.3 ± 10.9	56.9 ± 11.4	-19.044	0.0001	0.59

The difference between before and after the training period for Gr2 was examined (Table 3). It was found that 1RM loads of all exercises increased significantly after training period compared to before. The results were evaluated in terms of practical importance and it was found that all BP, LPD, SP, BC and TE exercises had medium effect size (ES= 0.52; 0.51; 0.54; 0.65 and 0.59 respectively).

Figure 1. Increases in amount of 1RM loads of the groups (kg and %)



* There is significant difference between the groups in 1RM load increase amount.

Increase amounts in 1RM loads (kg and %) depending on the training period in Gr1 and Gr2 were examined (Figure 1). There was significantly higher 1TM load increase for BP and LPD exercises in Gr1 compared to Gr2. There was no significant difference in 1RM load increase amount of SP, BC and TE exercises between the groups.

DISCUSSION

In present study, it is aimed to examine the effect of exercise order on 1RM strength performance. It was found that 1RM loads increased significantly in both groups who performed same exercises the opposite order. However, in the group that applied large muscle group exercises first, in BP and LPD exercises there was higher 1RM load increase compared to the other group. In 1RM load increase of SP, BC and TE exercises, there was no significant difference between the groups.

The effect of exercise order on performance was studied in different ways. Kazem et al. (2014) shown that exercise order from upper body to lower body or the opposite had no significant effect on performance (8). Fisher et al. (2014) used chest press, leg press, and pull-down exercises, and they found that the exercise order had no effect on performance (5). However, in our study, unlike designs of these studies, the order of exercise was performed from large muscle groups to small muscle groups or the opposite.

To increase the efficiency of the trainings, it is stated that the exercises involving large muscle groups should be performed first (1, 3, 12). It is possible to reach different results in the studies. For example, Kazem et al. (2013) found that there was no significant difference between the groups who applied the exercises from the small to the large muscle groups or from the large to the small muscle groups. On the other hand, in two different studies examining the effect of exercise order on rated perceived exertion, Simao et al. (2007) found that exercise order have no effect on perceived exertion rated, whereas Sheikholeslami-Vatani et al., (2016) found that participants assessed as more difficult the training session which performed small muscle groups first (17, 19). In another study, it was found that the number of repetitions were increased when exercises were performed first, independent of the exercise order (18).

In another study using the same exercises with our study, it was found that, in BP and LPD exercises, the number of repetitions were higher in the group who performed large muscle groups first, whereas in TE exercise, the number of repetitions were higher in the group who performed the small muscle groups first. There was no significant

difference between the groups in SP and BC exercises (9). Dias et al. (2010) found that there was

significant performance increase in both groups who performed the same exercises in different orders after the eight-week training program. They found that there was greater performance increase in TE exercise in the group that first performed the exercises involving small muscle groups. However, they found that performance increases in BP, LPD, SP, and BC exercises were similar and there was no significant difference between the groups. In our study, there was higher performance increase in BP and LPD exercises in the group who performed the exercises involving large muscle groups first, whereas SP, BC and TE exercises were not significantly different between the groups. However, in their research, Dias et al. (2010) studied on untrained individuals while our study was conducted on well-trained athletes.

CONCLUSION

According to the results of our study, it is recommended that exercises involving large muscle groups should be performed first. Because, in cases the exercises involving small muscle groups are performed, local fatigue occurred in small muscle groups may reduce performance during the exercises involving large muscle groups are performed. In other words, excessive fatigue in small muscle groups may cause early ending of exercise, although there is not enough fatigue in large muscle groups. The results of this study involve well-trained athletes and only upper-body exercises. The results of this study involve well-trained athletes and only upper-body exercises. In future studies, more comprehensive results can be found related to the effect of exercise order on performance in different participant groups and lower body exercises.

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Examination on Communication and Happiness Levels of Athletes

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Abstract

Aim: The aim of this study is to investigate the communication skills and happiness levels of athletes engaged in different sports branches. Material and Method: In the research, 240 amateur and professional athletes, who are active in the province of Kırşehir and volunteer, participated in the study. The questionnaire, which was formed in order to determine the characteristics of the athletes, "Communication Skills Assessment Scale (CSAS)" developed by Korkut (19) and Happiness Scale developed by Demirci (9) were used in data collection. Findings: When the happiness levels of the participants were examined according to gender, it was observed that the happiness levels of women were statistically significant compared to men ($p>0.05$), but there was no difference between communication skills according to gender ($p>0.05$). It was observed that professional athletes had higher levels of communication skills and happiness than amateur athletes ($p <0.05$). In the study, it was seen that the communication and happiness levels of the athletes who have 10 years or more sports experience are higher than the athletes who have less experience ($p <0.05$). It was seen that the happiness level of the participants who had 3 or more siblings were higher than the participants with 1-2 siblings ($p <0.05$). Result: As a result of the research, it was seen that female athletes' happiness levels were higher than those of male athletes, but there was no difference in communication skills of male and female participants. Professional athletes have higher communication skills and happiness levels than amateur athletes and the communication skills and happiness levels of the athletes who have 10 years or more sports experience are higher than those who have less experience. The happiness level of the participants who had 3 or more siblings were higher than the participants with 1-2 siblings.

Key words: Sports and communication, sports and happiness, physical activity, sports psychology

INTRODUCTION

Sport is an important issue in the social sciences because it addresses the goals, objectives and standards that people and societies desire. In general, sport is considered as a means to establish friendships that bring people and countries closer together and sports activities that include not only success criteria such as winning the game or playing well but also the universal values such as fair-play, sportsmanlike conduct, friendship or tolerance, which are related to the quality of the interaction during the activity (4).

As a social being, human beings always have to communicate with the environment regardless of their willingness. The concept of communication is an issue that should be examined in terms of the values to be obtained from the performance of the athlete in the sports field. The use of effective communication skills is an important factor increasing both the performance of the players and the performance of the team (2).

Communication skills can be defined as learned behaviors that facilitate the living of an individual in a society through providing the skills such as effective listening, self-disclosure by means of concrete speech, conveying feelings and thoughts to the other person without hiding out from the others, using verbal and non-verbal messages in a harmonious manner, establishing satisfactory relationships with people based on respect and empathy (18).

Persons involved in sporting activities (athletes, coaches, parents, managers, etc.) can be expected to have an effective communication process. It can be said that communication in sports teams is also important in attaining success and giving the desired performance. In sports, particularly during the coaching process, the relationship between the coach and the athlete plays an important role in the physical and psycho-social development of the athlete (17).

Physical activity enables people to be happy as it improves and maintains health, which is an important issue for people. Experiments conducted on American and Italian youth have shown that young people tend to be happy as they take part in sports and games (5). Fox (20), demonstrating that participation in physical activity has a positive effect on mental well-being, states that exercise improves mental health by self-perception and is an effective treatment for depression and anxiety. Generally, if exercise increases mental well-being of the individual and reduces the effects of depression and anxiety, it can also affect happiness (16).

Participation in physical activities such as sports or exercise provides opportunities for socializing with people and helps to improve communication skills and happiness so that they can lead an efficient life. It is also generally possible for the person to participate in physical activity to provide long-lasting happiness (16).

The main aim of this study is to evaluate the differences in communication and happiness levels of athletes engaged in sports as amateur and professional according to different variables.

MATERIAL AND METHOD

Research Model: This research is a descriptive research which addresses the communication skills and happiness levels of amateur and professional athletes actively participating in the sports activities in Kırşehir.

Population and Sample: The population of the study consists of amateur and professional actively participating in the sports activities in Kırşehir. The athletes participating in the study were selected randomly, no criteria were specified for participation in the study and volunteering was taken as the basis.

Data Collection Tools: In the study, Personal Information developed by making a literature review and Communication Skills Assessment Scale (CSAS) developed by Korkut (19) were used as a data collection tool. Communication Skills Assessment Scale is a 5-point Likert-type scale consisting of 25 items and the scale includes the graded options that are " always (5), often (4), sometimes (3), rarely (2), and never (1). The high score stated in the scale, which not includes reverse items, refers to the individuals' positive evaluation regarding their communication skills. The Cronbach's alpha value of the scale was found to be .86. The Happiness Scale, developed by Demirci, İ. (9), was also used in this study.

INTERPRETATION OF ANALYSIS AND FINDINGS

Data Analysis: SPSS 19 statistical program will be used for data analysis. The frequency and percentage distributions of the data will be taken, the t-test and the ANOVA test will be used in the parametric groups, and the Kruskal-Wallis and the Mann-Whitney U test will be used in the non-parametric groups.

Table 1. Personal Characteristics of the Athletes Participated in the Study

Characteristics		n	%
Age	11-13 years old	54	22.5
	14-17 years old	166	69.2
	18 and over	20	8.3
Gender	Male	119	49.6
	Female	121	50.4
Branch	Team sports	143	59.6
	Individual sports	97	40.4
Sports level	Amateur	213	88.8
	Professional	27	11.3
Sports experience year	1-3 years	128	53.3
	4-6 years	64	26.7
	7-9 years	32	13.3
	10-12 years	16	6.7
Number of siblings	1-2 siblings	139	61.8
	3 and over	86	38.2
Income level	1550 TL and less	56	23.3
	1551- 2250 TL	67	27.9
	2251-3800 TL	73	30.4
	3801 TL and over	44	18.3

As seen in Table 1, 69.2% of the athletes participating in the study are 14-17 years old, 50.4% of the participants are women, 59.6% of them are engaged in team sports, 88.8% of them are amateur athletes, 53.3% of them have been doing sports for 1-3 years, 61.8% of them have 1-2 siblings, 30.4% of them have monthly income between the ranges of 2251-3800 TL.

Table 2. Distribution of Happiness Levels of the Athletes Participated in the Study

Characteristics		n	x	u	z	t	p
Gender	Male	119	110.55	8.383	2.207	-	0.027
	Female	121	130.28				
Sports level	Amateur	213	117.29	3.559	2.019	-	0.044
	Professional	27	145.83				
Sports experience year	1-3 years	128	118.65			7.257	0.027
	4-9 years	96	115.52				
	10 years and over	16	165.19				
Number of siblings	1-2 siblings	139	106.26	6.914	1.982	-	0.048
	3 and over	86	123.90				

As seen in Table 2, when the levels of happiness of the athletes participating in the study were examined by gender, the happiness levels of the female athletes were found to be statistically significant compared to the male ones ($p<0.05$).

When the happiness levels of the athletes were examined according to their sports level, it was seen that the professional athletes were happier than the amateur ones ($p<0.05$).

When the levels of happiness of the athletes who participated in the study were examined according to their sports level, it was seen that the happiness levels of the athletes who are engaged in sports for 10 years and over were higher than those who are engaged in sports for a shorter period ($p<0.05$).

When the happiness levels of the athletes participating in the study were examined according to their number of siblings, it was observed that the participants with 3 or more siblings had higher levels of happiness than the participants with 1-2 siblings ($p<0.05$).

Table 3. Distribution of Communication Skills Levels of the Athletes Participated in the Study

Characteristics		**n**	**x**	**u**	**z**	**t**	**p**
Gender	Male	119	114.5	7.913	1.328	-	0.184
	Female	121	126.4				
Sports level	Amateur	213	116.32	3.765	2.618	-	0.009
	Professional	27	153.44				
Sports experience year	1-3 years	128	112.75			15.636	0.001
	4-9 years	96	120.01				
	10 years and over	16	185.50				
Number of siblings	1-2 siblings	139	106.47	6.884	1.912	-	0.056
	3 and over	86	123.55				

As seen in Table 3, when the level of communication skills of the athletes participating in the study is examined by gender, it is observed that the level of communication skills of the female athletes is not statistically significant compared to the male athletes ($p>0.05$).

When the communication skills of the athletes were examined according to their sports level, it was seen that the level of communication skills of the professional athletes was higher than the amateur athletes ($p<0.05$).

When the communication skills of the athletes who participated in the study were examined according to the sports experience years, it was seen that the communication skills levels of the athletes engaged in sports for 10 years or more were higher than those who are engaged in sports for a shorter period ($p<0.05$).

When the level of communication skills of the athletes participating in the study was examined according to the number of siblings, it was determined that the result was not statistically significant ($p>0.05$).

CONCLUSION AND EVALUATION

In this study, communication skills and happiness levels of athletes engaged in sports as amateur and professional were examined according to different variables.

As a result of the study, when the happiness levels of the athletes participating in the study were examined by gender, the happiness levels of the female athletes were found to be statistically significant compared to the male athletes ($p<0.05$).

Tingaz and Hazar (23) stated in their study that according to the gender of the students studying in the Physical Education and Sports Teaching Department, the mean of happiness levels of the female students (115.46±17.2) is higher than that of male students (113.18±17.2).

In their study, Gülcan et al. (12) and Gökdemir and Dumludag (10) found that the mean of happiness level scores of female participants were significantly higher than that of the male participants.

According to the gender, there were no statistically significant differences in the communication skills level of the athletes participating in the study ($p>0.05$).

In the studies conducted by Mutlu et al. (20) and Çavuşoğlu and Günay (7), it was observed that the mean of communication level of the athlete students did not constitute a statistically significant difference according to the gender variable and in the studies conducted by Dalkılıç (8) and Çiçek (6), it was seen that there was no significant difference between the communication skills of male and female athletes in terms of the gender variable.

In a study conducted by Hacıcaferoğlu et al. (14) regarding the examination of the views of student-athletes playing in the intervarsity minor volleyball league in Turkey on their communication and performance efficiency, it was asserted that there are no differences in terms of the gender variable.

In the study conducted by Gün (13), in which communication skills of prospective music teachers were examined, it was found that there was no significant difference between the communication skills scores of the prospective music teachers and the gender variable.

When the happiness and communication skill levels of the athletes who participated in the study were examined according to their sports levels, it was observed that the professional athletes had higher levels of happiness and communication skills compared to the amateur athletes ($p<0.05$).

It was found in several studies that sportive participation significantly improves and influences communication skills (8). Hacıoğlu (15) concluded in the study conducted on "Examining the Body Image Satisfaction and Communication Skills of University Students" that the body satisfaction and communication skills of the students engaged in sports at a professional level were higher than the ones at an amateur level.

In a study, which reveals the communication level differences of professional and amateur football players with the coach, Abakay and Kuru (1) determined that communication level of professional football players with the coach is higher than that of amateur football players.

In a study conducted by Şahin (22), it was determined that the communication skill scores of the volleyball players in the successful group were high (95.44). Şahin stated that the high level of communication skills of professional athletes is caused by professional athletes have to communicate with many people, different lifestyles and daily habits (22).

According to the happiness and communication levels by sports experience year, it was observed in the study that the communication and happiness levels of the athletes who have 10 years or more sports experience are higher than the athletes who have less experience.

In the study carried out on Perceptions of Professional Basketball and Volleyball Players on Communication Skill Levels with the Coach and Anxiety Levels of Athletes, Ateş et al. (3) determined that the athletes who have 22 years and over sports experience perceive their coach's communication skills at a higher level than those who have 7 years or less sports experience.

As a result, it was stated that coping strategies of the athletes regarding training and competition conditions, referees, teammates, interacting with the other athletes and the other concrete and abstract factors will be improved as sports experience period increases, thus, this situation may increase the communication skills of athletes (3).

The high level of communication skills and happiness levels of the individuals engaged in sports can be caused by the fact that the athletes are in contact with many different individual/s due to the excess and variety of communication fields (team-mate, coach, spectator) within the active

sports lives. Considering some psychological positive effects of sports, it is thought that the level of communication and happiness may be increased as the sports experience period increases.

Age and experience, as in any professional group, is quite important for athletes. People learn the most accurate information by experience throughout their lives. Our knowledge and experience are always the vital factor in learning better and more accurate things. Similar results were not found in the literature on the age of athletes, however, some studies that determine the happiness and communication skills of the athletes according to the age variable are in parallel with the results that we have found.

In the study, which is titled as Comparison of Emotional Intelligence and Happiness of Prospective Physical Education and Sports Teachers and Some Other Prospective Teachers, it was stated that the mean values of happiness of students in the 22+ age group (117.43±18.03) were higher than those of the 18-22 age group (113.05±17.28) (24).

Razı et al. (22) also found that there was a significant difference between the age group of 20-24 and the age group of 15-19 in terms of communication skills. The mean of communication skills of 20-24 age group was higher than that of the 15-19 age group.

In the study conducted by Görür (11) with adolescents, it was shown that the findings about the perception of communication skills have a significant difference in favor of the adolescents who were relatively older.

As a conclusion, it can be said that the level of communication and happiness of the athletes increases, as the sports level (amateur, professional) and sports experience year increase, and that the athletes can adapt themselves more easily to their social environment and therefore they can be happier and more successful in the social life.

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Relationship Between Health Perception and Life Satisfaction in Individuals Who are Member of Recreative Fitness Center

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Abstract

The aim of this study was to compare the health perception and life satisfaction levels of the individuals doing recreational sports according to various demographic variables and to determine the relationship.

This study was conducted on the basis of survey model; Individuals attending recreational fitness centers in Konya participated on a voluntary basis. "Health Perception Scale" which was developed by Diamond et al. (2007) and adapted to Turkish by Kadıoğlu and Yıldız; and "Life Satisfaction Scale" which was developed by Diener et al. and adapted to Turkish by Köker (1991) were used. SPSS 20 package program was used to analyze the data. In the evaluation of the data, complementary statistical methods like standard deviation (sd) frequency (f) percentage (%) average (M) and since normal distribution conditions were not met Kruskal Wallis Test and Mann-Whitney U test, which are non-parametric tests, were used. Spearman Correlation coefficient test was used to reveal the relationship between them. Results were evaluated at 0.05 significance level.

As a result of the study, when the health perception scale and life satisfaction scale were compared according to the variables of gender, age and educational status, statistically significant differences were found and it was found that the relationship between life satisfaction and health perception scale had low positive correlation levels with each other. In this context, health perception and life satisfaction can be evaluated as factors affecting each other.

Key words: Health Perception, Life Satisfaction, Recreation

INTRODUCTION

Being healthy is one of the fundamental rights of humans. Today's health care policies, which are based on the protection, maintenance and development of this right, focus on individuals taking responsibility for their own health and gaining behaviors that improve their health (1).

The health benefits of physical activity are also listed as being good for stress-related disorders and paving the way for individuals to think healthily (4).

In addition to the aim of competition, the idea of preserving health is included in the sport context and people are invited to do sports with this idea. This invitation is particularly popular in developed countries and a wide range of people are engaged in various sporting events. With slogans like lifelong sports, sports for healthy living, recreational sports, fitness (physical fitness), aerobics, jogging and so on and the activities of various sports clubs it is tried to increase the number of people doing sports (17).

According to health belief model; perception of health affects health behaviors and health responsibility. Therefore, health perception is directly related to the process of health promotion aiming at gaining and maintaining healthy living behaviors (6).

Youth and adulthood ages are known as the most dynamic period for the individual and society. During these ages, individuals prefer fitness centers, where they can do sports at all times (10). In parallel with this, health perceptions take shape in these ages. It is easier to acquire lifestyle behaviors such as healthy eating, exercise, effective communication and stress coping methods that need to be developed throughout life compared to older individuals. Lifestyle behaviors have a significant effect on individuals' academic achievement, physiological and psychological health (5,20).

As the importance of physical activity is understood, there is also an increase in the number and density of the members of the fitness centers that provide the modern community with the opportunity of physical activity (13).

Today's modern human has always understood that the sportive activities that she/he is going to do for now are a way of life and they aim to start and continue the sport. (7).

Health is the mainstay of life; meeting the physical, spiritual and social needs of people; increasing the welfare of the society and developing awareness of health perception in individuals in our developing country will be the most fundamental element. Life satisfaction emerged with health awareness and behavior will give the individual the chance to adapt to society and subjective well-being.

METHOD

This study was conducted on the basis of survey model; Individuals attending recreational fitness centers in Konya participated on a voluntary basis. Turkish reliability and validity tests of five likert type Health Perception Scale which was developed by Diamond et al. (9) and originally in in English was conducted in 2012 by Kadıoğlu and Yıldız (14). There are four sub-dimensions titled "Control Center", "Self-awareness", "Precision" and "Importance of Health".

Life satisfaction scale which was developed by Diener et al. (11) and adapted to Turkish by Köker (16) was used to determine life satisfaction levels of the participants. The answers were rated in a 5-point likert style scale (1 = definitely not expressing me, 5 = definitely expressing me).

Analysis of data

SPSS 20 package program was used to analyze the data. In the evaluation of the data, complementary statistical methods like standard deviation (sd) frequency (f) percentage (%) average (M) and since normal distribution conditions were not met Kruskal Wallis Test and Mann-Whitney U test, which are non-parametric tests, were used. Bonferroni correction from Post-Hoc tests was used to find out which groups caused this difference when there was a difference between the groups. Results were evaluated at 0.05 significance level.

RESULTS

Table 1. Demographic findings of participants

		N	**%**
Gender	Woman	95	49,5
	Man	97	50,5
Age	21 age and under	40	20,8
	22-24 age	45	23,4
	25-28 age	36	18,8
	29-32 age	36	18,8
	33 age and above	35	18,2
Education	Elementary	27	14,1
	High school and equivalent	95	49,5
	Graduate	70	36,5
Monthly Income	2000 tl and under	47	24,5
	2001-3000 tl	89	46,4
	3001 tl and above	56	29,2
TOTAL		**192**	**100**

Table 2. Results of participants' perception of health and life satisfaction levels according to gender variable

		Perception of Health Scale								**Life Satisfaction Scale**	
		Control Center		**Importance of Health**		**Precision**		**Self-awareness**			
Gender	n	X	Ss	X	Ss	X	Ss	X	Ss	X	Ss
Woman	95	2,36	0,61	2,31	0,72	2,52	0,68	2,63	0,78	2,91	0,48
Man	97	2,47	0,60	2,52	0,63	2,84	0,52	2,66	0,66	3,22	0,45
z		-1,233		-1,608		-3,499		-0,539		-5,035	
p		0,218		0,108		**0,000****		0,590		**0,000****	

**p<0,01

As can be seen in Table 2, a statistically significant difference was found in favor of male participants in the sub-dimension of health perception scale and life satisfaction scale of individuals doing recreational sports according to gender variable ($p < 0.01$).

Table 3. Findings of health perception and life satisfaction levels of participants according to age variable

			Perception of Health Scale								Life Satisfaction Scale	
			Control Center		Importance of Health		Precision		Self-awareness			
Age		n	X	Ss	X	Ss	X	Ss	X	Ss	X	Ss
A	**21 age and under**	40	2,35	0,58	2,37	0,72	2,83	0,53	2,70	0,74	3,02	0,42
B	**22-24 age**	45	2,53	0,62	2,52	0,69	2,91	0,54	2,82	0,76	3,11	0,53
C	**25-28 age**	36	2,50	0,52	2,66	0,60	2,58	0,61	2,86	0,71	3,04	0,58
D	**29-32 age**	36	2,30	0,64	2,21	0,72	2,61	0,68	2,37	0,62	2,99	0,45
E	**33 age and above**	35	2,38	0,66	2,31	0,60	2,38	0,65	2,41	0,64	3,16	0,44
X^2			3,933		10,601		18,097		15,276		3,788	
p			0,415		**0,031***		**0,001****		**0,004****		0,435	
					D<B,C E<C		**D<A,B**		**D<A,B,C E<B,C**			

*p<0,05; **p<0,01

As can be seen in Table 3, when the participants were examined according to age variable, the perception of health scale was not statistically significant in the control center sub-dimension and life satisfaction scale, and it was determined that this differences were caused by individuals between the ages of 29-32 and 33 and older individuals (p<0,05).

Table 5. Spearman Correlation Coefficient Results for Determining the Relationship Between Life Satisfaction Scale and Health Perception Scale Dimensions

		Control Center	Importance of Health	Precision	Self-awareness	Life Satisfaction Scale
Control Center	r	1				
	p					
Importance of Health	r	**0,505****	1			
	p	0,000				
Precision	r	**0,497****	**0,446**	1		
	p	0,000	0,000			
Self-awareness	r	**0,543****	**0,405**	**0,676****	1	
	p	0,000**	0,000	0,000		
Life Satisfaction Scale	r	**0,185***	**0,165***	**0,142***	**0,209****	1
	p	0,010	0,022	0,049	0,004	

*p<0,05; **p<0,01

The relationship between life satisfaction scale and health perception scale dimensions of recreational sports members of fitness centers were investigated. As a result of this study, a statistically significant relationship was found between the scale and the sub-dimensions.

There was a low positive correlation between life satisfaction scale and health perception scale importance of health sub-dimension (r = 0.152; p <0.05).

There was a low positive correlation between life satisfaction scale and health perception scale control center sub-dimension (r=0,185; p<0,05).

There was a low positive correlation between life satisfaction scale and health perception scale precision sub-dimension (r=0,165; p<0,05).

There was a low positive correlation between life satisfaction scale and health perception scale self-awareness sub-dimension (r=0,209; p<0,01).

DISCUSSION

Health awareness/perception and life satisfaction contexts which were handled when reasons of individuals do recreational workouts are considered as gains of individuals participating in recreational activities (3). When it is studied within this context, the main purpose of this study is to determine the current health perceptions and life satisfaction of individuals who benefit from fitness centers for leisure time evaluation and to reveal the relationship between these two cases.

In our study, health perception and life satisfaction scale scores of male participants were higher than female participants according to gender. In his study, Ardahan (2) states that health is the most important factor motivating female individuals for recreational workout and that it is focused on competition and power for male individuals. Since the result in favor of male participants in the health

perception precision sub-dimension expresses inadequate knowledge and inadequacy about being healthy, we can say that it is actually a result in favor of women and is compatible with the literature. The same situation is valid for the results of the sub-dimensions of the importance of health and the self-awareness sub-dimensions of health perception scale according to age variable. It is observed that the mean age decreases as age increases in the sub-dimensions. When the average age and education levels are taken into consideration, the development and increase of health education and awareness will increase the level of inclination to anti-social behaviors and subjective well-being and life level will be positively affected. In the descriptive study by Evren et al. (12) examining the relationship between student behaviors and perceived health; it was stated that health perception was affected by behaviors. In a descriptive study conducted with adolescents in Izmir by Simsek et al. (19), healthy lifestyle behaviors were examined and emphasized the importance of health. In another descriptive study by Kara et al. (15), conducted with adolescents, risky health behaviors were evaluated, and it was found that education was effective in health perception and importance. When results of intervention study conducted by Cevizci et al. (8) on disadvantaged by performing 3 weeks of supportive training are considered, it was seen that students' health perception improved at the end of the training. In the same study; benefits of health promotion intervention programs and health education with the participation of professionals from different disciplines are mentioned. In the research of Şengel (18), the importance of multidisciplinary studies in the development of health perception was highlighted and it was concluded that social responsibility and social harmony towards health can be adopted through sports and exercise in the effect pattern nature.

In the study of Evren et al., It can make inference in relation to life satisfaction and health perception that as the level of social acceptance increases, health perception increases as well, and life satisfaction level is affected. It is clear that new policies are needed in areas such as transportation, sports, entertainment and urban planning to make our young people more active (15). These policies should aim to make people use their bodies more in daily activities. For example, walking can be made a natural part of daily activities by arranging places such as homes, schools and neighborhoods.

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Nutritional Habits' Review of Amateur and Professional Football Players

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Abstract

The aim of our study is to investigate the dietary habits of amateur and professional football players and their differences.A hundred football players actively playing football during the 2013-2014 football season in 2nd League A Category, 2nd League B Category, 3rd League, 1st Amateur and 2nd Amateur Leagues participated in our study. A questionnaire that consists of 17 personal information and nutritional habits questions was developed based on the literature and was filled out by the players to determine their nutritional habits. There were statistically significant differences between the groups at $p<0.01$ level across their education level on nutrition issues, number of meals, alcohol and cigarette use, daily fluid intake, pre-game fluid intake, pre-game foods consumed, liquids and food consumed outside of three regular meals, late-time meals, regular supplementary products and last food before games. There were statistically significant differences between the groups at $p<0.05$ level across information resource on nutrition issues, skipped meals, fluid intake during training, late time meals, attention to expiration dates while shopping.In conclusion, consistent with previous studies in the literature it is found that amateur and professional football players don't have good nutrition information and habits. Clubs, coaches and athletes looking for success on a national and international level should consult and collaborate with a nutritionist. We believe that it will be very useful to train athletes and coaches, with seminars, courses, panels, etc. and to have an expert dietitian in sports clubs, and to emphasize the importance of this issue in written and visual media.

Key words: Football Players, Sports Nutrition, Amateur Football Player, Professional Football Player, Nutrition Habits.

INTRODUCTION

Nutrition is the use of the necessary elements in the body to grow, develop, and live healthy and productive for a long time (11).

Athlete nutrition is an issue that athletes and trainers still do not pay enough attention to. Because, their attention is focused on the elements which will improve their training and performance in very short way. However, nutrition is one of the most important factors determining the athlete's performance in addition to genetic structure and proper training. In recent years, the importance of nutrition in the success of athletes has started to be understood gradually (21).

There is a direct proportion between athletes' nutritional habits and performance. Success can be achieved by making good use of nutrition and energy balancing in the sports done both for health and the amateur and professional sports. Today, nutrition in sports, as a separate science, attracts the attention of every athlete. In fact, athlete nutrition directly shows parallelism with the endless development of science thoroughly. The athletes and trainers' knowing the importance of the nutrition-related information and their implementation is great (3, 21). When making a nutrition plan, it is necessary to pay attention as it were a training plan. In the nutritional plan and diet of the athletes, nutritional contents and energy values should be balanced (16).

Upper The importance of nutrition in sports and the relationship between the workout performance and nutrition has been determined by researches carried out. Although there is no "magical formula" to improve performance in

terms of nutrition in sport, which is considered as a struggle, the nutrition of athletes shows some characteristics and reveals the importance of nutrition (30).

MATERIAL & METHOD

The teams playing in different leagues were determined as three teams according to random method. A total of 100 football players - 50 amateur and 50 professional who actively played football in 6 different league categories in the 2013-2014 football season constituted the group of subjects in the research.

In order to determine the nutritional habits of the research, a questionnaire which was used in the scientific studies before (10, 12, 13, 18, 29, 35) and a questionnaire consisting of 17 personal information and nutrition habits which were developed by taking the opinions of experts was used. First of all, the subjects were give explanations about the questionnaire; the questionnaires were distributed to the athletes directly or through the managers of the athletes, and were collected in the same way by controlling after being completed.

Subjects were warned to provide careful and reliable information to the questions. Statistical calculations were made in SPSS (version 1.4) program.

RESULTS

The mean age of the professional football players participating in the study was 24.6 ± 3.8 years, and the mean age of the amateur players was 22.5 ± 3.8 years; body weight of professional footballers was found to be 72.9 ± 4.4 kg and body weight of amateur players was 70.4 ± 4.5 kg. 52.5% of professional footballers are high school and equivalent schools graduates and 47.1% are undergraduates; 51.2% of amateur football players are of high school and equivalent education level.

When asked about the adequacy of their knowledge about athlete nutrition, professional footballers significantly found themselves more efficient than amateurs ($p<0.001$) (Table 1).

30% of professionals showed their trainers, 20% written and visual media, 12% nutrition books as a source of information on nutrition; 48% of amateurs showed written and visual media, 28% nutrition books and 24% their trainers. While the professionals showed their trainers as a source of information at a significant level compared to the amateurs among the groups, the amateurs showed the written and visual media ($p<0.05$).

Amateur footballers said that they skipped significantly more meals than professionals ($p<0.001$) (Table 1). While breakfast is the most common skipped meal for professional footballers, it is lunch for amateurs.

No significant difference was observed between amateurs and professional footballers in alcohol and smoking ($p>0.001$) (Table 1).

While there was no significant difference between amateurs and professional football players in the amount of fluid consumed during training, it was seen that amateurs consumed less liquid in one day compared to professionals ($p<0.05$) (Table 1).

When asked about the food consumed by footballers before the competition, 40% of professional football players stated that they preferred protein-content, 30% carbohydrate-content, 18% vitamin-content drinks; and 46% of amateurs preferred protein-content, 32% vitamin-content, 18% carbohydrate-content drinks. While amateurs consumed significantly more protein and vitamin-containing foods than professionals, it was observed that they consumed significantly less carbohydrate and fat-containing foods ($p<0.001$).

When asked about the drinks consumed out of the meals, 42% of the professional footballers stated that they consumed fruit juice, 28% water, 20% coke, 10% tea and coffee; and 30% of amateur football players consumed fruit juice, 24% water, 18% tea and coffee, and 28% coke more often. Amateurs are observed to consume significantly more coke, tea and coffee, and professionals consumed significantly more juice and water ($p<0.001$).

When asked about the consumed appetizers out of the meals, 44% of professional footballers were seen to consume fruit, 26% were toast and 22% were biscuits, 8% were chocolate; and 36% of amateur football players consumed chocolate, 28% fruit, 18% toast and 14% were biscuits. Professionals were seen to consume significantly more fruit and toast than amateurs and amateurs consumed more chocolate ($p<0,001$).

Amateur footballers were found to have significantly more late-evening meals than professionals ($p<0.05$) (Table 1).

Professional footballers are more careful than amateurs in paying attention to the expiration dates of foodstuffs in shopping ($p<0.05$) (Table 1).

When supplementary products (vitamins, minerals, carbohydrates, amino acid tablets, etc.) used regularly by football players were asked, it was seen that professional footballers used significantly more products than amateur football players ($p<0.001$) (Table 1).

When asked how many hours ago they consumed the last meal before the competition, 68% of professional footballers answered that they had 3-4 hours before, 32% 1-2 hours; and 56% of amateur footballers had 1-2 hours before, 44% 3-4 hours. Professionals eat their last meal significantly before the competition compared to amateurs ($p<0.001$).

It was seen that professional football players thought that they had enough nutrition compared to amateurs ($p<0.001$) (Table 1).

When asked how many meals they consume per day, 56% of professional footballers answered that they have 3-4 meals, 28% have 5 meals and more, 16% 1-2 meals; and 60% of amateur footballers have 3-4 meals, 26% 1-2 meals, 14% gave 5 meals and more. It was seen that professional footballers significantly had more meals than amateurs ($p<0.001$).

Table 1. Some questions asked to players and answers received.

Questions		Amateurs				Professionals			
		Yes	No	No idea	Total	Yes	No	No idea	Total
Do you find your knowledge on athlete nutrition sufficient? ($p<0.001$)	N	23	16	11	50	28	14	8	50
	%	46	32	22	100	46	28	16	100
Do you skip meals? ($p<0.001$)	N	36	14		50	21	29		50
	%	72	28		100	42	58		100
Do you drink alcohol? ($p>0.001$)	N	24	26		50	27	23		50
	%	48	52		100	54	46		100
Do you smoke? ($p>0.001$)	N	24	26		50	23	27		50
	%	48	52		100	46	54		100
Do you take care of fluid intake during training? ($p<0.001$)	N	39	11		50	42	8		50
	%	78	22		100	84	16		100
Do you think you have adequate nutrition? ($p<0.001$)	N	22	28		50	35	15		50
	%	44	56		100	70	30		100
Do you eat late in the evening? ($p<0.05$)	N	31	19		50	21	29		50
	%	62	38		100	42	58		100
Do you pay attention to the expiration date of the food you take? ($p<0.05$)	N	29	21		50	32	18		50
	%	58	42		100	64	36		100
Do you regularly take supplementary product supplements? ($p<0.001$)	N	25	25		50	40	10		50
	%	50	50		100	80	20		100

DISCUSSION

The aim of this study was to investigate the differences in nutritional habits of football players according to their status as amateur and professional footballer. Athlete nutrition is an area which studies nutrition science under the scope of "exercise-nutrition" interaction and whose importance has been increasing for the last 25 years.

The elite athletes enforcing the extreme points of the human genetic pool and pushing the physically possible training limits are a good model for demonstrating the relationship between nutrition and performance. Proper nutrition does not give a non-elite athlete the chance to become a world-class player. However, with elite athletes, where training and genetic conditions are similar and competition is experienced at a high level, nutrition may be the only element to gain fitness (8). It is the only way that the athlete develops his body, protects his health and achieves high sporting

performance through balanced, regular and appropriate nutrition to the purpose (33).

The mean age of the professional football players participating in the study was found to be 24.6 ± 3.8 years, the mean age of the amateur players was 23.2 ± 3.8 years; and the body weights of professional footballers were found to be 72.9 ± 4.4kg and the body weights of amateur players were 73.1 ± 4.5 kg. Amateur and professional footballers are seen to have high school and equivalent school and undergraduate level education in general. Income levels of professional footballers were found to be much higher than amateurs. In the study conducted by Göral et al. (18), 70.8% of amateur footballers are seen to have high school and equivalent school, 16.7% of undergraduate, 12.5% of primary school education level; and according to another study, 67.5% of football players have high school, 25% have undergraduate and 7.5% have primary education level (29).

When Pulur and Cicioglu (31) stated in their study that a large portion such as 54% of the athletes are knowledgeable about athletes nutrition; and Atay et al (6) stated in their study that 73.7% of football players have good and very good knowledge about nutrition and 26.2% of them have low and medium level knowledge about nutrition. In another study conducted by Abood et al. (1), nutritional information of football players was found to be insufficient. In another study, they examined socioeconomic status, nutritional information and habits of 1455 athletes. At the end of the study, it was found out that athletes have nutritional problems. This results in the lack of information about nutrition (17, 35). In his study of Öztürk (29), it was found that professionals generally fed more regularly than amateur players. It was found that the majority of the players (51%) who participated in our study thought that their knowledge about athlete nutrition was sufficient.

According to Sivrikaya (34), 76.6% of the athletes and according to Sürücüoglu et al (36), 38.3% of the athletes showed their trainers as a source of information about nutrition. In the study conducted by Senel et al. (39), 42.5% of the athletes show their trainers as sources of information, and 25.8% show books-magazines and radio-television. In our study, it was found out that 42% of all football players received nutritional information from their trainers. This shows that trainers have an important place on athletes in nutrition knowledge. However, in another study on the nutritional attitudes of the trainers, while the rate of those who received information from the seminars on athlete nutrition was 24.3%, the fact that the trainers who did not receive information was 75.7% can be expressed as a thought-provoking result (10).

However, in some studies conducted in the literature (10, 40), the nutritional knowledge level of the trainers was not found at the desired level. In a study in which the nutritional information of the trainers was measured in the teams, the trainers answered 55.6% of all information questions correctly. It was concluded that their trainers were not ready enough to give nutrition advice to athletes and should benefit from further nutrition training (41).

Şanlıer and Arıkan (38) stated that 48.1% of the athletes skipped meals and the skipped meal was generally (51.4%) breakfast. Bulduk et al (14) stated that 36.8% of athletes skipped meals, 47% of them skipped meals in the morning, 46% of them skipped lunch and 7% in the evening; and Arıkan and Şanlıer (4) reported that 58.6% of these skipped meals were breakfast and 41.4% were lunch. In our study, while most of the amateur football players skipped one of the daily meals (72%), the majority of professional footballers did not skip meals (58%); 41% of those who say that they skipped meals were found to skip breakfast meals, 44% of them skipped lunch. Our data are similar to the studies in the literature.

In a study Atamtürk et al. (5) conducted on 232 footballers in Northern Cyprus, 55.2% of footballers smokes, 52.4% drinks alcohol; according to Akil's (2) study, 43.2% of athletes drink alcohol and 27% smokes cigarettes; according to Bilgiç et al. (12), 29.4% of athletes smoke and 33.3% smokes 15 or more cigarettes per day. In our study, suitable results were observed with the ones in the literature and it was observed that the harmful habits of football players such as alcohol (51%) and cigarettes (47%) were common.

In a study conducted by Javandel and Berahmandpour (24), they stated that extra fluid should be taken on the match day breakfast, lunch and 10-15 minutes before the match. Bilgic et al. (12) reported that 88.2% of athletes felt thirsty after the competition and 84.3% consumed 0.5 liters less liquid before the competition. According to Özmerdivenli and Karacabey's (28) study, 12% of volleyball players and 24% of basketball players emphasize that it is important to take water that has

such important tasks after training and match. It can be understood from this that a large number of athletes consider the task of water only as quenching. However, water is the most important nutrient that can affect the athlete's performance positively or negatively in a short time. In our study, although the majority of the players (81%) stated that they paid attention to fluid intake, it was found that their fluid consumption was inadequate, similar to other studies in the literature.

Hickner et al. (23) recommend that athletes have a more advanced ability to store carbohydrates after exercise, and athletes should be given foods food containing a high glycemic index. In our study, it was determined that most of the professional football players prefer carbohydrate-containing foods as pre-competition food, mineral and vitamin supplements which are thought to be energy-enhancing among football players are used quite regularly and with the majority of their own will.

For years, athletes believe that supplementary protein intake increases muscle performance, while nutritionists and physiologists have argued whether supplementary protein is required for optimal athlete performance or not (Gürsoy 22). In a study conducted by Ayca and Ciloglu (7) on football players, 37% out of 127 football players use protein powders, amino acids and sports drinks. Akil (2) reported that 76.4% of the athletes participating in the research use energy enhancers and 6.6% do not use and the rest of the athletes benefit rarely. Douglas and Douglas (15) found out in a study that athletes used high levels of vitamins and minerals (58%). According to Bozkurt's (13) study, 52.1% of the athletes do not use foods that they consider as energy enhancers while 44.3% of athletes do use. Öztürk (29) found that the rate of use of products such as vitamin-mineral preparation, energy drink, sports drink among amateurs was lower than that of professionals. Massad et al. (26) found out in a study that 41.7% of athletes used vitamin and mineral supplements. According to the study of Güler et al. (19), 25.4% of the athletes used supplementary sports nutrition and 74.6% did not use it; Swirzinski et al. (37) found that 31% of football players use supplementary sports nutrition. In our study, it was seen that the rate of supporting product use in professional football players (80%) was much higher than amateurs (50%).

In Leblanc et al. (25) stated that the number of meals was insufficient in their study conducted on young French football players. The conducted studies show that the number and times of meals affect physical performance. It was determined that athletes with five meals performed better than those who ate three meals and total working efficiency increased with five meals (31). Öztürk (29) reported that all professional footballers had a feeding habit 3-4 hours before the competition and 95% of amateur 2 - 3 hours before the competitions. The athlete must take part in the competition digesting what he has eaten. Being hungry or full affects the performance negatively (31). In the study conducted by Sanlier and Arikan (38), 49.8% of athletes consumed meals three times a day, 28.4% four times, 14% twice a day, 7.8% five or more meals a day. In their study, Sağlam (32) found that 84.6% of football players consumed 3 meals a day, 12.5% consumed four meals and more. The fact that 68% of professional football players participating in our research, 44% of amateurs and 56% of all football players said that they ate the last meal before the competition 3-4 hours ago, can be considered as having sufficient information about this subject.

Consequently, the clubs, trainers and athletes looking for success on a national level and international platform should cooperate with a nutritionist. In the domestic and foreign literature, it is revealed that nutrition information and habits of amateur and professional football players, which are the subject of our study parallel to the studies on nutrition habits of athletes, are not in good condition; and nutritional problems are existed.

In the light of nutritional information supported by scientific studies, we believe that it is very beneficial to support athletes and trainers with nutrition training, seminars, courses, panel etc., make a specialized nutritionist in the sports clubs available and constantly emphasize the importance of this issue in the written and visual media.

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Analysis of Dominant and Non-dominant Biceps and Deltoid Muscle Volumes of Badminton Players

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Abstract

The main purpose of this study is to analyze whether there is a difference between dominant and non-dominant biceps and deltoid muscle volumes of badminton players.Also hand grip strengthlevels were compared dominant and non-dominant hands of badminton players.14 registered badminton players between the ages of 11 and 14, who have been playing badminton for at least 5 years and practicing at least 5 days a week, have participated in this study. The muscle volumes of the participants were determined through an MR (1.5 T Philips Achieva Netherlands) device. The T1 weighed MR images of 5 mm section thickness of dominant and non-dominant deltoid and biceps muscle volumes of the participants were obtained, and the lines were drawn at each section at the work station of the related muscle and the sectional area was calculated. The muscle volume was obtained by multiplying the resulting sectional area by the section thickness (Cavalieri principle). Wilcoxon signed rank test was used to analyze the data obtained in this study.It was observed that the dominant deltoid muscle volumes of the players were more than their non-dominant muscle volumes ($p<0.01$). Dominant and non-dominant biceps muscle volumes of the players were analyzed and it was observed that the dominant biceps muscle volumes of the players were more than their non-dominant biceps muscle volumes ($p<0.01$).Dominant hand grip strength values were found to be higher than non-dominant hand ($p<0.01$).It was consequently observed that the dominant biceps and deltoid muscle volumes and the dominant grip strength values were higher of badminton players than non-dominant side.These results suggest that the badminton players should also focus on exercises for improving the non-dominant side of their bodies.Otherwise, it can lead to muscle imbalance and injury.

Key words: Badminton, Muscle Volume, MR

INTRODUCTION

The lateralization refers to how the anatomical structure and identical body organs sharing similar characteristics and functions tend to be more dominant and functional in one hemisphere than the other. People tend to prefer their left hand or foot over their right hand or foot or vice versa (19). Lateral dominance is an extremity or a general term for functional dominance of one half of the body. The preferred or better functioning side of the body is clearly observed particularly in athletics (e.g. throwing, bouncing arm, first step, etc.). Highly intense long-term exercises focusing on one side of the body create a risk of morphological asymmetry. One of the paired organs is preferred over the other one (5).

As in other racquet sports, there are short-term maximal or submaximal efforts and short-term resting periods in badminton. Particularly, speed, endurance, strength, coordination, reaction, anticipation, game skills and technique are considered preconditions of success in these sports (4).

When considered in terms of strength and muscular endurance, since the legs, arms and upper part of the body are used in a complicated way when playing badminton, insufficient strength and endurance in upper extremities begin to take effect towards the end of a long rally or the end of the game. The striking power decreases, the player gets distracted and the shape of the body changes (12).

Badminton players favor one particular arm to hold the racket, but it is not known whether this preference causes an asymmetry in the muscles. Too much stress is put on the shoulder of a badminton player. Extraordinary moves are made in order to achieve extra speed. The player creates maximal mobility in order to increase power, and to transform potential energy into kinetic energy to hit the ball. The player pushes his shoulder to its limits

since hitting the ball with the racquet is a repetitive activity.

The studies show that an exercise performed by one extremity affects the opposite extremity. The results of Tok's (18) research he conducted on healthy male students in Physical Education Teaching Department proved that exhaustion of dominant extremity affects the non-dominant extremity (18).

Therefore, this study was designed to determine whether muscle volume differences between the dominant and non-dominant side is present in the biceps and deltoids of badminton players. Dominant and non-dominant hand grip strengths of badminton players are also compared in this study.

MATERIAL AND METHOD

Fourteen healthy badminton players who played badminton at least five years (age; 13.07±2.01 years, height153.64±9.18 cm, weight 44.71±7.28 cm) and who exercised at least 6 times per week for 120 min or more participated in the study. Informed consent was obtained from all subjects prior to experimental procedures which were approved by the University Ethical Committee. Each subject filled out a questionnaire on demographics, medical history and physical activity patterns.

Image Analysis

MRI Protocol

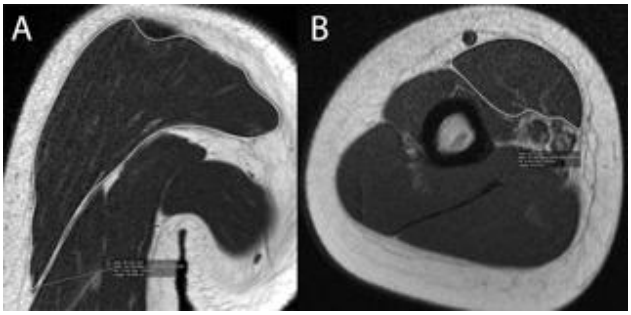
All MRI examinations were performed on a 1.5 Tesla MRI scanner (Philips, Achieva, Netherlands). A shoulder coil with 8 channel was used for acquisitions. For deltoid muscle imaging, coronal turbo spinecho T1 weighted images were obtained (TR: 18 ms,TE: 556 ms, slice thickness: 3 mm, NSA:2). For bicepsbrachii muscle imaging, axial turbo spinecho T1 weighted images were obtained (TR: 20,TE: 600, slicethickness: 5 mm, NSA:2).

Volumetric image analysis

All MRI images were transferred to an Osirixim aging software. The borders of the muscle of interest were manually traced on each slice and cross-sectional areas were measured in cm^2 (Figure 1). Volume of each muscle was calculated according to Cavalieri principle by multiplying the sum of cross-sectional areas with the slice thickness. All measurements were performed by a radiologist with 8 years of experience in radiology who were blinded to the knowledge of the side of the dominant arm.

Musclevolume (cm^3)=Sum of the cross-sectional areas X slice thickness

Figure 1. Manual delineation of the borders of the deltoid (A) and bicepsbrachii (B) muscles on T1- weighted coronal and axial MR images



Hand grip strength

A Takei Physical Fitness Test Grip-D Grip Strength Dynamometer, which measures strength between 0 and 100 kg, was used to measure hand grip strength. Dynamometer was adjusted for the hand size of each participant. After warming up for five minutes, the measurements were taken when the participants were in standing position, without bending their arms, and their arms were at a 15° angle and not touching their own bodies. This process was repeated three times for each hand and the highest value was used.

Heights of the participants

The heights of the participants were measured with a cm-scale measurement scale.

Body weight measurements

The participants were barefoot and wearing shorts and their body weights were measured on a body weight scale.

Statistical Analysis

As a result of the power analysis performed to determine the number of participants, it was decided that 14 participants would be sufficient to achieve 85% of test power at 2 units of mean difference and 4 units of standard deviation. Wilcoxon signed rank test were used to compare the data obtained in this study. Statistical significance was determined as $p<0.05$. SPSS version 21.0 was used to perform statistical analysis of the data obtained in this study.

RESULT

Table 1. Dominantand non-dominant biceps and deltoid muscle volumes of badminton players

Muscle volume		Mean	Standard Deviation	Median	Min	Max	p
Deltoid	Dominant	1749,85	772,14	1370.50	718,00	2922,00	0.001**
(cm^3)	Non-Dominant	1317,71	595,51	1099.00	681,00	2541,00	
Biceps	Dominant	657,64	276,45	571.00	360,00	1192,00	0.001**
(cm^3)	Non-Dominant	565,64	294,30	484.00	207,00	1133,00	

**p<0.01

A statistically significant difference was observed between the dominant and non-dominant deltoid muscle volumes of the players. It was observed that the dominant deltoid muscle volumes of the players were more than their non-dominant muscle volumes (p<0.01).Dominant and non-dominant biceps muscle volumes of the players were analyzed and a statistically significant difference was observed between these muscle volumes. It was observed that the dominant biceps muscle volumes of the players were more than their non-dominant biceps muscle volumes (p<0.01).

Table 2. Dominant and non-dominant hand grip values of badminton players

		Mean	Standard Deviation	Median	Min	Max	p
Hand grip strength (kg)	Dominant	20,77	6,05	20.55	13.40	31.00	0.001**
	Non-Dominant	18,30	5,65	18.95	10.50	28.00	

**p<0.01

Dominant and non-dominant hand grip strength values of the badminton players were compared and the grip strength of their dominant hands were found to be higher than the other hand (p<0.01).

DISCUSSION

In this study, it was aimed to find out whether there were any differences between the dominant biceps and deltoid muscle volumes and non-dominant biceps and deltoid muscle volumes of badminton players. It was observed that the dominant deltoid muscle volumes of the players were more than their non-dominant muscle volumes. Again, dominant and non-dominant biceps muscle volumes of the players were analyzed and it was observed that the dominant biceps muscle volumes of the players were more than their non-dominant muscle volumes. The grip strength of their dominant hands was also found to be higher than the other hand. It was reported that the dominant hand is an effective factor on hand grip strength (1). The reason of this result could be due to the nature of badminton in which players repeatedly hold the racket and hit the ball with a dominant arm.

Similar studies, which reported the difference between the dominant and non-dominant sides of the players, were also found in literature (6,7,9).

Ducher et al. (6) investigated the effects of long-term tennis playing on the relationship between lean tissue mass and bone mineral content in the forearms, taking the body dimensions into account. Fifty-two tennis players were recruited. They measured lean tissue mass, bone area, bone mineral content (BMC), and bone mineral density at the forearms from a DXA whole-body scan. They assessed grip strength with a dynamometer. They found a marked side-to-side difference in favor of the dominant forearm in all parameters. They assessed bone area and BMC correlated with grip strength on both sides. They found the correlations were still significant after adjusting for whole-body BMC, body height, or forearm length. Their study result reinforced that, the putative role of the muscles in the mechanical loading on bones (6).

Pennock et al. (13) examined abnormalities noted on magnetic resonance imaging (MRI) in the shoulders of asymptomatic Little League baseball players. The dominant arm was 8.5 times more likely to have an abnormality on MRI compared with the nondominant arm. In all, 12 players (52%) had 17 positive MRI findings in their throwing shoulder that were not present in their nondominant shoulder (13).

Kong and Burns (9) compared bilaterall strength characteristics of the hamstrings and the quadriceps muscle groups in recreationally active, healthy males and females. Their main findingwas H:Q ratio was higher in the dominant than the non-dominant legs for both isometric and isokinetic measurements (9).

A study by Ellenbecker (7) conducted on 22 professional male tennis players showed that all players had high levels of isokinetic strength, and the average internal rotation peak torque value was higher in the dominant side than the non-dominant side. Significant differences were found between the dominant and non-dominant shoulders in shoulder rotation moves (7).

Grip strength is considered an objective measurement in upper extremity performance evaluation (11). Peterson et al. (15) found that the grip strength of the dominant hand is 10% more than the grip strength of the non-dominant hand (15). In another study dominant hand grip strength were found to be higher and statistically significant compared to non-dominant hand grip strength (10).

In another study on soccer players where there was a greater than 10% difference in muscle strength between the knee flexors of the dominant legand the non-dominant leg, a total of 28 of the 41 players (68%) had significant musculoskeletal abnormality (imbalance>10%) in one or more specific muscle groups (16).

Another study reported that the dominant shoulders of tennis players have significantly more scapular and glenohumeral mobility than their non-dominant shoulders. Poor body mechanics, muscular exhaustion or weakness that emerges following these extreme moves may result in injuries. This risk depends on the balance between the mobility and the stability of the shoulder (2).

Although our data is in alignment with the study by Ducher et al. (6) and Kong and Burns (9), it is contradictory to a published study by Rosene et al. (17). They have found no difference between the dominant and non-dominant legs in collegiate athletes.

It is not clear what causes this discrepancy between the studies. It might be a sports branch issue since our study was conducted on badminton players where as volleyball, soccer, basketball and softball players were involved in the study by Rosene et al. (17). Badminton players use dominant arm too much so this could be the reason.

Based on the previous studies, which showed no differences between the dominant and non-dominant sides of non-athletes (3), it may be concluded that the difference observed in athletes is related to their training activity. In other words, training may be more relevant for the reasons of the difference between dominant and non-dominant sides.

Armstrong and Oldham's study (3) compared dominant and non-dominant hand strength in both right- and left-handed participants in non-athletes. Their study group was recruited from hospital staff and visitors and the staff and students of a local university college. Maximum voluntary contraction of the first dorsal interosseous muscle, power grip strength and pulp-to-pulp pinch strength were assessed under carefully controlled conditions. They observed no significant differences between dominant and non-dominant hands in left-handed participants for all tests. They observed small but significant differences (0.1–3%) between dominant and non-dominant hands in right-handed participants for all three tests (3).

Extreme and repetitive moves put the static stabilizers (glenohumeral ligaments, labrum, and bone structure) of the shoulder under stress. Extreme moves during the game and tightening of these stabilizers increase the player's performance. However, this may cause underperformance, shoulder instabilities or injuries in the long run. In order to prevent these problems, each player should be well-trained on maintaining the balance between shoulder mobility and stability. This training process should start early in the career of the player (8,14).

It was consequently observed that the dominant biceps and deltoid muscle volumes of badminton players were higher. It was also observed that the grip strength of badminton players' dominant hands was also found to be higher than the other hand.

CONCLUSION

Therefore, while planning the training programs of badminton players, considering individual characteristics depending on laterality may both increase performance and decrease the risk of injuries.

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Determination of HIF1-Ars11549465 Polymorphism in Elite Skiers

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Abstract

Studies in sports genetics have increased nowadays and the identification of genotype and allelic distributions of candidate genes in different athletes has provided important information to sports scientists. One of the candidate genes studied in sports genetics is the hypoxia-inducible factor 1-alpha (HIF1A) gene, which is associated with the endurance phenotype. In our study, we aimed to determine the genotypic and allelic distribution of HIF1A rs11549465 polymorphism in Turkish Elite cross-country athletes. 34 (23 male, 11 female) athletes were included in the study, and 1 cc of blood samples taken for routine analysis after the approval of the ethics committee was used for DNA isolation. The commercial kit was used for DNA isolation and genotyping was performed by Real-time PCR method. The number and percentage of CC, CT and TT genotypes of the HIF1A rs11549465 polymorphism were 24 (72.72%), 8 (24.24%) and 1 (3.03), respectively. In male skiers CC, CT and TT genotype numbers and percentages were determined as 17 (55.51%), 4 (12.12%) and 1 (3.03%) respectively. In female, CC and TT genotypes were determined as 7 (21.21%) and 4 (12.12%). We detected no TT genotype in female athletes. When we look at allel numbers, C allele was determined as 56 (84.84%) and T allele was determined as 10 (15.15%). This is the first study on HIF1A rs11549465 polymorphism on Turkish elite ski cross-country athletes. The higher prevalence of CC genotype and C allele in the athlete group is similar to the previous studies on different groups of athletes. We believe that this study will be an important reference for further studies.

Key words: Sport genetics, cross-country, athletic performance, HIF1-A

INTRODUCTION

One of the ways to be successful in sport is being talent. Although it is known that sportmen physical, physiological and mental capacities are an important indicator affecting athletic performance, being talent as an individual is a significant factor. Being a talent individual depends on the features such as mental skill and high performance, inborn physical (flexibility, muscular force, body composition) and physiological factors and genetic factors suitable to the sport that he deals with (9). In addition to that, their nourishment, discipline of training and their genetical inclinations with suitable training conditions provide them to be successful in certain branches of sports. In recent years, the effects of a lot of genes on athletic performance in sport have been researched with the help of the human genom project carried into effect.

As a result of these researches it has been stated that genetic features also effect on athletic performance as well as the components such as force, strength, agility, flexibility, nerve-muscle coordination considered to be effective in identifying athletic performance in athletes and it can be indicated as a criteria in even making athletes lead to the sport that they tend to and in their performances (5,10).

The polymorphisms in genes such as especially HIF1-A, ACTN3, ACE and PPAR-A in sports requiring endurance or explosive power have been often a subject of researches.

Hypoxia-inducible factor alpha gene (HIF1-A) as a transcription factor associated with athletic performance and regulating the expression of the genes providing cell adaptation to hypoxia is one of the studied genes in subjects related to genetic and athletic performance (11). HIF1A is localized in 14q23.2. factors (hypoxia inducable factors, HIFs) that can be stimulated in hypoxia conditions provide cells to adapt the hypoxia conditions and also provide athletes to adapt better especially in aerobic exercises. When the oxygenation of cells is reduced,

they support fulfillment of residual oxygen demand by stimulating glycolisis and angiogenesis (15).

Functional rs11549465 polymorphism on HIF1A causes proline-serine amino acid change in 582nd position of synthesised polypeptide and cytosine-thymine transition. In the result of this, stability and transcriptional activity of HIF1A protein are increased and it causes the athletes to develop new adaptations against changing conditions (8).

Cross country is a sport disciplines requiring endurance and high effort performed on skiers. The typical characteristics of high level skiers, which means that their endurance features are good, are their ability to run on skiers with high level performance for a long time. This characteristic of athletes besides it is effective for them to be successful at sport has been stated that it is related to physiological structure and gene factor (18,16).

In generally, Cold weather and in flat and rough country that has high elevation, 1.5 km sprint 15 km, 50 km and 15+15 km biathlon in male athletes, and 1.5 km, 10 km,30 km,7.5 +7.5 km biathlon in female athletes performed on skis are a sport disciplines requiring high effort and endurance. The most typical characteristics of high level skiers are their ability to sprint for a long time with high level of performance on skis in cold weather and in places where there is high altitude.

When the literature has been examined it has been found out those genetic studies on Cross Country athletes have not been conducted enough. Thus, in this study performed in our country for the first time, it has been aimed to identify HIF1A rs11549465 polymorphism in elite cross-country athletes.

MATERIAL AND METHOD

Participants

The most significant characteristic of athletes attended in our study is that they have elite athletes status. When determining elite athletes criteria, " raking among at least top three in Turkish Championship in past two years in his/her own branch and taking part in international tournaments" have been considered. 34 volunteer cross-country athletes in total consisting 23 male and 11 female athlete taken part in National Ski Team camp conducted in Erzincan and Ağrı have attended to our research. Before beginning the study, the document of legal permission has been taken from Chairmanship of Turkish Ski Federation for study to be done. Our study protocol is designated in accordance with Helsinki Decleration and confirmed by Clinical Studies Council of Faculty of Medicine in Atatürk University. Voluntary Consent Form notifying study protocol and outputs has been confirmed by all athletes attended the study before the study.

Athletes' DNA Recovery and Genotyping

Blood samples for our study have been provided by taking 1 cc of preferic blood taken for routine biochemical analyses into tubes containing EDTA. DNA isolation has been executed by examining user protocols with High Pure PCR Tamplate Preperation Kit(Roche, Germany). Final concentrations of obtained DNAs have been measured with spectrophotometer and sufficient DNA from all samples has been obtained for genotyping. Isolated DNA material has been executed with 7500 Fast Real-Time PCR System (Applied Biosystems) device by using Taqman Genotyping Assays (Applied Biosystems Foster City, CA, USA) genotyping kits. Genotyping processes have been completed by using 10uL in total consisting 5 μL master mix, 3,75μL H2O, 0,25μL assay and 1μL (10 ng) DNA.

RESULT

Athletes age average as 25,60±6,8 (years), height as 172,00±6,38 (cm) and weight as 72,77±11,79 (kg) have been found. Demographic information about elite athletes has been shown in Table 1.

Table 1. Demographic information about elite athletes

Physical Feature [± ss]		Education [n (%)]		Number of Level [n (%)]	
Age (year)	25.60 ± 6.8	**High School**	1 (5)	Turkish Championship	25 (69,44)
Height (cm)	172.00 ± 6.38	**Undergraduate**	18 (90)	Balkan Championship	9 (26,47)
Weight (kg)	72.77 ± 11.79	**Postgraduate**	1 (5)		

In our cohort study, number and percentages of HIF1ACC,CT and TT genotypes have been found as respectively 24 (%72.72), 8 (%24.24) and 1 (3.03). The numbers and percentages of CC,CT and TT genotype in male skiers have been identified as respectively 17 (%55.51), 4 (% 12.12) and 1 (% 3.03) while CC and CT genotype and percentages in female skiers have been identified as respectively 7 (%21.21) and 4 (% 12.12). TT genotype has not been identified in females. When we look at the number of alleles, C allele has been identified as 56 (%84.84) while T allele has been identified as 10 (%15.15) in our cohort. HIF1A genotype and allele frequencies of cross country national team athletes have been summarised in Table 2.

Table 2. HIF1Ars11549465 genotype and allele frequencies of cross country national team athletes

	Genotype			Allele	
Groups	**CC**	**CT**	**TT**	**C**	**T**
Male (n=22)	17 (%55.51)	4 (%12.12)	1 (%3.03)	38	6
Female (n=11)	7 (%21.21)	4 (%12.12)	0 (%0)	18	4
Total (n=33)	24 (%72.72)	8 (% 24.24)	1 (%3.03)	56 (%84.84)	10 (%15.15)

DISCUSSION

Studies in the area of sport genetic have been started by Bouchard et al.(4) who revealed the effects of gens on sportive activity and researched sportive achievements of monozygotic and dizygotic twins in a most comprehensive way and investigated by Montgomery et al. (14). However in the helm of the most effective studies in this area it has been accelerated with the effect of ACTN3 rs1815739 polymorphism yang et al.(17) on sprinter and endurance activities. From this date, studies in this area have been accelerated and the determination of the contributions of new genes to sportive activities has been accelerated as physiological features are identified and with the help of development of new technologies.

HIF1-A protein synthesized by HIF1A gene is a transcription factor that enhances expressions of the other genes having roles in aerobic metabolism and sustains expression as an answer to oxygen stress of the tissues and cells especially. HIF1A rs1154965 Polymorphism on genes provides cells and tissues to be prepared against oxygen stress by effecting to the speed of gene transcription (3).

C allele of polymorphism codes proline amino acid and T allele called as allele codes serine amino acid. In phenotypic perspective Ahmedov et al. (1) have shown that HIF1A rs11549465 polymorphism is connected with fast type IIX muscle fibre. It has been determined that T allele also increases the speed of transcription. In our Turkish cross-country athletes cohort study, it has been determined that CC genotype and C allele in terms of HIF1A rs11549465 polymorphism are higher compared to TT genotype accepted as polymorphic and rare variant T allele.

In the study, where 316 elite male endurance athletes from Caucasus and 304 control individual are compared, it has been statistically (p=0.006)determined that C allele and CC genotype in athletes are higher than the control group (6). This result shows congruity with our cohort results. All the same, in the study (2) where 265 Russian endurance athletes and controls have been examined, the difference between two groups has not been identified (p>0.05).

There are different studies notifying that HIF1A rs11549465 polymorphism has a connection with athletic performance in elite enduring athletes (13). Similarly, it has been identified that the same polymorphism in Russian weight-lifters and wrestlers provides inclination in sportive achievement (1). Similar results have been observed in Polish athletes (12) but not in Israeli sprinters (7).

When examining the studies in literature, it has been observed that the results obtained from HIF1A rs11549465 polymorphism are contradictory. The eventuation of these studies on athletes from different discipline and populations can be asserted as the biggest reason. In our cohort study it has been found out that CC genotype related to endurance and C allele are in high ratio. According to the results that we obtained, we anticipate that related genetic polymorphism has close connection with the endurance feature.

We consider that the eventuation of these analyses on Turkish athletes for the first time will be an important source of information not only in terms of contributing to the literature but also in

terms of leading next studies to be done. Moreover the implication of HIF1Ars11549465 genotype test as a significant indicator of endurance feature in national team selections with new beginners of biathlon in terms of selecting talented athletes becomes more of an issue.

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The Protective Effect of Melatonin on Plasma Lipid Profile in Rats with Cerulein-induced Acute Pancreatitis

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Abstract

The objective of this study was to assessment the effect of melatonin on lipid profile in rats with experimentally induced acute pancreatitis. In this study, 32 adult, male, healthy Wistar Abino rats were used. Group I animals was no applied. Group II animals was intraperitoneally administered 50 mg/kg melatonin per rat twice for two hours intervals. Animals of group III received two intraperitoneal injections of cerulein (50 μg/kg and 25 μg/kg bw, respectively) at two hours intervals.Animals of group IV received two intraperitoneal injections of cerulein (50 μg/kg and 25 μg/kg bw, respectively) at two hours intervals and the rats received an intraperitoneal injection of 50 mg/kg melatonin 30 min before each cerulein injection.After 12 hours from the last cerulein injection, total cholesterol, triglyceride, LDL, HDL levels was determined.In this study, experimentally induced acute pancreatitis resulted in significantly increase in levels of total cholesterol, triglyceride and LDL ($p<0.05$), while HDL level significantly decreased compared with control group level ($p<0.05$). Pretreatment of melatonin to the rats with acute pancreatitis importantly reduced triglyceride and LDL levels compared to pancreatitis group ($p<0.05$).In conclusion, melatonin pretreatment may alleviate the abnormalities in plasma lipid profilecaused by acute pancreatitis.

Key words: Cerulein, melatonin, acute pancreatitis, lipid profile, rats

INTRODUCTION

Acute pancreatitis (AP) is noninfectious inflammatory disorder of pancreas representing variable severity ranging from mild to severe inflammatory cascade associated with multiple-organ failure. (38, 45). The incidence of this disease is increasing in the worldwide(11). Acute pancreatitis is characterized with parenchymal edema, tissue necrosis, hemorrhage and inflammatory cell infiltration (2, 11, 24, 29, 35, 43, 59, 60). A number of pathophysiological processes of acute pancreatitis include inflammation, apoptosis, necrosis and oxidative stress (28). Researches have been focused on dyslipidemia during the course of acute pancreatitis and about relationship between hypertriglyceridemia and acute pancreatitis(13, 18, 26). Despite developments in treatment of the disease, acute pancreatitis has still high morbidity and mortality rates reaching up to 30% in severe cases(7, 49). In treatment of the disease, new approaches and use of alternative medicinal agents are continued to investigate due to its complex etiology and clinical course.

Melatonin (N-acetyl-5-methoxytrptamine) known as major pineal secretory product is also synthesized in other organs and tissues such as retina, lens, bone marrow cells, gastrointestinal tract and skin. (48). Melatonin has several physiological functions including control of reproductive activity in seasonally reproductive animals, sleep promotion, circadian regulation and modulation of immune responsiveness. (44).In addition, melatonin effectively reduces oxidative stress viamany mechanisms (44, 48, 53). Melatonin detoxifies highly toxic hydroxyl and peroxyl radicals. It has been reported that melatonin increased the synthesis of glutathione and several antioxidant enzymes. (47, 52).Numerous experimental studies have shown that melatonin is not only an important antioxidant but also an important anti-inflammatory molecule (1, 5, 9, 19, 21, 23, 37). Thus, melatonin has been clinically interest regarding these properties (21).

Also, earlier studies reported that melatonin has effects on lipid metabolism (16). It has been noted that melatonin lowered serum, hepatic, adrenal and testicular cholesterol levels. In consistent with above results,pinealectomy caused the opposite effects on lipid parameters. There are also other studies about this lowering effect of melatonin on serum cholesterol and triglyceride.(20, 30, 39,52, 56). The objective of this study was to assessment the effect of melatonin on lipid profile in rats with experimentally induced acute pancreatitis.

degrees, it is considered that the knee joint causes deterioration of the extension mechanism and patella causes femoral pain with increasing tendency to slide laterally (3). It has been emphasized that it causes various pain and disability in abnormally low values (19).

MATERIAL AND METHOD

In the study, 32 adult (6 weeks), male, healthy Wistar Abino rats were used. The animals were divided into four groups. All animals were fasted before at the beginning of study, while it allowed to drink water. The study protocol was approved by The Ethical Committee of Selçuk University Experimental Medicine Research and Application Center(Report no. 2017-16).

Group Ianimals(n=6) was no applied. Group II animals(n=6) was intraperitoneally administered 50 mg/kg melatonin (Sigma-Aldrich, St. Louis, MO, USA) per rat twice for two hours intervals. Animals of group III (n=10) received two intraperitoneal injections of cerulein (Sigma-Aldrich, St. Louis, MO, USA) (50 μg/kg and 25 μg/kg bw, respectively) at two hours intervals.Animals of group IV (n=10) received two intraperitoneal injections of cerulein (50 μg/kg and 25 μg/kg bw, respectively) at two hours intervals and the rats received an intraperitoneal injection of 50 mg/kg melatonin 30 min before each cerulein injection.After 12 hours from the last cerulein injection, blood samples were taken from all animals. It was determined total cholesterol, triglyceride, LDL, HDL levels in the Abbott C8200autoanalyzer using Abbott kits in these blood samples.

The data obtained from the study were analyzed by one-way ANOVA (SPSS 19).Differences among the groups were determined by Duncan's multiple range test. Differences were considered significant at $p<0.05$.

RESULTS

The effect of melatonin on lipid profile in experimentally induced acute pancreatitis was summarized in Table 1. In this study, experimentally induced acute pancreatitis resulted in significantly increase in levels of total cholesterol, triglyceride and LDL ($p<0.05$, Table 1), while HDL level significantly decreased compared with control group level ($p<0.05$, Table 1). Melatonin administration to intact animals caused some fluctuations in all parameters but these changes were not important. Pretreatment of melatonin to the rats with acute pancreatitis importantly reduced triglyceride and LDL levels compared to pancreatitis group ($p<0.05$, Table 1). Occurred changes in total cholesterol and HDL levels with melatonin treatment to the rats with acute pancreatitis were not important.

DISCUSSION

In this study, the changes in lipid parameters in acute pancreatitis are consistent with some studies which reported severe acute pancreatitis can alter lipid profile (6, 32). In acute pancreatitis cases, high triglyceride level is most common data. In generally, low HDL level, high LDL and cholesterol levels accompanied to hypertriglyceridemia in acute pancreatitis (6, 57). It has been reported that high concentration of triglycerides and low HDL level are associated with severity of acute pancreatitis (14, 54). It was suggested that HDL has anti-inflammatory and antioxidant properties (6, 12, 34, 46,55) and low HDL level may be associated with an increase in severity of the disease due to decrease in anti-inflammatory and antioxidant activity of HDL (57). Carpentier and Scruel (8)reported that production of triglycerides increased in the liver and lipoprotein lipase activity decreased during acute pancreatitis. It was noted that these events might lead to higher serum triglycerides concentration (8, 32).

Bonjoch et al. (4) have previously reported that inflammatory mediators promoted the progression of inflammation in acute pancreatitis. It was stated that the activation of macrophages by inflammatory cytokines from adipose tissue

increased the inflammatory response during pancreatitis (4, 25, 36, 51). In parallel to above knowledge, it was notedthat free fatty acids, oxidized lipids, halogenated lipids and bioactive lipid mediator's production increased during acute pancreatitis (4, 15, 22, 27, 41). There are notifications that inflammatory cytokines induced hepatic synthesis of acute phase proteins and low level of HDL is associated with high levels of inflammatory cytokines. It has been suggested that high levels of inflammatory cytokines impaired biosynthesis of HDL and also facilitated degradation of lipoprotein (45).

Based on antioxidant and anti-inflammatory properties of melatonin, pretreatment of melatonin to the rats with acute pancreatitis importantly reduced triglyceride and LDL levels compared to pancreatitis group($p<0.05$, Table 1).Túnez et al. (56) reported that cholesterol, phospholipids, triglycerides and free fatty acids levels decreased in the brain and liver of melatonin-treated rats. Hoyos et al. (30) suggested that melatonin could promote augmenting the clearance of endogenous cholesterol. Melatonin administration to rats fed with high-cholesterol diet reduced total cholesterol and LDL and prevented a decrease in HDL (30). It also improved fatty liver induced by high-fat diets that affect serum lipids (42).

In ovariectomized rats, it has been noted that melatonin administration prevented increase in body mass and cholesterol concentration (50).A lowering effect of long term melatonin treatment on serum cholesterol has been reported in adult rats (3, 39) and hamsters (58). In another study, it was suggested that short term melatonin treatment decreased free cholesterol level in rats, presumably by augmenting lecithin-cholesterol acyltransferase-mediated cholesterol esterification (20).

Our results are consistent with above studies which have been shown improvement in lipid profile after melatonin treatment. Lipid lowering effect of melatonin were attributed to several mechanism such as decrease in intestinal cholesterol absorption (31), inhibition of cholesterol biosynthesis and LDL accumulation (10), interactions with LDL receptors (40) or inhibition of fatty acid transport via metabotropic receptors (17, 33).

Table 1. Effect of melatonin on lipid profile in acute pancreatitis (Mean±SE

	Total Cholesterol (mg/dl)	Triglyceride (mg/dl)	LDL (mg/dl)	HDL (mg/dl)
Group I	95,83±4,01^{bc}	67,17±4,69^{b}	51,67±1,28^{b}	42,50±2,86^{a}
Group II	89,33±5,35^{c}	61,50±3,33^{b}	45,17±3,50^{b}	43,83±3,27^{a}
Group III	118,20±3,17^{a}	86,70±3,58^{a}	64,90±3,35^{a}	31,40±3,57^{b}
Group IV	107,50±3,66^{ab}	72,60±4,00^{b}	53,30±3,61^{b}	36,10±2,59^{ab}

$^{a-c}$ The difference between mean values with different superscripts in the same column is significant at the $p<0.05$ level.

Conclusions

Moved on our results, it was considered that melatonin pretreatment in rats with acute pancreatitis may be useful to alleviate the abnormalities of lipid profile caused by acute pancreatitis.

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Comparison of Bone Mineral Density of Dominant and Non-dominant Forearm of Badminton Players

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Abstract

Research related to arm bone density of badminton players focused mainly on humerus, how much forearm exposed to physical load is affected by this stress has been studies less. Thus, the aim of this study was to investigate mineral density of dominant and non-dominant forearm bone mineral density of badminton players who have been regularly playing badminton for 10 years. 12 male badminton players whose dominant arms were the same voluntarily participated in this study. Bone Mineral Density (BMD) of the players was evaluated with Dual X Ray Absorptiometry (DEXA). Data was evaluated with SPSS 23. Controlled research method was used to estimate BMD of the players. Differences between dominant and non-dominant arms were assessed with a non-parametric test, Wilcoxon Signed Rank Test. P value was set at $p<0.05$. Significant difference was found between BMD of dominant right ultra-distal part and BMD of non-dominant left ultra-distal part (z:-2,94, sig:0,00) and between BMD of dominant right proximal part and BMD of non-dominant left proximal part (z:-2,09, sig:0,03). There was no significant difference between dominant proximal 1/3 part and non-dominant proximal 1/3 part (z:1,85, sig:0,06). As a result, long-term badminton training has positive effects on BMD.

Keywords: Badminton, bone mineral density, forearm.

INTRODUCTION

Osteoporosis is a metabolic bone illness characterized by decrease in BMD and bone strength, bone fragility and increase in fracture risk, deformation in bone tissue. Osteoporosis is a big threat for public health (2,8)

Maximizing BMD till the age of 30 is of great importance for hindering or postponing osteoporosis. Therefore, protective measures should be taken during childhood or youth and increasing BMD should be at the highest level if possible (4). Although genetic factors seem to affect bone mass, exercise, hormonal situation and nutrition can change bone structure (15). Changes in exercise, nutrition and hormonal changes with the aging shape the skeletal structure. BMD increases acutely till the ages of 15-20 and this increase continue slowly till the age of 30 (5). 60% of the bone development appears in adolescence, the earliest age of reaching peak bone mass (PBM) is 17-18 and 35 at the latest (16). PBM acquired during young adulthood is under genetic control and is an important indicator of BMD of farther ages (12).

Physical activity help bones tolerate high level of stresses and it is effective during growth period (16). Bone is an active tissue which develops when exposed to load and weaken when the load does not appear. Bone tissue changes and adjust to resist against the load by strain, flexion and compression (17). A study indicates that high frequency of physical activity during early ages is important to hinder osteoporosis (14). Most studies state that regular physical activity positively affects bone health (7,10). Numerous studies have investigated the effects of a specific sport on BMD (19,3). However, there are almost no study investigating especially effects of long-term interaction with badminton on BMD of forearm.

Although there are many methods evaluating bone tissue, Dual Energy X-Ray Absorptiometry

(DEXA) is a method to evaluate BMD and bone mineral content (13). DEXA is accepted as golden standard due to its value, usage limitedness and qualified technical personnel. It provides certain results in bone mineral content measurements (16).

Due to aforementioned reasons, the aim of this study was to investigate BMD in dominant and non-dominant arms of badminton players. Determining BMD of dominant and non-dominant forearm of athletes playing badminton for a long time is thought to play an important role in exploring the effect of badminton on BMD.

MATERIAL AND METHOD

Twelve badminton players whose dominant hands were the same voluntarily participated in this study. Players having at least ten years of badminton experience, with no orthopedic health problem and with acceptable BMD according to age and gender were included in this study. Each participant was informed about the content of the study and their consent was obtained. The body height and body weight were measured after taking the position in anatomical posture in such a way that heels adjacent, holding breath, head on the frontal plane, overhead plate touching the vertex point and the measurements were recorded in "cm" and "kg". The body height of the subjects was measured with stadiometer with a precision of ± 1 mm (Seca 213). The body weights were measured with an electronic scale with a precision of ± 100 g (Seca 760). Physical characteristics of the participants are presented in Table 1.

Table 1. Physical characteristics of badminton players

Variables (n=12)	Mean±SD
Age (years)	20.33±2.54
Height (cm)	178.00±6.19
Body Weight (kg)	78.50±5.36

Bone mineral density measurement

BMD of the dominant arm (forearm) with which players use the racket and non-dominant arm was measured with the method of Dual X Ray Absorptiometry (DEXA). Forearm bones were radioed with Hologic QDR-4500 A and Hologic 4500 C. Specific areas such as radius and ulna were chosen with the help of software of the system. Analysis was carries out on ultra-distal and 1/3 proximal bone areas and BMD of three different areas were calculated as g/cm2.

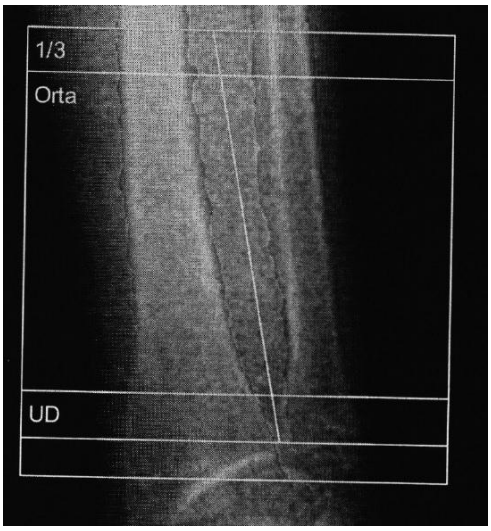

Figure 1. Reference areas (for dominat and non dominant forearm).

Data were evaluated with SPSS 23. Controlled research method was used to estimate BMD of the players. Therefore, Wilcoxon Signed Rank Test, a non-parametric test, was used to determine differences in BMD of the right and left forearms of the badminton players. P value was set at $p<0.05$.

RESULTS

Significant difference was found in BMD between dominant right ultra-distal area and non-dominant left ultra-distal area (z:-2,94, sig:0,00) and between dominant right middle proximal area and non-dominant left middle proximal area (z:-2,09, sig:0,03). No significant difference was found in BMD between dominant proximal 1/3 area and non-dominant proximal 1/3 area (z:1,85, sig:0,06). Results are given in Table 2.

Table 2. BMD of dominant and non-dominant forearm reference areas

Variables (n=12) (g/cm²)	Mean±SD	Z	sig
Right Ultra BMD	0.58±0.09	-2.94	0,00*
Left Ultra BMD	0.53±0.89		
Right Middle BMD	0.86±0.09	-2.09	0,03*
Left Middle BMD	0.82±0.09		
Right 1/3	1.10±0.09	-1.85	0,06
Left 1/3	1.07±0.10		

It was determined that BMD was really high in dominant forearms of the badminton players, especially areas which are actively used during badminton play compared to non-dominant forearm. In view of these findings, long-term badminton exercises can be said to be positively effective on BMD.

DISCUSSION and CONCLUSION

The main finding of this study was that badminton players with long-term badminton experience have a higher BMD in dominant forearm than non-dominant forearm. Another important finding is that dominant forearm ultra-distal area and middle proximal area have a higher BMD values than proximal 1/3 area which is less effective while playing badminton.

It is suggested that BMD increases with increase in exercise and fitness level (1,6). A decrease in exercise level is stated to lead to an increase osteoporotic fractures. Researchers stating a negative significant relationship between osteoporotic fractures and exercise highlighted that individuals with a more active life have more BMD (10).

A study which compared BMD of badminton and ice hockey players stated that badminton players had more BMD than ice hockey players. Given that badminton players use forearm actively during the game, it can be concluded that badminton players have more BMD than ice hockey players (4). Another study compared BMD of long distance runners, tennis players and sedentary individuals with DEXA and found out that tennis players had significantly higher BMD values than other groups (18). It can be said that forearms of the tennis players are exposed to high amount of stress as that of badminton players.

Results of different measurement applied to different bone areas of upper body suggest that dominant arm have 20% higher BMD than non-dominant forearm while the extend of difference is 5% in sedentary individuals (11). This finding supports our results.

Previous studies focused mainly on humerus as a target area for bone characteristics of badminton players, limited study investigated how much forearm is affected by this stress exposed to high level of physical stress. Our study investigated only forearm area (radius and ulna) and compared BMD levels in dominant and non-dominant arms.

A similar study investigated BMD levels of humerus and ulna bones of both arms in women playing squash. This study presented positive correlation between BMD of dominant humerus and training years (r= 0.63-0.69) (9). This finding is similar to ours.

In conclusion, it is deduced that BMD of dominant forearm is significantly higher than non-dominant forearm in badminton players with a long-term experience. It can be suggested that the same study should be applied to a broader experimental group.

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Frequency of Sportive Injuries in Amateur Athletes and Factors Affecting Injuries

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Abstract

It is possible to face injury risk whether the sport is recreational or contest purpose based. Exposure to injury can be attributed to many factors (field, competitor, etc.). Because of an injury amateur or elite athletes may move away from their sporting lives. This study aims to investigate frequency of sport injuries and factors affecting injuries to amateur athletes in Samsun region. 666 amateur athletes serving in various amateur sports clubs in Samsun province were selected randomly. 462 participants were men, 204 were women. 240 athletes in individual sports branches (wrestling, table tennis, taekwondo, wrist wrestling, wushu, athletics), and 426 athletes in team sports (basketball, football, handball, volleyball) constitute the sample. The subjects completed a sports injury survey developed by the researchers. X2 was used for statistical analysis of the data. Participants were most often (44.6%) faced with a sprain injury. The most injured areas were the wrists and ankles, with a ratio of 36.4%. The period of disability was found to be 0-1 days with 62.8%. The injured rested for 7 days or less with a ratio of 57.4%. Athletes were found to exercise partially intensively during injury (52.1%). Treatment applied during injury was mostly performed by the self, the doctor and others. Among the causes of injuries, opponent player was found to be the leading factor with 33.6%. It was found that in amateur sports, gender and type of sport had an effect on injuries. Regional preventive precautions may be taken to avoid injuries. Trainings and seminars can be given to coaches and athletes to reduce injuries in individual and team sports. In addition, medical personnel can be provided to amateur sports clubs with the support of the state.

Key words: Sports, Amateur, Injury.

INTRODUCTION

Sport is defined as the set of movements that develop an individual's state of health, physical ability and performance (1). During these movements, that is, sportive activities, athletes are faced with various risks of injury (2). Thus, all kinds of damage that occur during sportive activities can be called sport injury (10), and sport injury is identified as a major public health problem in the Western world (5). Dvorak and Junge define sport injury as an event that occurs during training or a match that causes the sports player to be absent from the next training session or match (7). Incidence and distribution of sports related injuries vary based on sport affiliation, participation level, gender and player position (18). When the reasons which cause sport injuries are examined, they can be listed as personal reasons such as age and gender, physical structure and predisposition to sport branch, psychomotor development, psycho-social reasons, past injuries and insufficient rehabilitation, insufficient sport technique and insufficient warm-up and external reasons such as type of sport, physical area in which the sport is done, sports equipment, coach and training planning, climatic and environmental conditions, duration of sportive activity, the role of opponents and team mates, referee and activity rules (13). However, the definitions, diagnoses, and categorizations of injuries differ among studies, making comparison of results difficult (16).

It can be stated that every sport branch has specific rules or practices; however, it can also be stated that none of the differences has eliminated the state of injury in sport. Thus, it can be stated that no matter which sport activity is chosen, it is inevitable for the athlete to be exposed to small or big injuries (15). Regardless of the sport branch, training itself, which is a prerequisite to reach high performance, is a life-threatening practice. Any health problem has physical, psychological and economic consequences. Most of the time, following the injury of an athlete, only training and competition losses are remembered. However, when discussed in a wider perspective, the price paid is much higher than thought, considering first the immediate circle (the athlete, athlete's family and coach) and then the remote circle (the citizens of the country the athlete

lives in and even the world sport public opinion) (8). The serious consequences that may result from injuries among the youth population (including, but not limited to, early bone disease, high medical costs, and a decrease in physical activity) are responsible for the heightened awareness to this topic (3). In line with all the expressions stated, it can be said that it is important to conduct various studies on sports injuries since this is an issue that appeals to a wide circle.

To reduce sports injury and better educate the public, understanding the risk factors is essential for prevention (12). However, there are limited numbers of studies which focus on amateurs. Therefore, the aim of this study is to research the frequency of sport injuries and the factors influencing injuries in amateur athletes of Samsun region.

MATERIAL AND METHOD

In order to find out the frequency of sport injuries and the factors influencing injuries in amateur athletes, a total of 666 amateur athletes in Samsun region chosen with random sampling method filled in a questionnaire form prepared by the researchers. The questionnaire was constructed based on the objectives of the study and each question in the questionnaire included various variables depending on the subject. Events which prevented amateur athletes from participating in sport at least for one day were defined as sport injury. The first part of the questionnaire includes demographic information such as age, gender, sport branch, height and weight of amateur athletes. In the second part, there were questions about risk factors influencing sport injuries, such as previous injuries and warm-up level. The third part included information such as post-injury resting times, post-injury injured time, amateur athletes' state of training, injury types, area of injury, and the treatment methods applied by the athletes.

A total of 666 athletes, 462 males and 204 females, chosen randomly as subjects were in various sport clubs in the province of Samsun. The sample of the study consists of 240 athletes in individual sport branches (wrestling, table tennis, taekwondo, arm wrestling, wushu, athleticism) and 426 athletes in team sports (basketball, football, handball, volleyball). Arithmetic averages, percentage frequency distributions and X2 were used in the statistical analysis of data.

RESULTS

Table 1 shows the distributions of sport injuries by age, height and weight. Average age of the athletes was found as 21,09 years. Average height of the athletes was found as 174,34 cm, while average weight was found as 68,11 kg.

Table 1. Distributions of sport injuries by age, height and weight in amateur athletes

Parameters	N	Ave.	St dev	Min	Max
Age (years)	666	21,09	3,04	18,00	36,00
Height (cm)	666	174,34	8,34	154,00	196,00
Weight (kg)	666	68,11	12,05	45,00	120,00

Table 2 shows the data about risk factors influencing sport injuries by gender and sport branch. There is a significant difference at the level of $p<0,001$ between risk factors influencing sport injuries by gender ($p<0,05$). It can be seen that the most effective risk factor in terms of gender was opponent player (33,6%), while the least effective risk factor was insufficient flexibility and other risk factors (shoes worn, level of education, environmental factors, etc.) (2,9%). It can be said that male athletes experience injuries due to characteristics of the sport the most (32,5%). When it is also considered that men view sport as a power indicator, it can also be said that they adopt the power-based aspects of the sport branch. Thus, in this case, the type of sport can have caused sport injuries to have a higher average when compared with the other parameters. It can be seen that injuries occur due to the frequency of training the least (1,3%). It can be seen that men do not experience much negativity in terms of injuries due to training frequency. The reason for this may be the fact that men have a resistant physique and that men have a higher speed of post-training recovery when compared with women. It can be seen that the risk factor causing the highest number of injuries is opponent player (41,2%). The risk factors causing the least number of injuries are insufficient flexibility and other risk factors (shoes worn, level of education, environmental factors, etc.) (2,9%). It can be expressed that in their sport life, women experience injuries due to insufficient flexibility the least. The reason for this may be the fact that women's physiological structure is more prone to flexibility and that they have higher flexibility levels when compared with men. A significant difference at the level of $p<0,001$ was found between types of

sports in risk factors that caused sport injuries (p<0,05). It can be seen that athletes doing individual sports experience injuries due to type of sport the most (30,0%). It can be stated that injuries occurred due to other risk factors (shoes worn, level of education, environmental conditions, etc.) the least (2,5%). It can be said that athletes doing individual sports experience low levels of injuries due to parameters that can be expressed as main risk factors. In terms of risk factors that caused injuries in team sports, it was found that the highest number of injuries occurred due to opponent players (36,6%). The reason for this result can be the fact that since team sports are generally played with balls, unconscious moves to possess the ball can be preparing a basis for the opponents to experience injuries. It can be seen that the least number of injuries in team sports occur due to insufficient flexibility (2,8%). It can be stated that due to flexibility, athletes doing team sports experience almost no injuries. The reason for this may be the fact that since an athlete participating in team sports does not need to have top levels of flexibility when compared with athletes doing individual sports, s/he may not be negatively influenced by injuries resulting from insufficient flexibility.

Table 2. Distribution of risk factors influencing sport injuries in amateur players by gender and sport branch

Parameters	Percentage	Gender			Sport branch		
		Men	Women	Total	Individual	Team	Total
Type of sport	Number	150	36	186	72	114	186
	%	32,5	17,6	25,0	30,0	26,8	28,4
Opponent player	Number	120	84	204	48	156	204
	%	26,0	41,2	33,6	20,0	36,6	28,3
Field area	Number	42	12	54	24	30	54
	%	9,1	5,9	7,5	10,0	7,0	8,5
Previous injuries	Number	24	18	42	30	24	54
	%	5,2	8,8	6,3	12,5	5,6	8,1
Warm-up level	Number	48	30	78	12	30	42
	%	10,4	14,7	11,7	5,0	7,0	6,3
Training frequency	Number	6	12	18	42	36	78
	%	1,3	5,9	2,7	17,5	8,5	11,7
Insufficient flexibility	Number	24	6	30	6	12	18
	%	5,2	2,9	4,5	2,5	2,8	2,7
Others (*)	Number	48	6	54	6	24	30
	%	10,4	2,9	8,1	2,5	5,6	4,5
Total	Number	462	204	666	240	426	666
	%	100,0	100,0	100,0	100,0	100,0	100,0
		Chi square=51,09 p<0,001			**Chi square=40,16 p<0,001**		

*Shoes worn, Level of education, Environmental conditions

Table 3 shows the data about gender and sport type in terms of athletes' resting time following injuries. No significant difference was found in post-injury resting time in terms of gender (p>0,05). Significant difference was found in post-injury resting time in terms of sport type (p<0,05). It can be seen that total resting time is 7 days or shorter in resting parameters in terms of gender (57,3%) and sport type (57,4%). It can be seen that in both gender (7,8%) and the sport type (5,4%), the least occurring period of resting time in total was 8-14 days. In athletes doing individual sports, it was found that the most occurring period of resting time following injury was 7 days and shorter with a rate of 60,0%. The least occurring resting time was 8-14 days with a rate of 5,4%. It can be stated that the mild injuries occurring in athletes doing individual sports can have caused a relatively shorter resting time interval following injury. In teams sports, the most occurring post-injury time interval was 7 days and shorter with a rate of 54,9%. The least occurring period of post-injury resting time was 8-14 days with a rate of 5,6%. It can be stated that most and least occurring resting times in individual and team sports were similar.

The reason for this can be explained with the similarity within the treatment processes of similar injuries in terms of science.

Table 3. Gender and sport type data of amateur athletes by post-injury resting times

Parameters		Male	Female	Total	Individual	Team	Total
7 days and shorter	Number	258	120	378	144	234	378
	%	55,8	58,8	57,3	60,0	54,9	57,4
8-14 days	Number	36	0	36	12	24	36
	%	7,8	0,0	7,8	5,0	5,6	5,4
15-21 days	Number	102	54	156	48	108	156
	%	22,1	26,5	24,3	20,0	25,4	22,7
22 days and longer	Number	66	30	96	36	60	96
	%	14,3	14,7	14,4	15,0	14,1	14,5
Total	Number	462	204	666	240	426	666
	%	100,0	100,0	100,0	100,0	100,0	100,0
		Chi square:2,77 p>0,05			**Chi square 17,30 p<0,001**		

Table 4 shows the data about post-injury total injured time in terms of gender and sport type. No significant difference was found between gender and type of sport parameters during the time athletes were injured (p>0,05). It can be stated that there is no significant difference in injury times of athletes in terms of gender and type of sport.

Table 4. Gender and sport type data of amateur athletes by the post-injury injured time

Parameters		Male	Female	Total	Individual	Team	Total
0-1 day	Number	282	132	414	156	258	414
	%	61,0	64,7	62,8	65,0	60,6	62,8
2-7 days	Number	66	18	84	24	60	84
	%	14,3	8,8	115	10,0	14,1	12,0
8 days and longer	Number	114	54	168	60	108	168
	%	24,7	26,5	25,6	25,0	25,4	25,2
Total	Number	462	204	666	240	426	666
	%	100,0	100,0	100,0	100,0	100,0	100,0
		Chi square:3,83 p>0,05			**Chi square:2,52 p>0,05**		

Table 5 shows the data about the state of training during the time the amateur athletes were injured in terms of gender and sport type. Significant difference was found between the state of training during injury in terms of gender (p<0,05). It can be seen that the athletes partly trained during injury in terms of gender (50,9%) and type of sport (52,1%). It can be seen that male athletes (51,9%) and female athletes (50,0%) mostly answered that they partly trained during injury. It can be stated that both genders trained during injury with specific intervals. It can be seen that only a small number of male (20,8%) and female (11,8%) athletes trained during injury.

Significant difference was found between the athletes' state of training during injury in terms of the type of sport (p<0,05). It can be seen that individual (55,0%) and team sport (49,3%) athletes mostly stated that they trained partly during injury. It can be seen that only a small number of athletes doing individual (20,0%) and team (16,9%) sports stated that they trained during injury. In terms of the state of training during injury by gender and the type of sport, a similarity was found that no matter what the athletes' characteristics (gender, type of sport) were, most athletes partly trained. The fact that the athletes did not want to be deprived of recreation activities during injury in terms of not preventing the body from experiencing negativities by many factors (physiological, psychological, etc.) may have caused this result. Although parameters such as the type of sport and gender were taken into consideration in athletes' states of training during injury, it can be seen that very few athletes trained. The fact that they could not train as a result of negativities that occurred during injury may have caused the result that few athletes trained during injury.

Table 5. The data of amateur athletes' state of training by gender and type of sport

Parameters		Male	Female	Total	Individual	Team	Total
I do train	Number	96	24	120	48	72	120
	%	20,8	11,8	16,3	20,0	16,9	18,4
I do train partly	Number	240	102	342	132	210	342
	%	51,9	50,0	50,9	55,0	49,3	52,1
I don't train	Number	126	78	204	60	144	204
	%	27,3	38,2	32,7	25,0	33,8	29,4
Total	Number	462	204	666	240	426	666
	%	100,0	100,0	100,0	100,0	100,0	100,0
		Chi square:12,04 p<0,05				**Chi square:5,71 p<0,05**	

Table 6 shows amateur athletes' gender and sport type data by their injury type. Significant difference was found in the injury type of amateur athletes in terms of gender (p<0,05). No significant difference was found in the injury type in terms of the type of sport (p>0,05). In total, the highest number of injury in terms of gender (44,6%) and sport type (41,6%) was sprain. In total, the lowest number of injury in terms of gender (9,8%) and sport type (8,7%) was fracture. It can be seen that sprain was common in male athletes (36,4%), female athletes (52,9%), individual sport athletes (42,5%) and team sport athletes. It can be said that the most common injury type in both classifications and subgroups were similar. Whatever the characteristics differentiating between athletes are (gender, type of sport), the reason why the highest number of injury was sprain can be thought as the weak structure and the intense use of joints. It can be seen that the least number of injury athletes were exposed to was fracture in male athletes (7,8%) and team sport athletes (9,0%). It can be seen that female athletes (5,9%) were exposed to dislocation, while individual sport athletes (7,5%) were exposed to fracture and dislocation. It can take a long time for the injured area to be treated after being exposed to injuries such as fracture and dislocation. Thus, an athlete's being exposed to injuries such as fracture and dislocation can mean a long break to sport life. For this reason, it can be expressed that athletes are more careful to protect from these injuries and thus the least common type of injury is fracture or dislocation.

Table 6. Amateur athletes' injury types by gender and sport branch

Parameters		Male	Female	Total	Individual	Team	Total
Fracture	Number	36	24	60	18	42	60
	%	7,8	11,8	9,8	7,5	9,9	8,7
Dislocation	Number	54	12	66	18	48	66
	%	11,7	5,9	8,8	7,5	11,3	9,4
Sprain	Number	168	108	276	102	174	276
	%	36,4	52,9	44,6	42,5	40,8	41,6
Bruises	Number	84	24	108	36	72	108
	%	18,2	11,8	15	15,0	16,9	15,9
Other	Number	120	36	156	66	90	156
	%	26,0	17,6	21,8	27,5	21,1	24,3
Total	Number	462	204	666	240	426	666
	%	100,0	100,0	100,0	100,0	100,0	100,0
		Chi square:24,46 p<0,001			**Chi square:6,25 P>0,05**		

Table 7 shows the rates of injury areas by gender and sport type parameters. No significant difference was found between genders in terms of the area the athletes had injuries in (p>0,05). Significant difference was found between sport types in terms of the area the athletes had injuries in (p<0,05). In total, it can be seen that the least injured area was shoulders in terms of gender (6,2%) and sport type (7,1%). In total, it can be seen that the least injured area was wrist and ankle in terms of gender (36,4%) and sport type (36%). It can be said that in terms of both gender parameter and the sport type variable, the most injured area was wrist and ankle. Table 6 shows that athletes experienced injuries due to

sprain the most. Thus, this may have caused the most injured area to be wrist and ankle in terms of both variables.

Table 7. Data about the area of injury in amateur athletes by gender and sport type

Parameters		Male	Female	Total	Individual	Team	Total
Wrist and ankle	Number	162	77	239	88	151	239
	%	35,1	37,7	36,4	36,7	35,4	36
Knee	Number	90	37	127	43	84	127
	%	19,5	18,1	18,8	17,9	19,7	18,8
Shoulder	Number	30	12	42	24	18	42
	%	6,5	5,9	6,2	10,0	4,2	7,1
Elbow	Number	52	24	76	23	53	76
	%	11,3	11,8	11,4	9,6	12,4	11
Finger	Number	36	21	57	20	37	57
	%	7,8	10,3	9	8,3	8,7	8,5
Other (*)	Number	92	33	125	42	83	125
	%	19,9	16,2	18	17,5	19,5	18,5
Total	Number	462	204	666	240	426	666
	%	100,0	100,0	100,0	100,0	100,0	100,0
		Chi square:5,91 p>0,05			**Chi square:9,88 p<0,05**		

* Cheekbone and collar bone, tendon injury

Table 8 shows the rates of treatment methods during injury in terms of gender and sport type variables. Significant difference was found between treatment methods applied during injury in terms of gender and sport type variables (P<0,05). In total, when the data were analyzed in terms of gender (54,3%) and sport type (56,0%), the most commonly applied treatment method was by self and other individuals. It can be said that athletes want to use all the means to make the treatment process more useful or to make the treatment process quicker. Thus, this can have caused most athletes to conduct treatment methods during injury both by self and under doctor control and also with the support of other individuals. It can be seen that the least preferred treatment method during injury is by self in terms of both gender (18,4%) and sport type (20,9%). Considering that it will be correct to advance the treatment process with a scientific method, this may have caused many athletes not to perform their treatment on their own.

Table 8. Data about the treatment methods applied by amateur athletes during their injury in terms of gender and type of sport

Parameters		Male	Female	Total	Individua l	Team	Total
By myself	Number	102	30	132	60	72	132
	%	22,1	14,7	18,4	25,0	16,9	20,9
Been to the doctor	Number	102	66	168	36	132	168
	%	22,1	32,4	27,2	15,0	31,0	23
Myself, doctor and other individuals	Number	258	108	366	144	222	366
	%	55,8	52,9	54,3	60,0	52,1	56,0
	Number	462	204	666	240	426	666
Total	%	100,0	100,0	100,0	100,0	100,0	100,0
		Chi square:10.03	**P<0,05**		**Chi square:22,37**	**P<0,001**	

DISCUSSION

In this study, which examines the frequency of sportive injury in amateur athletes and the factors influencing injuries, the average age of the participants is 21,09. The average height of the participants in the study was 174,34 cm. The average weight of the participants is 68,11 (Table 1).

During intense sportive workout, sport injuries occur due to different reasons (4). In a study conducted by Doğan et al. (6) on the risk factor influencing the injuries of amateur athletes, the factors that caused the least injuries were found as protective equipment, age, gender and garment worn with a rate of 0,95%; while the risk factor that caused the most injuries was type of sport with a rate of 20% (6). In a study by Bavlı (2) which

examined the association between recklessness levels and state of injury in children in their development age, it was found that the participants experienced injuries due to insufficient training the least with a rate of 1,7% and due to opponent player the most with a rate of 35,7% (2). In this study, it can be seen that the risk factor which influenced injury the least was insufficient flexibility with a rate of 2,7% and opponent player the most with a rate of 33,6% (Table 2). It can be said that there were differences in the risk factors influencing injury when compared with other studies conducted in terms of the risk factors that caused injury the least. This difference can have resulted from the fact that the risk factors that caused injury the least varied in terms of other parameters rather than main factors.

Minimizing the risk factors for athletes to experience sportive injuries can cause too many socio-economic advantages (6). Sorenson et al. reported that in sport injuries, more than half of the patients started working the next day (19). In a study they examined the risk factors influencing the injuries of amateur athletes, the injuries that required 0-1 day of resting period constituted 61,9% of all injuries (6). In addition, in Özgür et al.'s study (14) which examined the frequency of sport injury in volleyball and football players, it was found football players returned to sportive activity in six weeks or longer with a rate of 48,3%, while volleyball players returned to sportive activity in less than a week with an average of 30,4% (14). In this study, it can be seen that the participants rested for 7 days and less the most (58,8%) and between 8-14 days the least (5,4%) (Table 3). It can be seen that the results of resting time are parallel with the results of other studies. The fact that the types of injury athletes experienced were mild can have caused short resting periods.

Sport injuries can be defined as conditions preventing participation in sport the next day after an injury occurs (9). In Requa et al.'s (17) study which examined the state of injury in adult athletes, the longest period athletes were injured was between 1 and 2 days with a rate of 76% (17). In the present study, this period is also between 1 and 2 days with a rate of 64,7% (Table 4). In addition, when the athletes' state of training during the time they were injured was examined, it was found that 55% of the participants trained partly, while 11,8% of the participants did not train (Table 5). It can be seen that the results of the period athletes were injured are in parallel with the results of other studies. It can be thought that the fact that athletes mostly experienced injuries which will not prevent them from doing sport in high rates may have caused the aforementioned result.

When the types of injuries athletes were exposed to were examined, it was reported in a study by Yamaner et al. (21) which examined the lower extremity injuries of amateur and professional football players that athletes were exposed to sprain (16,6%) the most (21). In another study on a similar topic by Özgür et al. (14), it was found that the participants were exposed to sprain the most with a rate of 38,5% (14) . Similarly, in the present study it can be seen that the participants were exposed to sprain the most (52,9%) (Table 6). In addition, in terms of the areas of injuries, in a study by Kıratlı et al. which examined the association between basketball players' flexibility profiles and injury, it was reported that 46,15% of the athletes experienced injury in the ankle area (11). In the present study, the highest (37,7%) rate of injuries were found in wrists and ankles (Table 7). It can be said that the results are in parallel with the results of other studies. The fact that injuries will easily occur in areas which can be expressed as sensitive areas of the human body can have caused sprain to be the highest form of injury seen. Activity level of the participants, their branches, race, and factors affecting muscular strength or tendon and joint stability were among the confounding factors that should be evaluated in future studies along with other effective factors in ankle, knee and pelvis regions (20).

As a conclusion, it can be seen that the area in which the most injuries were seen was wrist and ankle. In addition, it can be said that the highest type of injury seen was sprain. It can be stated that the athletes trained partly during injury. What is more, it can be expressed that following injury, the resting period included 7 days or shorter and that the athletes mostly remained injured between 0 and 1 day. It can also be stated that the risk factor that influenced injury most was injury resulting from opponent players. It can be seen that the treatment method applied during injury took place both by the athlete's being his/her own doctor and also by being under the supervision of a doctor and with the advices of other people. In order to minimize the types of injury athletes experience, athletes and trainers should be informed through various ways (seminar, applied training, etc).

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The Effect of Beta-Hydroxy-Beta-Methylbutyrate Supplementation on Performance Adaptations Following Resistance Training in Young Males

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Abstract:

The aim of this study was to examine the effects of 8 weeks beta-hydroxy-beta-methylbutyrate (HMB) supplementation with resistance training on some components of physical fitness and body composition in young males. Twenty healthy young men volunteered to participate for the study and divided into two groups and performed 8-week resistance training while supplementing with either HMB or placebo (3 g per day). The subjects were evaluated for 1 repetition maximum (1RM) bench press and leg press, vertical jump (VJ), anaerobic power (RAST) prior to and after training intervention. In addition, body composition variables such as percent body fat, and BMI were assessed per and post training period. Both the groups showed significant increases in 1RM bench press and leg press, VJ, and anaerobic power (RAST), and also the HMB supplementation group showed greater gains compared with the placebo. In addition, percent body fat decreased significantly in HMB and placebo groups. BMI enhancements were greater for the HMB supplementation group indicated gains in body weight.

The results indicated that resistance training improved physical performance and HMB supplementation induced greater gains and therefore it could be recommend to coaches and athletes who use this supplementation to greater gains in physical fitness variables.

Keywords: body composition, leucine, , performance, strength training.

INTRODUCTION

β-hydroxy-β-methylbutyrate (HMB) has a long history of use as a nutritional supplement for enhancing recovery, and for increasing strength, power, aerobic performance and lean body mass with exercise (1-3). HMB improves muscle protein balance by decreasing muscle protein breakdown and by increasing muscle protein synthesis [3], resulting in reduced muscle damage and faster and improved recovery (4).

Studies assessing the effects of HMB in physically active individuals have mainly focused on verifying changes in the state of nutrition, assessing protein synthesis and proteolysis rates, and monitoring hormone levels and selected indices illustrating, for example, the degree of muscle damage and determination of changes in physical capacity (5,6). Since 1996, studies have been published that claim that HMB uptake may promote advantageous changes in body composition and strength, and reduced levels of muscle damage markers during resistance training (7,8). Further, in a meta-analysis by Nissen and Sharp (9), it was found that HMB supplementation for resistance exercise resulted in increased strength and fat-free mass by (net value) 1.4 and 0.28 % per week, respectively, in both trained and untrained individuals.

Although some findings suggest that HMB supplementation during training may enhances adaptations of trained and untrained individuals, others report no significant effects of HMB supplementation (8,10). Thus, the available scientific literature on HMB supplementation in humans is still preliminary in nature and should be considered with reservation (11,12).Also, the data about the influence of HMB supplementation, particularly with resistance training, in younger males are still scarce in the literature regarding the effect of HMB supplementation on these variables.

Therefore, the aim of the present study was to assess the effect of HMB supplementation on body composition, muscular strength and, performance adaptations after 8 weeks resistance training in younger males. We hypothesized that HMB supplementation will lead to greater adaptive responses than placebo groups in performance and body composition.

MATERIALS & METHODS

The subjects were 20 healthy men who were familiar with resistance exercise and training volunteered to participate in this study. Subjects were randomly assigned to one of two training groups: HMB plus resistance training group (HMB; *N* = 10, age = 17.5 ± 0.7 y, height = 172.2 ± 3.1 cm, and body mass = 75.4 ± 1.1 kg) and (b) placebo plus resistance training group (PL; *N* = 10, age = 17.1 ± 0.6 y, height = 175.2 ± 4.3 cm, and body mass = 76.3 ± 2.2 kg). The subjects did not have medical or orthopedic problems that compromised their participation in this study. Each parent subject was informed of the risks and benefits of the study and subsequently signed an informed consent form in accordance with the guidelines of the university's Institutional Review Board.

This study was designed to examine the effects of resistance training plus HMB or PL supplementation on body composition and performance adaptations. Subjects in both groups were instructed on proper technique of training one week prior to initiation of study. The subjects subsequently underwent 8 weeks of training and were tested a week pre-and a week post-training for the variable

The participant underwent 4 days of testing, namely 2 pre- (48 h apart between testing sessions) and 2 post-test day (48 h apart between testing sessions), respectively. A week before the initiation of training, each subject was familiarized with the training programs, and the demographic data were gathered and anthropometric measurements taken. The subjects were tested at the exact same time of day (2 to 4 P.M, post-test day) and same day of the week as the pre-test day to minimize the effect of circadian variations in the test results. All subjects had to continue with the normal daily life activity and dietary intake.

Anthropometric measurements were done in light clothes before and after the training period. Height and weight were measured by an automatic height–weight scale, to the nearest 0.1 cm and 0.1 kg, respectively. BMI was calculated by dividing weight (kg) by the square of the height (m^2). To estimate the amount of subcutaneous fat in the body, skinfold thickness was measured (Lafayette Caliper, model 01128, USA) at three sites (Chest, Abdomen and Quadriceps) in the right of body. Each measurement was performed in triplicate and the average was taken for analysis. All the measurements were made with the subject in standing position and body fat percent were estimated in accordance with Jackson and Pollack [13]. LBM was determined by subtracting the fat mass from weight.

The RAST test was used to measure subjects' anaerobic performance ability, maximum power. Subjects run 35-m intervals, six times, with 10 s of rest between each interval. Power was calculated as previously suggested (14).

In the vertical jump test (VJT), subjects performed three trials with 30-sec of rest in between each jump. The following procedure was used for each subject during data collection. Subjects stood directly under the Vertec, fully extending an arm to touch the highest vane possible while remaining flat-footed to establish standing reach height, which was recorded. Subjects were instructed to perform the highest jump vane possible. The difference between standing reach height and each vertical jump height was calculated and the highest jump was used in the data analysis (15).

A bilateral leg press test was selected to provide data on maximal strength through the full range of motion of the muscles involved. Maximal

strength of the lower extremity muscles was assessed using concentric 1RM leg press action. Bilateral leg press tests were completed using standard leg press equipment, with the subjects assuming a sitting position and the weight sliding obliquely at 45°. On command, the subjects performed a concentric leg extension (as fast as possible) starting from the flexed position to reach the full extension against the resistance determined by the weight. Warm-up consisted of a set of 10 repetitions at loads of 40-60% of the perceived maximum [16].

For the bench press, each participant lowered the bar until contact with the chest was achieved and subsequently lifted the bar back to the fully extended elbow position. Any trials failing to meet the standardized technique criteria were discarded. A warm-up consisting of 5-10 repetitions with approximately 40-60% of perceived maximum was performed. The rest period between the actions was always 2 minutes. Subjects were allowed to perform maximum 8 repetitions during bench press and leg press, and were used equation of Brzycki [17]: estimated 1RM= weight (kg)/1.0278 – (repetitions x 0.0278) for determining of 1RM.

The resistance training programs included three days weekly (on Saturday, Monday and Wednesday) for 8 weeks. Each training session lasted 85-min, including 10-min warm-up (e.g., jogging, stretching and ballistic exercises), 70-min training, and 5-min cool-down (e.g., jogging and stretching exercises). The resistance training program stressed all major muscle groups and included the following exercises (or variations of) in each session: leg press, knee extension, knee flexion, lat pull-down, bench press, shoulder press, cable biceps curl and triceps push down 3 sets of 12 to 8 repetitions with 70 to 80 % of 1RM . Exercise volume and intensity progressed during the training program according to previous recommendations [12]. Two and three minutes of rest intervals were assigned between sets and exercises, respectively.

The HMB supplementation consisted of 1 gram of β-hydroxy-β-methylbutyrate in the calcium salt form (Optimal Nutrition, USA) in each daily meal. Likewise, the subjects in PL group ingested 1 gram of polydextrose. In training days, only one gram of HMB or PL was consumed prior to the exercise session and other servings was consumed with breakfast and supper [18].

All data are presented as mean ± SD. The distribution of each variable was examined using the Shapiro-Wilk test. A two-way analysis of variance with repeated measures (2 [group] x 2 [time]) was used to determine significant differences between groups. A criterion α level of $P \leq 0.05$ was used to determine statistical significance. All statistical analyses were performed through the use of a statistical software package (SPSS®, Version 16.0, SPSS., Chicago, IL).

RESULTS

The results of this study are presented in Table 1. There were significant improvements in the percent body fat, RAST test, VJT, 1RM bench press and 1RM leg press after 8 weeks resistance training for both the HMB and PL groups ($P < 0.05$). In addition, the HMB group indicated greater changes than PL group in RAST test, VJT, BMI, 1RM leg press and bench press after training intervention ($P < 0.05$).

Table 1. Changes in anthropometric and performance variables in response to 8 weeks training intervention (mean ± SD).

	HMB (n = 10)	PL (n = 10)	Significance
Body fat (%)			
Pre	14.9±4.5	14.5±5.7	G=0.981
Post	12.1±3.6*	12.2±5.0*	T=0.039
			G×T=0.07
BMI (kg/m²)			
Pre	25.4±1.7	26.1±3.3	G=0.55
Post	27.7±2.5*, **	26.4±3.2	T=0.04
			G×T=0.05
RAST (w)			
Pre	562±32.5	568.1±25.5	G=0.08
Post	580.1±31.3*, **	577 ±23.3*	T=0.001
			G×T=0.045
VJT (cm)			
Pre	38.0±3.5	37.1±2.2	G=0.12
Post	46.1±3.1*, **	41±2.2*	T=0.02
			G×T=0.03
1RM leg press (kg)			
Pre	175.2±42.1	177.1±45.8	G=0.23
Post	201±35.7*, **	191.8±37.2*	T=0.02
			G×T=0.02
1RM bench press (kg)			
Pre	54.3±14.1	54.2±10.5	G=0.16
Post	66.3±13.6*, **	61.2±12.7*	T=0.01
			G×T=0.042

*: denotes significant differences between baseline and post-training values ($p \leq 0.05$); **: denotes significant differences between the HMB and PL supplementation groups at post-training ($p \leq 0.05$). G = group, T = time

DISCUSSION

The present study investigated the effect of 8 weeks HMB supplementation on body composition, muscular strength and power performance after resistance training. The results have shown that HMB supplementation induced significant change in body composition variables, power performance and strength gains after 8 weeks resistance training and the changes in strength, power and BMI were greater for HMB group compared to PL group. These results are in contrast with previous studies which found positive effects of HMB supplementation for performance adaptations [2-9].

In body composition variables such as BMI and body fat, both the groups showed improvements in these variables and also the changes in BMI was greater for the HMB group.

Recent dada suggests that HMB supplementation improves fatty acid oxidation, adenosine monophosphate kinase (AMPK), Sirt1, and Sirt3 activity in muscle cells. Sirt proteins modify the acetylation level of histones and proteins [19]. AMPK is also a sensor of energy balance, but does so through changes in AMP/ATP ratios [20]. Collectively, these proteins act to improve mitochondrial biogenesis, fat oxidation, energy metabolism, and the reactive oxygen defense system [20]. Consequently, this recent evidence has shown that HMB supplementation increases mitochondria biogenesis and fat oxidation [14], and it could be main mechanism to decrease body fat and increase BMI following HMB supplementation. These findings agreed with Kraemer et al. [21], who also found that participants lost more body fat following 12 weeks of HMB supplementation relative to a placebo- matched control.

Power is one of the most critical attributes underlying success in sport [6,7]. This variable is intimately related and allows athletes to be successful in their respective sport [7]. In this study, both the groups showed meaningful gains in VJ and RAST test after 8 weeks training, while the HMB group indicated more changes than PL group in power performance. In line with the present study, Kraemer et al. [21], suggest that changes in power following HMB supplementation are optimized within the training

program [11]. Moreover, it is conceivable that the magnitude of power adaptations resulting from HMB supplementation may be reflective of the measurement technique. For example, past research utilizing compound, sport-specific movements such as VJ have found more changes in power following HMB supplementation [21,22]. In contrast, researchers have found small treatment effects when using non-specific movements [9]. The greater adaptations in power performance may be due to neuromuscular adaptations and changes in muscle mass hypertrophy following HMB supplementation; however, it only could be speculations and more studies are necessary.

Regarding to strength performance, the results of our study indicated that HMB supplementation induced greater changes in 1RM leg press and bench press which is in line with previous findings that HMB supplementation resulted in a significant greater strength gain after training [3,4]. Recently, Portal et al.[23] showed that HMB supplementation led to an increase in knee flexion isokinetic force in elite adolescent volleyball players. In the study conducted by Kraemer et al. [21] bench press and squat 1RM were increased in HMB and control groups after 12 weeks of resistance training. However, the increases in 1RM were significantly greater in the HMB group when compared to the control group. However, other studies did not find positive effects of HMB to strength gains [4-8]. Changes in strength are largely due to neurological adaptations early in practice (i.e., changes in motor unit recruitment, asynchronous to synchronous contractions, etc.), while increases in lean muscle mass, which increases the capacity of the body to produce force, accounts for a greater percentage of strength gain later. Currently, the ability of HMB to increase indices of strength has been attributed to the changes observed in lean mass. However, to our knowledge, no research has examined possible neurological adaptations facilitated by HMB supplementation. It seems that HMB supplementation may have beneficial effects on neurological adaptations of strength gain [24].

In summary, the results of this eight-week study demonstrated the efficacy of HMB supplementation on strength and power performance. The use of these supplements appears to provide greater changes compared with placebo supplementation. It could be concluded that eight weeks of HMB supplementations induced meaningful increases in power and strength performance with reduction of body fat and increases in BMI.

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Comparison of Agility, Vertical Jump and Speed Parameters in Children Between 6-12 Years

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Abstract

The aim of the study is to compare the agility, vertical jump and velocity parameters in children between 6-12 years of age. One hundred thirty-six children (61 girls, 74 boys) participated as volunteers. The t-test was applied to the participants as a measure of agility test. Vertical jump and 20 meters speed test were applied. Statistics were performed using by SPSS package program. The data were evaluated by the Shapiro-Wilk test for normal distribution. Mann Whitney U test was used for intergroup comparisons. Accordingly, there is a significant difference in favor of males in the vertical jump in the 10-year age group ($p<0.05$). There is a significant difference between males and females in the 9 and 10 age groups in favor of males in vertical jump and speed ($p<0.05$).There was no statistically significant difference in the agility test, but the data showed that men performed better.

Key Words: Agility, vertical jump, speed

INTRODUCTION

Sportive abilities are characterized by different psychomotor characteristics. These; force, speed, endurance, skill and range of motion. Sportive abilities are characterized by different psychomotor characteristics. These are; force, speed, endurance, skill, and range of motion. These characteristics are the factors that determine how successful a person will be more successful and in which sport. Durability feature may be a prominent athlete marathon runner, who has a very good speed can be a sprinter, someone who uses his feet well can be a footballer, who use a good hand can be more successful in using volleyball (1). The width of movement in sports is an expression of flexibility. There are four main features of muscle tissue, namely: extensibility, flexibility, excitability, and contraction. The extensibility and flexibility of these forms the width of motion (2, 3). Elongation is the ability of the muscle to stretch. Flexibility; the ability to return to the normal length of the muscle after stretching or after contraction (4).Children between the ages of 6 and 12, rather than gaining new skills, demonstrate the basic skills they have previously gained more fluently and accurately. This phase of motor development is the stage of development of basic movements. Here, the term sports has been widely used; that is, it is adopted not only as a competition but also as a means of activities such as recreation, play, dance (5, 6). It is the transition phase of the age of seven to eight. During this period, performance is highlighted and efforts are made to increase. Performance is expected to increase with strength, durability, reaction time, movement time and balance (7). After this period, special movement skills are introduced and this phase includes children aged 11-13. At this stage, Starts to choosing a branch. Children are willing to learn and practice their mobility skills. The branch of movement which is specific to the sports branch is also called the branching period (8). In the age of 6-12 years, the child's perceptual

abilities are sharpened. Sensory-motor organs work more and more harmoniously. Thus, at the end of this semester, the child can achieve numerous complex skills. For example, hitting the flung baseball; age, application, visual acuity, running ability, reaction and movement time and sensory-motor integration depending on. It is imperative for the children to experiment for the maximum maturation of his movement skills. In other words, children can develop motor skills by developing their perceptual processes during normal maturation process (9).

Motor development; it is a process that continues throughout the acquisition of a child's movement patterns and skills. Continuous changes and developments are involving the interaction of many functions. These functions include neuromuscular maturation, an important genetic component. This maturation is realized through the environment and social life of a social being (10). Speed can be defined as the speed at which the whole body or body parts occur when applying a movement. Briefly, it can be defined as the ability to move the body or a part at high speed (11).

Based on this information, it was aimed to compare the agility, vertical jump and velocity parameters in children aged 6-12 years. Thus, we will have an idea about age groups by revealing the difference between the parameters we examined and comparing them in terms of gender.

MATERIALS & METHODS

One hundred thirty-six children (61 girls, 74 boys) aged 6-12 years in basketball, volleyball and football branches participated in the study voluntarily. Participants who were invited by face-to-face interview with their families were informed about the purpose and content of the study. The volunteer consent form was signed before the study. Body composition, body weight, body mass index (BMI), fat ratio (kg) and fat ratio (%) were performed by body composition analysis (Tanita BC 418, USA) based on bioelectric impedance method. The 4 funnel tracks are arranged in the T-shape for T-test section. Then run to the left (C funnel) side step and touch the C funnel with the left hand. Then the right hand (D funnel) runs sideways and touches it with the right hand. Then come to B with side running and then the funnel and touch it with the left hand. It then returns to A funnel by running back. The chronometer is stopped as soon as you reach the A funnel (Figure 1). The best duration of the participant will be recorded (12).

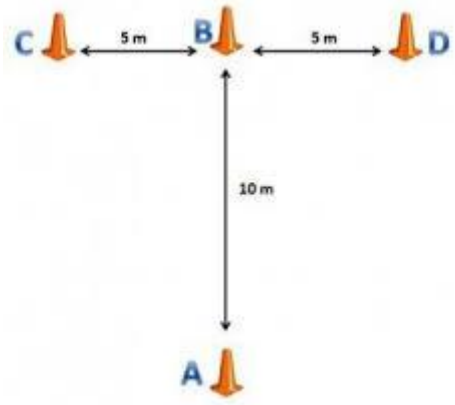

Figure 1. T-test

The vertical jump test was performed using the Jump Meter. Athletes, time and distance scale on the sensitive ground without taking the step and the top of the strength has jumped upwards. The distance he jumped was determined in inches on the device. Athletes jumped two times. The best degree is recorded as the vertical jump values.

Statistical Analysis

Statistical analysis was performed by in SPSS 23.00 package program. The data were evaluated by the Shapiro-Wilk test for normal distribution. All data were expressed as mean and standard deviation. The Mann Whitney U test was used to compare genders. Significance was accepted at $p < 0.05$.

RESULTS

Descriptive parameters of age groups are shown in Tables 1, 2, 3, 4 and 5.

Table 1. Descriptive parameters of age group 6

Age	Parameters	Girls (n=19)		Boys (n=23)	
		Min-max	Mean±SD	Min-max	Mean±SD
6 years	Height (cm)	94-128	116.05±8.83	103-139	119.78±8.4
	Body weight (kg)	13.2-32	19.94±4.23	33.7-22.73	22.73±5.17
	Body fat (%)	13.1-31.6	18.67±5.28	3-33.4	18.17±5.79
	Body fat (kg)	2.10-10.10	3.82±1.85	1-10.7	4.32±2.18
	BMI (kg/cm²)	12.1-20.8	14.69±1.88	13.2-20.5	15.66±1.96
	Vertical jump (cm)	10-28	16.1±4.79	9-27	18.6±4.66
	20 m. speed (sec)	4.45-6.44	5.27±0.59	4.18-6.32	5.04±0.49
	T test (sec)	9.25-14.12	11.46±2.64	8.74-13.54	10.1±4.65

Table 2. Descriptive parameters of age group 7

Age	Parameters	Girls (n=10)		Boys (n=13)	
		Min-max	Mean±SD	Min-max	Mean±SD
7 years	Height (cm)	119-142	125.1±7.74	122-131	126.23±3.0
	Body weight (kg)	17.9-45.6	25.96±7.73	20.7-42.7	26.58±5.49
	Body fat (%)	3-34.1	18.77±8.87	12.9-38.9	20.11±6.7
	Body fat (kg)	1.7-15.5	5.35±4.17	2.7-16.6	5.66±3.53
	BMI (kg/cm²)	12.6-22.6	16.3±2.91	13.9-26.1	16.66±3.16
	Vertical jump (cm)	11-25	17.14±3.25	10-24	19.84±4.12
	20 m. speed (sec)	4.23-5.80	5.01±0.52	4.15-5.98	4.82±0.55
	T test (sec)	9.88-13.48	10.67±15.2	8.56-13.56	9.67±15.1

Table 3. Descriptive parameters of 8 age group

Age	Parameters	Girls (n=10)		Boys (n=16)	
		Min-max	Mean±SD	Min-max	Mean±SD
8years	Height (cm)	123-138	131.4±4.88	108-145	129.5±9.12
	Body weight (kg)	19.1-33.7	25.98±4.89	13.9-46.6	27.83±9.32
	Body fat (%)	9-28	16.43±6.23	9-30.9	17.16±6.64
	Body fat (kg)	1.7-9	4.5±2.44	1.3-13.7	5.31±3.91
	BMI (kg/cm²)	11.5-18.9	14.98±2.35	11.9-22.3	16.15±3.32
	Vertical jump (cm)	11-23	19.1±2.4	13-25	20.15±6.1
	20 m. speed (sec)	4.18-6.39	4.95±0.76	4.31-5.21	4.74±0.26
	T test (sec)	9.75-13.45	10.56±4.12	8.42-13.32	9.56±3.48

Table 4. Descriptive parameters of 9 age group

Age	Parameters	Girls (n=11)		Boys (n=12)	
		Min-max	Mean±SD	Min-max	Mean±SD
9 years	Height (cm)	132-153	139.18±5.94	119-150	139.75±8.4
	Body weight (kg)	21.2-40.5	29.03±5.54	25.9-50.7	36.55±8.18
	Body fat (%)	3-28.7	14.88±8.02	12.4-30.6	21.06±5.53
	Body fat (kg)	1-11.6	4.59±3.27	3.6-14.7	8.02±3.74
	BMI (kg/cm²)	12.2-34	25.76±35.97	14.9-22.5	18.51±2.46
	Vertical jump (cm)	15-28	20.21±6.12	20-27	24.1±3.25
	20 m. speed (sec)	3.98-5.57	4.69±0.46	2.39-5.23	3.87±1.22
	T test (sec)	9.65-13.2	10.21±15.4	8.32-13.1	9.12±15.46

Table 5. Descriptive parameters of the 10 age group

Age	Parameters	Girls (n=11)		Boys (n=10)	
		Min-max	Mean±SD	Min-max	Mean±SD
10years	Height (cm)	133-157	145±12	138-159	146.7±7.36
	Body weight (kg)	27.7-61.3	40.7±18.04	23.1-63.4	43.09±11.85
	Body fat (%)	15.5-35.6	23.4±10.71	6.3-35.9	20.42±8.41
	Body fat (kg)	4.3-21.8	10.8±9.57	1.5-20.1	9.49±5.49
	BMI (kg/cm²)	15.7-24.9	18.76±5.31	12.1-26.3	19.79±4.27
	Vertical jump (cm)	20-29	25.65±5.17	22-34	28.1±2.54
	20 m. speed (sec)	4.40-4.72	4.6±0.17	3.67-4.56	3.88±0.42
	T test (sec)	9.56-12.84	9.76±45.1	8.12-12.58	9.10±1.65

The gender comparison of the parameters is shown in Table 6. According to this, there is a significant difference between boys and girls in 9 and 10 age groups in favor of males in vertical jump and speed.

Table 6. Comparison of vertical jump, agility and speed data in terms of gender

	6 years p	7 years p	8 years P	9 years p	10 years P
Vertical jump (cm)	.110	.165	.265	.354	.046*
20m Speed (sec)	.215	.687	.493	.039*	.042*
T test (sec)	.154	.215	.226	.154	.354

*p<0.05

DISCUSSION & CONCLUSION

One hundred thirty-six children (61 girls, 74 boys) participated as volunteers between the ages of 6-12. The age group consisted of 42 participants (19 female, 23 male). Twenty-three participants from 7 age group (10 girls, 13 boys). Twenty-six participants (10 girls, 16 boys) aged 8 years. Twenty-three participants (11 girls, 12 boys) aged 9 years. The age group ten consisted of 22 participants (11 females, 10 males). All participants' vertical jump, 20m speed, and agility tests were compared. According to this, there is a significant difference between boys and girls in nine and ten age groups in favor of males in vertical jump and speed.

Kara (2018), the aim of this study was to investigate the relationship between body mass index and speed in male and female athletes aged 10 years. as a result, it is possible to mention an improvement in speed characteristics in parallel with the positive increase in BMI, albeit at a low level. (13). It is stated in the sources that the bone length reached the endpoint in the first 2-4 years following puberty in girls (14). With age progression, the increase in height and body weight together with passive physical activity are thought to negatively affect girls' long distance performances. It is seen that the boys perform better when the children who are engaged in sports are considered to be better at the same time when their long-distance values are better.

Savucu et al. (2004) found that the average age of the basketball players, 14 from the junior category, 36 from the star category, 32 from the junior category and 30 from the basketball players, the average of the vertical jump values of small males was found to be 36.75 ± 3.82 cm. The male average of the stars was found to be 45.55 ± 4.03 cm. Young people have found an average of 50.83 ± 5.26 cm (15). Erikoglu et al (2009) evaluated the performance parameters of the Eurofit test battery according to gender and age groups in children aged 7-12 years. In conclusion, it was reported that boys and girls showed similar development up to the age of 10, however, boys from this age showed a higher rate of development in some parameters than girls (16). Anıl (2001), in the study conducted by female basketball players in the 14-16 age group, found that the vertical jump values were 33.58 cm in the experimental group, 42.17 cm in the post-training group, and 33.25 cm in the control group before the training and 33.08 cm in the post-training period (17). Williams et al (2011), 10 m sprint times in their study for 40 football players under age 12 1.98 ± 0.09. Mean age of 13 for 47 football players was reported to be 1.97 ± 0.34 (18). Girard and Millet (2009) reported that 12 tennis players with ages of 13.6 ± 1.4 years had 5m sprint and 10m sprint

performance as 1.19 ± 0.07 and 2.02 ± 0.14, respectively (19).

In our study, no difference was observed between the age groups in terms of gender in the agility test. However, it is possible to say that the boys have completed the test at a higher degree than the girls. A significant difference was found in favor of males in terms of sex in the 10 years age group in vertical jump and speed. It can be said that there is a proportional change in aerobic and anaerobic performance along with age-related anthropometric properties.

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The Perceived Stress Reactivity Scale For Adolescent Athletes: Translation, Adaptation, Validity and Reliability Study

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Abstract

This study aims to analyze the validity and reliability of The Perceived Stress Reactivity Scale for Adolescent Athletes. 220 athletes including 111 females and 109 males from seventeen different sports branches participated in the study. The age mean of the participants was found to be 19.76±1.05. The sporting age mean was found to be 7.11±2.96. Data was collected by using The Perceived Stress Reactivity Scale for Adolescent Athletes (8), Perceived Stress Scale (9, 11). The factor structure was analyzed by using Confirmatory Factor Analysis in AMOS. Pearson Correlation test was used to analyze factor-factor relationship and criterion-related validity. The method of translation-back translation was used for the translation of the scale into Turkish. The results of the factor analysis displayed that 5-factor model had acceptable fit indices (CFI=.83, SRMR=.07, RMSEA=.07). The 5-factor scale including the subscales of prolonged reactivity, reactivity to work overload, reactivity to social conflict, reactivity to social evaluation, and reactivity to failure had the same factor structure in Turkish athletes. Consequently, it can be said that The Turkish form of the Perceived Stress Reactivity Scale for Adolescent Athletes is valid and reliable.

Keywords: Adolescent athletes, scale adaptation , stress reactivity.

INTRODUCTION

The intense success pressure and high-level of stress and emotional distress among adolescents have been frequently seen in media and popular culture (28). The sports competition context in which success pressure is experienced intensively includes some factors causing stress at different levels for all age groups. Performance or mental errors, doing a mistake resulting in a serious punishment, being rebuked by the coach, coach's choice, discontent input from opponent, audience or teammate, and the stress stemming from the opponent's successful performance can be shown as the stressors in sport (1, 2, 3, 14, 29). When faced with a stressor, the autonomous nerve system and the initial activation of hypothalamic-hypophysis-adrenal axis prepare the individual for the action and facilitate the processes of evaluation and coping reactions (8). The researchers have argued that stress is an ongoing operation between the environmental demands and the resources of the individual, and provided the "strain" concept resulting from the imbalance between these demands and the resources (20).

Competition stress and emotions have been explained in Lazarus' Cognitive-Motivational-Relational Theory (17, 18, 19), it is suggested that an individual is more likely to experience negative emotions when lacking the resources to cope with the faced demands in the competition context (23). Lazarus and Folkman (21) argued that an evaluation of stressor consisted of many judgments related to the difficulty and threat to the individual, potential damage or benefit, and the perceived control.

The concept of coping, which is a complicated, intentional and generally planned psychological process and in accord with social context and its behavioral standards, contrary to innate action

tendencies, focuses on the evaluation for what is possible, becomes effective in particular setting (17), is the process for the management of the individual's demands of individual-environment relations evaluated as stressful. This process includes cognitive and behavioral efforts spent to manage particular internal and external demands (20, 21). It has been found that athletes use various coping strategies (1, 24). According to Lazarus' theory, there are three types of coping strategies including problem-, emotion-, and avoidance-oriented strategies (21). While emotion-oriented coping aims to regulate emotions associated with stress condition, avoidance-oriented coping aims at steering away from the source of the problem. In problem-oriented coping, the individual collects information about what to do by aiming to change the reality in the problematic individual-environment relation (18).

Coping can reduce stress reactions with the actions changing the actual relationship between individual and environment (problem-oriented), or by changing only the meaning of the relation (13, 18, 20). The ability to cope with stressors during sports competitions is an inseparable part of the successful performance (15). Researchers have revealed that stressors negatively affect the performance (2, 3, 4) and that undesirable emotion can arise when there are inadequate coping with stressors (5, 6, 19, 24). However, Lazarus (19) suggested that the sense of anxiety could be beneficial for performance, with an increase in activated energy and focus on the existing task.

Determining the reaction of adolescent athletes to stressors can help coaches, trainers, parents, and athletes to adjust proper and adequate coping strategies. However, there is no measurement tool to assess the reactivity against stressors in the sports context in Turkish literature. This study aims to analyze the validity and reliability of The Perceived Stress Reactivity Scale for Adolescent Athletes.

MATERIALS & METHOD

Participants

The athletes competing in different sports branches were recruited (111 females, 109 males). The age mean was 19.76±1.05. The athletes trained approximately for 2.27±.96 hours per day, 3.57±.80 day per week. They reported to have been competing for 7.11±2.96 years on an average. Preliminary study included 30 athletes including 15 females and 15 males. The age mean of the participants in preliminary study was 19.06±1.19. Most of the athletes participated in this study reported that they have been competing in amateur leagues (77.7%).

Measurements

The Perceived Stress Reactivity Scale for Adolescent Athletes (PSRS-AA): Britton, Kavanagh, and Polman (8) developed the 5-factor scale. The original scale consists of 23 items and includes five sub-scales. Each item has three specific responds between zero (0) and two (2). Zero represents the lowest reactivity while two reflects the highest. The sum of each sub-scale reveals the reactivity of athletes. The instruction of the original scale was designed for athletes to reflect the reaction against stressors in the sports participation, rather the stressors faced generally. The instruction of this study was designed in this direction.

Perceived Stress Scale: The criterion related validity was tested by correlating PSRS-AA with PSS, developed by Cohen, Kamarck, and Mermelstein (9), translated into Turkish by Eskin, Harlak, Demirkıran and Dereboy (2013). The scale consists of 14 items rated between 1 (never) and 5 (very often).

Translation Process

The scale was translated by following the stages suggested by Beaton et al. (7) for conceptualization of self-report measures for cross-cultural adaptation studies and the steps of translation were as follows: synthesis, back translation, expert committee evaluation, pretesting, and submitting the measure to the developers or coordination committee for evaluation. Since there was no coordination committee and developer evaluation in this study, five basic steps were followed. Author permission was asked and after the permission was granted, the translation process started. Two translators—one was informed and aware of the concepts (T1) and another was neither informed nor aware of the concepts (T2)—translated the items into Turkish (Stage 1). Two academicians having studies into sport psychology examined both translations (T1 and T2) and created a synthesis form (Stage 2), which was used for back translation. The synthesis form was created after examining the items translated in T1 and T2. Two academicians, both

were neither informed nor aware of the concepts, translated the synthesis form (T12) into English (Stage 3). Five academics, working in the field of sport sciences, knowing English and Turkish very well, evaluated the T1, T2, T12, BT1, and BT2 versions in terms of equivalences of semantic, idiomatic, experiential, and conceptual (Stage 4). After considering the suggestion and corrections, the Turkish form of the inventory was ready for the pretesting (Stage 5).

Data Collection

Researchers collected the data in the second term of the 2017-2018 season. They explained the purpose of the study in detail and guaranteed that all of the responses kept secret and used for scientific goals.

Statistical Analysis

Data was analyzed in SPSS® statistics (version 22) software and AMOS™. The analyses for demographic information and features were done by using descriptive statistics. The factor structure was analyzed with Confirmatory Factor Analysis (CFA). CFA is a proper method for testing the explored and theory-based models (12, 16, 30). Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity values were calculated to determine whether the data was proper for the factor analysis. The fit of the hypothesized models to data was evaluated through chi square value (significance level a = 0.05), degrees of freedom, comparative fit index (CFI), standardized root mean residual (SRMR), root mean square error of approximation (RMSEA). The mean score and standard deviation of the students' ratings was calculated in excel. The scores were shown in the Figure 1. Content validity index for item (I-CVI) and scale (S-CVI) were calculated in excel (see Table 1). Polit and Beck (25) defined the content validity as the degree to which an instrument has an appropriate sample of items for the construct being measured. To calculate the I-CVI, the number of agreement among the experts was calculated for each item. I-CVI was calculated by dividing number of agreement by number of experts. The mean score of I-CVIs shows the S-CVI (26). Pearson Correlation test was used to analyze factor-factor relationship and criterion-related validity.

FINDINGS

Figure 1. The means and standard deviations of items from the Turkish form of PSRS-AA

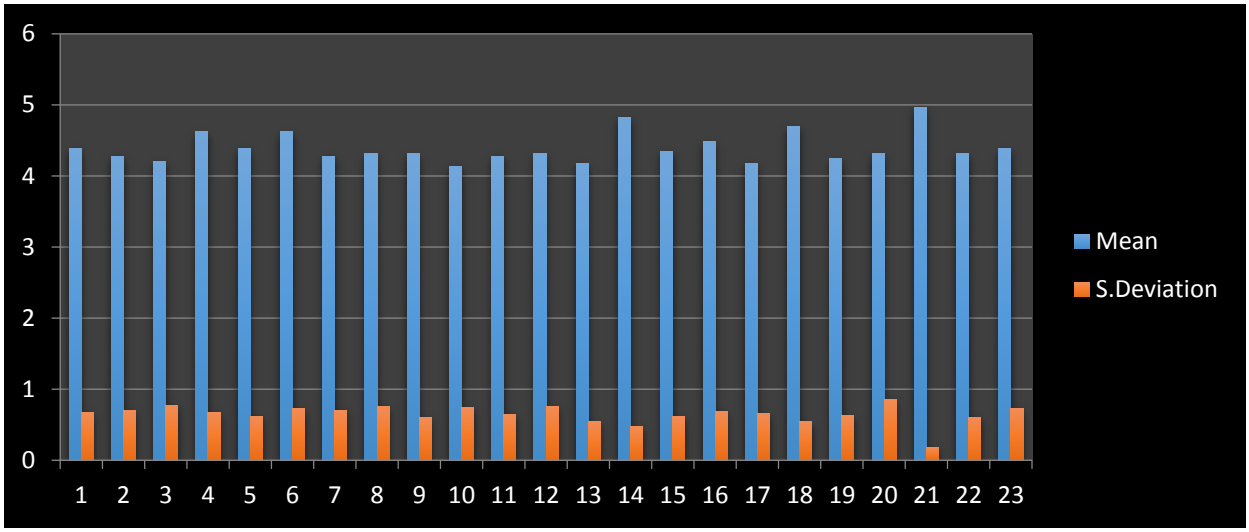

Figure 1 presents the mean scores and standard deviation of the extent to which the student-athletes understand each item of the new Turkish version of the PSRS-AA. The mean scores are between 4 and 5, which means that the items are understandable.

Table 1. The Content Validity Indexes

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number of agreement	I-CVI
1	4	4	4	4	4	4	6	1
2	4	4	3	3	4	4	6	1
3	4	3	3	4	4	4	6	1
4	4	4	4	4	4	3	6	1
5	3	4	3	4	3	3	6	1
6	3	4	4	4	4	4	6	1
7	4	4	4	3	3	4	6	1
8	4	3	3	3	4	3	6	1
9	3	3	3	3	3	2	5	0,83
10	3	4	4	4	4	3	6	1
11	4	4	4	4	4	4	6	1
12	4	4	3	2	4	4	5	0,83
13	4	4	4	4	4	3	6	1
14	4	4	4	4	4	4	6	1
15	3	4	4	4	4	3	6	1
16	3	4	4	4	4	2	5	0,83
17	3	4	4	4	3	4	6	1
18	4	3	3	3	4	4	6	1
19	3	4	4	4	4	4	6	1
20	4	4	4	4	4	4	6	1
21	4	4	4	4	4	4	6	1
22	4	3	4	4	4	4	6	1
23	4	4	4	4	4	3	6	1
							S-CVI/Ave	0,97
							Total Agreement	20
Proportion relevant	1.0	1.0	1.0	.95	1.0	.91	**S-CVI/UA**	0,86

Scale Content Validity Index (S-CVI), Item Content Validity Index (I-SCV), Universal Agreement Calculation Method (UA).

Table 1 represents the content validity indexes calculated after the expert ratings. In line with our results, Beaton et al. (7) suggested that the responses and answers to the interview ensured that the adapted version maintained the equivalences. Participants rated how well they understood each item by scoring between 0 and 4. In this study, experts were asked to rate the relevance of each item to perceive stress reaction against the stressors in sport (26). As it was advised (10, 32), six experts rated the items between 1 and 4. The I-CVI values were not lower than 0.78 (21), and these results were acceptable. S-CVI/Ave and S-CVI/UA were found to be as 0.97 and 0.86, respectively, and this result is also acceptable (10, 26). S-CVI and I-CVI scores were calculated, and the results showed that the content of the inventory was valid.

The CFA revealed that the 5-factor model had acceptable fit indexes (CFI=.83, SRMR=.07, RMSEA=.07). It was found that the factor structure of the original scale including PrR, RWO, RSC, RFa, and RSE displayed the same structure in Turkish athletes. The factor loads ranged between 0.43 and 0.70. Cronbach's alpha internal consistency values of subscales ranged between 0.60 and 0.75 while composite reliability ranged between 0.59 and 0.77. The internal consistency value of the whole scale was 0.89. The correlation between the subscales and perceived stress showed that the Turkish form of the scale was a valid structure.

Table 2. 5-Factor model solution, factor-factor correlations, criterion-related validity, and CFA fit indexes of Turkish version of PSRS-AA

Items	Error Variances	5-Factor model solution				
		Factor Loads				
		F1	F2	F3	F4	F5
I2	.68	.56				
I10	.68	.56				
I20	.74	.51				
I21	.81	.43				
I1	.78		.46			
I7	.57		.65			
I12	.61		.62			
I16	.64		.60			
I23	.59		.64			
I3	.70			.54		
I5	.76			.49		
I6	.76			.49		
I17	.45			.74		
I19	.57			.65		
I8	.46				.73	
I13	.48				.72	
I15	.56				.66	
I18	.62				.61	
I4	.61					.62
I9	.69					.55
I11	.84					.39
I14	.60					.63
I22	.62					.61

					Factor-Factor Correlations				
Factor	*Ort. ±S.S.*	*Skew.*	*a*	*cr*					
Prolonged reactivity (PrR)	.67±.46	.047	.60	.59	1	.467**	.524**	.581**	.565**
Reactivity to work overload (RWO)	.53±.44	.445	.71	.73		1	.571**	.432**	.703**
Reactivity to social conflict (RSC)	.72±.47	-.083	.68	.72			1	.635**	.614**
Reactivity to failure (RFa)	.90±.56	-.370	.75	.77				1	.602**
Reactivity to social evaluation (RSE)	.57±.43	.129	.65	.69					1

Criterion-related validity					
	1	2	3	4	5
Perceived Stress	.224**	.254**	.221**	.217**	.181**

Fit Indexes	x^2	df	x^2/df	CFI	SRMR	RMSEA
	472.34	212	2.22	.83	.07	.07

DISCUSSION & CONCLUSION

This study aimed to translate the PSRS-AA into Turkish and conduct the initial structure analysis. In line with the suggestion by Beaton et al. (7) for the adaptation of self-report measurements, the items were translated into Turkish. In the preliminary study, the scores of the athletes on the items showed that the items are understandable, and the experts' opinions revealed that the scale and its items are valid according to content validity indexes. I-CVI values were not lower than 0.78, and these results are at an acceptable level (22). S-CVI was found to be 0.94, and this result was also acceptable (10). The preliminary analysis showed that the initial version of the scale was understandable and fit for the athletes. By using CFA to test the structure of an explored model, the factor structure of the Turkish version of PSRS-AA was analyzed. CFA is a more convenient method for testing previously discovered theoretical-based models (12, 16). For the reliability of the scale, the internal consistency

coefficient, as well as the composite reliability analysis, was performed. When the errors of measurements positively correlated, the alpha coefficient can overestimate the true reliability of a composite (27). Thurber and Bonynge (31) suggest that calculating composite reliability is a more proper method. Both alpha and composite reliability scores displayed that the scale was reliable. Consequently, these results indicate that the Turkish version of PSRS-AA is valid and reliable structure to use in the Turkish population.

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The Effects of Trenbolone Supplementation on the Extremity Bones in Running Rats

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Abstract

Anabolic steroids are testosterone derivatives through which anabolic effects are maintained and androgenic effects are minimized. The use of ergogenic agents is increasing among athletes for doping in order to increase physical performance and change external image. The objective of this study was to determine effects of trenbolone supplement administered on running rats for 4 weeks on extremity bones. The study was conducted with 28 male Wistar rats aged 28 days with a mean weight of 61,80 g supplied from the Selcuk University Experimental Medical Research and Application Center. The rate were divided into 4 groups as C (Controls), E (Exercise), T (Trenbolone), and TE (trenbolone + Exercise). The trial period lasted 4 weeks. Supply, care, feeding, and experimental applications of rats were performed in the Selcuk University Experimental Medical Research and Application Center. Anterior and posterior extremities' bones were dissected and exposed, and the humerus and femur bones exposed were dried. Length, corpus thickness, cortex thickness, and medulla diameter points were determined and the necessary measures were taken. The results are expressed as mean ± SD. ANOVA and Duncan tests were used for the comparison of data. $p<0.05$ values were considered statistically significant. The mean femoral length was found as 31.31 ± 0.69 in the rats in Group T, 31.46±0.72 in Group E, 31.51±0.58 in Group TE, and 31.48 ± 0.71 in Group C (controls). Examining the mean femoral lengths of Groups T, E, TE and C; the mean femoral length in Group T was numerically higher than that of the Groups E, TE and C, although the difference was not statistically significant (F:0.112; p:0.637). The mean humerus length was found as 24.93 ± 0.59 in the rats in Group T, 24.96±0.68 in Group E, 25.33±0.81 in Group TE, and 25.29±0.77 in Group C (controls). Examining the mean humerus lengths of Groups T, E, TE and C; the mean humerus length in Group T was numerically higher than that of the Groups E, TE and C, although the difference was not statistically significant (F:0.608; p:0.355). We found that the mean values of corpus and cortex thickness, and medullary diameters were similar in the Groups T, E, TE, and C, and the differences were not statistically significant ($p>0.05$). Results of this study indicate that trenbolone supplement may lead to early epiphyseal closure in femur and humerus bones of rats, ceasing the increase in their length. We believe that the results obtained from this trenbolone trial will provide important data to the studies that will be conducted on anabolic androgenic steroids.

Key words: Anabolic Androgenic Steroid, Trenbolone, Rat, Femur, Humerus

INTRODUCTION

In the most universal definition, doping is defined as the use, consume or illegal intake of substances prohibited under the rules in order to increase the athletic (12).

Anabolic androgenic steroids (AASs) are mostly used for their anabolic effect, and for increasing endurance and sportive performance by increasing muscle mass and muscular tissue (2, 6).

Frequently preferred anabolic androgenic steroid by athletes and other persons is trenbolone (20). Trenbolone hormone was produced for the first time at the end of 1960s. 19-nortestosterone (19-nor) classification shows structural variance from testosterone since it is deprived of one carbon atom. This difference provides trenbolone to be in the same category with Deca Durabolin (Nandrolone Decanoate) (14). Trenbolone is a highly potent anabolic steroid and primarily preferred by many athletes (20).

Similar to the other steroids, trenbolone significantly increases protein synthesis and nitrogen involvement in muscular tissue. Protein synthesis is rate of cell to produce proteins; protein represent primary constituent of a cell (19). Another steroid feature of trenbolone is inhibition of glucocorticoid hormones. Glucocorticoid hormones that are named as stress hormones in some sources function differently from anabolic steroids in many aspects since these hormones destroy muscular tissue and increase adipose tissue (4).

The objective of this study was to determine effect of trenbolone supplement administered for four weeks in extremity bones of rats.

MATERIAL & METHODS

This study was conducted on 28 rats (Male, Wistar) of 28 days (61.80 g) supplied from the Selcuk University Experimental Medicine Research and Application Center. The rats were divided into four group as the Control group (C), Exercise group (E), Trenbolone group (T), and Trenbolone + Exercise group (TE). The experiments lasted for four week. Supply, care, feeding, and experimental application were conducted in the Selcuk University Experimental Medicine Research and Application Center. The rats were hosted in the experimental animals unit, in the plastic rat cages at 23±2°C room temperature and 50±10% relative moist environment, 12/12 light/dark cycle and with feeding ad libitum. Daily freshened water (~ 50 mL/day/rat) was kept available in front of the rats for drinking any time. The study was approved by the Selcuk University Experimental Medicine Research and Application Center Ethical Committee (Decision no: 2018-2, Date: 24/01/2018). The animals were grouped as follows:

Group 1, C (Control) group (n:7): Rats in this group were given standard pellet feed and drinking water ad libitum.

Group 2, E (Exercise) group (n:7): Rats in this group were given standard pellet feed and drinking water ad libitum. The rats were exercised on treadmill at a rate of 25 m/min, 45 minutes a day, 5 days a week for 4 weeks.

Group 3, T (Trenbolone) group (n:7). Rats in this group were given standard pellet feed and drinking water ad libitum during the study. Trenbolone enanthate at a dose of 10 mg/Kg/rat (10) was diluted in 100 mcl peanut oil and administered as intraperitoneal one day a week for four weeks.

Group 4, TE (Trenbolone + Exercise) group (n:7). Rats in this group were given standard pellet feed and drinking water ad libitum during the study. Trenbolone enanthate at a dose of 10 mg/Kg/rat (10) was diluted in 100 mcl peanut oil and administered as intraperitoneal one hour before the exercise, one day a week. The rats in this group were exercised for four week.

Trenbolone Supplement: Trenbolone enanthate (TRENBOLONE E_{200}, Pharma Generics) at a dose of 10 mg/Kg/rat was diluted in 100 mcl peanut oil and administered as intraperitoneal in rats in the groups T (Trenbolone) and TE (Trenbolone + Exercise) for four weeks. Body weight of the rats was measured at the beginning of the study and on the same day during 4 weeks to adjust the weekly dosage (10 mg/Kg/rat) for trenbolone administration.

Exercise Program: 8-track treadmill, specially designed for rats was used in exercise application. After an adaptation period of one week (5 days), rats in the exercise groups were exercised on the treadmill at a rate of 25 m/min (1.5 Km/hour) for 45 minutes, 5 days a week over 4 weeks.

Adaptation protocol:
Day 1: 10 m/min, 10 minutes
Day 2: 20 m/min, 10 minutes
Day 3: 25 m/min, 10 minutes
Day 4: 25 m/min, 20 minutes
Day 5: 25 m/min, 30 minutes

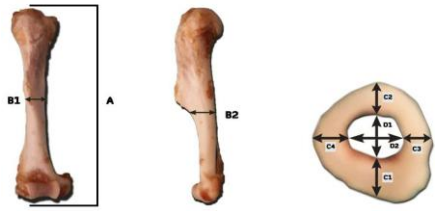
Measurements: At the end of the study, front and back extremities of the subjects were exposed and dissected. Length, corpus thickness, cortex-cortical bone thickness and medullary diameter-cavum medullare measurements were carried out in the exposed humerus and femur bones, using a 0-100 mm caliper.

Anatomic reference points [A (length), B (corpus), C1-C2 (cortex-cortical bone thickness-substantia compacta) and D (medullary diameter-cavum medullare)] of the humerus and femur bones at the right side to be measured were determined and the necessary measurements were made in each of these points with a 0-100 mm caliper (Stainless hardened digital caliper, China) (Images 1, 2).

Status of epiphysis was examined in the relevant bones. Images of the bones were taken with a digital camera (Nikon D200, China) (Images 1, 2). In addition, final mean body weight was measured in all subjects with a precision scale before euthanasia.

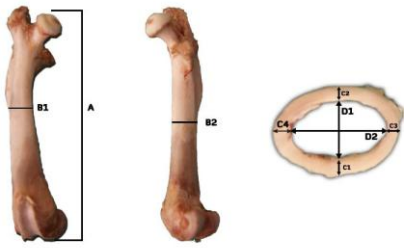
Statistical Analysis: Statistical evaluation of the data was performed utilizing SPSS 18.0 (SPSS 18.0 for Windows/SPSS Inc, Chicago, USA). The results were expressed as mean ± standard deviation. Comparison of the data between the groups was made using ANOVA and Duncan tests. $p<0.05$ values were considered statistically significant.

Image 1. Reference points of length (A), Corpus (B1+B2/2), Cortex (C1+C2+C3+C4/4) and medullary diameters (D1+D2/2) of humerus of the rats (Right medial side)



A: Distance between the end points of caput humeri and trochlea humeri
B: Corpus thickness of the humerus (lower border level of Tuberositas deltoidea)
C1-C2: Mean femur thickness of the humerus at cortex level (cortical bone-substantia compacta)
D: Cavum medullare diameter of the humerus at cortex level

Image 2. Reference points of length (A), Corpus (B1+B2/2), Cortex (C1+C2+C3+C4/4) and medullary diameters (D1+D2/2) of femur of the rats (Right medial side)



A: Distance between the end points of caput ossis femoris and trochlea ossis femoris
B: Corpus thickness of the femur (lower border level of Trochanter tertius)
C1-C2: Mean femur thickness of the femur at cortex level (cortical bone-substantia compacta)
D: Cavum medullare diameter of the femur at cortex level

RESULT

Table 1. Comparison of the mean length, and diameters of corpus, cortex and medullary of femur bones in (Trenbolone), E (Exercise), TE (Trenbolone + Exercise) and C (Control) groups (mm) (mean ± SD).

	T	E	TE	C	Test value, p
Length	31.31±0.69 [a]	31.46±0.72 [a]	31.51±0.58 [a]	31.48±0.71 [a]	F: 0.112 p:0.637
Corpus	3.74±0.15 [a]	3.76±0.18 [a]	3.92±0.13 [a]	3.74±0.15	F: 2.797 p:0.062
Cortex	0.614±0.04 [a]	0.605±0.03 [a]	0.612±0.04 [a]	0.610±0.05 [a]	F: 0.043 p:0.988
Medullary	1.987±0.14 [a]	2.135±0.20 [a]	2.125±0.12 [a]	1.975±0.21 [a]	F: 1.811 p:0.172

*Different letters (a,b) at the same row indicate statistical significance (p<0.05)
**F:Oneway ANOVA/Duncan

The mean femur length of the rats was found as 31.31±0.69 in Group T, 31.46 ± 0.72 in Group E, 31.51 ± 0.58 in Group TE, and 31.48±0.71 in Group C. When the mean femur length values of the Groups T, E, TE and C were examined; the mean length was numerically shorter in Group T compared to Groups E, TE, and C, although the difference was not statistically significant (F:0.112, p:0.637).

The mean femur corpus thickness of the rats was found as 3.74±0.15 in Group T, 3.76±0.18 in Group E, 3.92±0.13 in Group TE and 3.74±0.15 in Group C. When the mean femur corpus thickness values were evaluated; it was found that the mean femur corpus thickness was similar among all groups and no statistically significant difference was found between them (F: 2.797, p: 0.062).

The mean femur cortex thickness of the rats was found as 0.614±0.04 in Group T, 0.605±0.03 in Group E, 0.612±0.04 in Group TE and 0.610±0.05 in Group C. When the mean femur cortex thickness values were evaluated; it was found that the mean femur cortex thickness was similar among all groups and no statistically significant difference was found between them (F:0.043, p:0.988).

The mean femur medullary diameter of the rats was found as 1.987±0.14 in Group T, 2.135±0.20 in Group E, 2.125±0.12 in Group TE and 1.975±0.21 in Group C. When the mean femur medullary diameter values were evaluated; it was found that the mean femur medullary diameter was similar among all groups and no statistically significant difference was found between them (F:1.811, p:0.172)

Table 2. Comparison of the mean length, and diameters of corpus, cortex and medullary of humerus bones in (Trenbolone), E (Exercise), TE (Trenbolone + Exercise) and C (Control) groups (mm) (mean ± SD).

	T	E	TE	C	Test value, p
Length	24.93±0.59 a	24.96±0.68 a	25.33±0.81 a	25.29±0.77 a	F:0.608 p:0.355
Corpus	2.47±0.06 a	2.51±0.12 a	2.52±0.13 a	2.46±0.07 a	F:0.496 p:0.689
Cortex	0.594±0.06 a	0.591±0.03 a	0.594±0.06 a	0.595±0.02 a	F:0.013 p:0.998
Medullary	1.512±0.12 a	1.723±0.14 a	1.714±0.21 a	1.524±0.18 a	F:0.246 p:0.652

*Different letters (a,b) at the same row indicate statistical significance ($p<0.05$)
**F:Oneway ANOVA/Duncan

The mean humerus length of the rats was found as 24.93±0.59 in Group T, 24.96 ± 0.68 in Group E, 25.33 ± 0.81 in Group TE, and 25.29±0.77 in Group C. When the mean femur length values of the Groups T, E, TE and C were examined; the mean humerus length was numerically shorter in Group T compared to Groups E, TE, and C, although the difference was not statistically significant (F:0.608, p:0.355).

The mean humerus corpus thickness of the rats was found as 2.47±0.06 in Group T, 2.51±0.12 in Group E, 2.52±0.13 in Group TE and 2.46±0.07 in Group C. When the mean humerus corpus thickness values were evaluated; it was found that the mean humerus corpus thickness was similar among all groups and no statistically significant difference was found between them (F:0.496, p:0.689).

The mean humerus cortex thickness of the rats was found as 0.594±0.06 in Group T, 0.591±0.03 in Group E, 0.594±0.06 in Group TE and 0.595±0.02 in Group C. When the mean humerus cortex thickness values were evaluated; it was found that the mean humerus cortex thickness was similar among all groups and no statistically significant difference was found between them (F:0.013, p:0.988).

The mean humerus medullary diameter of the rats was found as 1.512±0.12 in Group T, 1.723±0.14 in Group E, 1.714±0.21 in Group TE and 1.524±0.18 in Group C. When the mean humerus medullary diameter values were evaluated; it was found that the mean humerus medullary diameter was similar among all groups and no statistically significant difference was found between them (F:0.246, p:0.652).

DISCUSSION

When femur and humerus lengths of Groups T (Trenbolone), E (Exercise), TE (Trenbolone + Exercise) and C (Control) were examined; the mean femur length was numerically shorter in Group T than Groups E, TE, and C, although the difference was not statistically significant ($p>0.05$).

Studies conducted on experimental animals have reported many side effects of AASs (1, 3, 8, 13, 15, 17, 21).

In a study investigating effects of trenbolone application on the urinary system, it was concluded that trenbolone application has a partial effect on the urinary system in experimental group (9).

In a study examining effects of trenbolone administered at different time periods and different doses on female rats, trenbolone was found to cause an increase in density of amniotic fluid in pregnant rats (8).

In a study evaluating effects of trenbolone application on muscles, bones, adipose tissue and hemoglobin levels of rats, it was concluded that trenbolone increased density of muscle and bone tissues (16).

In a study investigating effect of trenbolone on bone mineral density, intramuscular trenbolone application was found to increase bone mineral density without changing hemoglobin density (11).

In another study investigating effects of exercise plus nandrolone supplement on heart muscle of rats, it was reported that heart muscle of the rats administered nandrolone supplement was damaged (7).

In a study in which rats were given AAS for 15 days and effects of AAS in cognitive function of rats were investigated, it was reported that rats in AAS group developed learning and memory disorder (18).

In a study examining effect of trenbolone and testosterone supplement on skeletal muscle growth of rats, it was concluded that testosterone grew skeletal muscle at a higher rate than trenbolone (22).

In a study investigating effects of androgen application on bones of rats, it was reported that femur bones of the rats given androgen remained short (5).

In the present study, when corpus and cortex thickness and medullary diameter values of femur and humerus were examined in T (Trenbolone), E (Exercise), TE (Trenbolone + Exercise) and C (Control) groups; corpus and cortex thickness and medullary diameter values of femur and humerus were similar between Groups T, E, TE and C ($p>0.05$).

CONCLUSION

Femur length was shorter in the rats in Group T compared to the rats in Groups E, TE and C after trenbolone supplement.

Humerus length was shorter in the rats in Group T compared to the rats in Groups E, TE and C after trenbolone supplement.

Although the results were not statistically significant for both measurements, looking to the numerical values of humerus and femur bones among the groups, remarkably the shortest measurement was in the trenbolone group.

As it will be understood from the result of this study, it can be said that trenbolone supplement will lead to the cessation of growth in humerus bone and early epiphyseal closure.

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Investigation of The Effect of Smoking on Some Blood Parameters and Respiratory Functions in Wrestlers

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Abstract

This study was conducted to investigate the effects of smoking on some blood parameters and respiratory functions in wrestlers. To the study 18 non-smoker wrestling athletes for at least 11,500 years, studying at different departments at Muğla Sıtkı Koçman University Faculty of Sport Sciences, whose average age 20,888, average height 177,555, average weight 82,777 kg; and 16 athletes smoking 15, 062 pieces of cigarettes in a day for averagely 3, 406 years, doing licenced wrestling at least for 11,625 years whose average age 22, 000, height average 179,375, weight average 86, 250; a total of 34 male individuals voluntarily participated in the study. Height and body weight measurements, blood analysis and pulmonary function tests were respectively applied to the participants. Statistical analysis of the obtained data was done by SPSS 21.00 package program. Since the data were distributed normally, the Independent-Samples T Test was used for intergroup comparisons, and the level of significance was set at $p < 0.05$ and 0.01 by using regression analysis test methods. RBC values of the smokers were significantly higher than the ones who did not ($p < 0.01$), and the results of the respiratory function test showed that there were significant differences in favor of the non-smokers ($p < 0.01$, $p < 0.05$). While RBC and HGB values of cigarette users were found to be significantly higher, non-smokers had a 35,2% effect on RBC values of 33,9%, while FVC and FEF25 / 75 were significantly lower than non-smokers. FVC values of -47,4%, and FEF25 / 75 were found to have an effect of -65,7%. In conclusion, it was determined that smoking in wrestlers has statistically significant but negative effects on some blood parameters and respiratory functions. For this reason, it is necessary to emphasize the importance of smoking in the wrestlers to ensure that both athletes and coaches demonstrate the required sensitivity.

Key words: Wrestling, smoking, blood parameters, respiratory functions

INTRODUCTION & AIM

Wrestling is defined as the struggle of two athletes to make each other superior by using their techniques, skills, forces, and intelligence in accordance with the rules determined by World Wrestling Association without using a vehicle on a custom-made canvas cushion with dimensions (24,27). Wrestling is a challenging sport with short periods and a resting element, which requires high-intensity effort and includes submaximal and maximal loads with the athlete's physical superiority (17). Also; Wrestling is also defined as a sports branch where anaerobic energy metabolism is used predominantly, affecting the performance of motor factors such as force, speed, quickness, balance, flexibility, muscular and cardiovascular endurance and coordination (8,3).

The fact that smoking is easy to obtain and the use of it is legal, which makes individuals addicted, it is considered to be valid for athletes (26). In a study, 14.1% of northern American aboriginal athletes (n = 156; mean age: 19.6 ± 7.4) were reported to smoke regularly.33 However, there are some studies showing that male athletes use cigarettes more commonly in the season break than in the season (35).

Smoking is an important risk factor for many lethal diseases, including chronic lung cancer. It can cause diseases such as respiratory diseases, cardiovascular diseases, type 2 diabetes, and hypertension. Research shows that smoking increases the risk of coronary heart disease by 2 to 4 times. Smoking can cause lung diseases, emphysema, and chronic bronchitis. Smoking opens a new door into diseases such as blood (acute myeloid leukemia), cervix, colon and rectum, and esophageal cancer (30).

During exercise, at the end of the interaction among respiratory ventilation, cardiac output, systemic and pulmonary blood flow, the metabolic needs of skeletal muscles should be met. The metabolic rate of the muscle increases 50 times, especially during heavy exercise (31). While a significant change in breathing volume and frequency occur during exercise; O2 consumption rate increases in maximal aerobic metabolism (28). The increase in the need for energy due to the work done results in the production of a significant number of metabolic by-products at the end of the accelerated muscle metabolism. One of these products is the reactive oxygen species, also known as free radicals formed by different biological mechanisms in the body (23).

While the maximal oxygen consumption corresponding to the effort during exercise is considered to be important in terms of performance, the physical and physiological characteristics of the wrestlers are important in terms of performance improvement and performance control (3). This research was carried out to investigate the effects of smoking on some blood parameters and respiratory functions in wrestlers.

METHOD

Into the study, Participants: To the study, 18 non-smoker wrestling athletes for at least 11 ± 500 years, studying at different departments at Muğla Sıtkı Koçman University Faculty of Sport Sciences, whose average age 20 ± 888, average height 177 ± 555, average weight 82 ± 777 kg; and 16 athletes smoking 15± 062 pieces of cigarettes in a day for averagely 3 ± 406 years, doing licensed wrestling at least for 11 ± 625 years whose average age 22 ± 000, height average 179 ± 375, weight average 86 ± 250; a total of 34 male individuals voluntarily participated in the study. Participants were informed about the study and signed an attendance form regarding that they were voluntary.

Data Collection Methods

The participants were subjected to height and body weight measurements, blood analysis and pulmonary function tests, respectively.

Measurements of Height and Body

The height measurements of the participants were measured with Holtain Limited brand size meter with a precision of 0.01 cm and body weights were measured with an Angel brand electronic scale with a precision of 0,1 kg.

Blood analyses

Blood samples of the participants were taken by a specialist in a private hospital and analyzed in the laboratory of the same hospital. White blood cells (WBC), red blood cells (RBC), hemoglobin levels (HGB), hematocrit (HCT), platelet (PLT), LDL cholesterol (LDL), HDL cholesterol (HDL) and triglyceride values were analyzed.

Pulmonary Function Tests

Pulmonary function tests were performed with MEC Pocket-Spiro USB100 spirometer. The participants were informed about the measurement rules before the test and the measurements were recorded three times and the highest values were recorded. orced Expiratory Volume (FEV1) in one second from respiratory parameters, forced vital capacity (FVC), peak expiratory flow (PEF), forced expiratory center flow rate (FEF 25/75), and forced expiratory volume per second to forced vital capacity (FEV1 / FVC) were used.

Data Analysis

The statistical analyses of the obtained data were done in SPSS 21.00 package program on a personal computer. In the data showing normal distribution, intergroup comparisons were made by Independent-Samples T Test and regression analysis was used to determine the effect of variables.

FINDINGS

Table.1: Descriptive Statistics of the Participants

	Variables	N	Minimum	Maximum	$\bar{X}$	Std. D.
Non Smokers	Age	18	18.00	22,00	20,88	1.231
	Height	18	168.00	186.00	177.55	6.491
	Weight	18	66.00	93.00	82.77	8.795
	Sporting Year	18	9.00	15.00	11.50	1.723
Smokers	Age	16	20.00	25.00	22.00	1.932
	Height	16	170.00	188.00	179.37	6.042
	Weight	16	72.00	109.00	86.25	12.635
	Sporting Year	16	9.00	15.00	11.62	1.707
	Smoking Duration	16	1.00	6.00	3.40	1.331
	Pieces in a day	16	10.00	20.00	15.06	4.057

Table.2: Comparison of Blood Parameters' Values of Smokers and Non-Smokers

Variables		N	$\bar{X}$	Std. D.	t	p
WBC 10*3/u L	Non-Smokers	18	7.82	1.595	.216	.830
	Smokers	16	7.71	1.290		
RBC 10*6/u L	Non-Smokers	18	5.25	.122	-3.771	.001**
	Smokers	16	5.76	.564		
HGB g/d L	Non-Smokers	18	15.54	.675	-.835	.410
	Smokers	16	15.78	1.007		
HCT %	Non-Smokers	18	47.06	3.091	-.134	.894
	Smokers	16	47.19	2.623		
PLT 10*/u L	Non-Smokers	18	264.11	44.880	-.220	.827
	Smokers	16	267.87	54.865		
LDL mg/dl	Non-Smokers	18	94.79	11.506	-1.511	.141
	Smokers	16	102.94	19.371		
HDL mg/dl	Non-Smokers	18	43.38	8.982	.704	.486
	Smokers	16	41.57	5.351		
TRIGLYCERIDE mg/dl	Non-Smokers	18	116.11	22.671	-1.930	.063
	Smokers	16	130.09	19.094		

P<0.05*.p<0.01**

There was a significant difference between the mean values of erythrocyte parameters of the participants (p <0.01). RBC values of non-smokers are higher than the non-smokers.

Table.3: Comparison of Participants' katılımcıların Respiratory Functions

Variables		N	$\bar{X}$	Std. D.	t	p
FEV1 (L)	Non-Smokers	18	4.99	.663	3.608	.001**
	Smokers	16	4.28	.485		
FVC (L)	Non-Smokers	18	5.27	.654	2.782	.009*
	Smokers	16	4.68	.610		
PEF (L/sn.)	Non-Smokers	18	8.96	.464	2.341	.026*
	Smokers	16	8.46	.778		
FEF25/75 (L/sn.)	Non-Smokers	18	129.00	14.840	5.806	.000**
	Smokers	16	103.75	10.700		
FEV1/FVC %	Non-Smokers	18	97.55	5.679	.271	.788
	Smokers	16	97.00	6.271		

*:p<0.05. **:p<0.01

There were significant differences between the mean values of the respiratory function of non-smokers and smoker participants ($p < 0.01$. $p < 0.05$). The average of FEV1. FVC. PEF and FEF 25/75 values of non-smokers were higher than the smokers. There was no significant difference between the FEV1 / FVC values of the participants ($p > 0.05$).

Table: 4. Regression analysis of the effects of smoking on blood parameters and respiratory function in participants

Model	R	R^2	SurplusR^2	Estimated Standart Error	Durbin-Watson
1	.935[a]	.874	.802	.22554	1.699

Independent Variable: Smoke
Dependent Variable: RBC. HGB. HCT. HDL. LDL. PCT. TRIGLYCERIDE. FEV1. FVC. PEF. FEF2575. FEV1FVC
The effect of smoking on blood and respiratory function values of the participants was 87.4%.

Table: 5. ANOVA Statistics about Variables

Model 1	Sum[2]	Std. D.	Average[2]	F	p
Regression	7.402	12	.617		
Surplus	1.068	21	.051	12.126	.000[b]
Total	8.471	33			

Independent Variable: Smoke

Dependent Variable: RBC. HGB. HCT. HDL. LDL. PCT. TRIGLYCERIDE. FEV1. FVC. PEF. FEF2575. FEV1FVC
There was a significant difference between the mean values of blood and respiratory function according to the smoking status of the participants ($p < 0.01$).

Table: 6. Coefficient Statistics about Variables

Coefficients[a]					
Model	**Non-Standart Coefficient**		**Standart Coefficient**	T	p
	B	Std. D.	Beta		
DependentVariable	-2.171	2.039		-1.065	.299
RBC	.833	.265	.339	3.141	.005
HGB	.211	.068	.352	3.132	.005
HCT	-.017	.018	-.095	-.931	.362
HDL	.012	.008	.182	1.464	.158
LDL	.002	.004	.075	.609	.549
PCT	.473	1.147	.048	.413	.684
TRIGLYCERIDE	.001	.003	.063	.513	.613
FEV1	-.024	.124	-.032	-.195	.847
FVC	-.356	.102	-.474	-3.495	.002
PEF	.139	.130	.179	1.070	.297
FEF2575	-.019	.003	-.657	-5.613	.000
FEV1FVC	-.016	.009	-.173	-1.790	.088

Independent Variable: Smoke

Smoking has a 33.9% effect on the RBC values on the participants. RBC values of smokers are higher than those who do not. Smoking has a 35.2% effect on HGB values. RBC values of smokers are higher than those who do not. Smoking has a 35.2% effect on HGB values. HGB values of smokers are higher than those who do not. Smoking has a -47.4% effect on FVC values. FVC values of smokers are lower than those who do not. Smoking has an effect of 65.7% on FEF25 / 75 values. FEF25 / 75 values of smokers are lower than those who do not.

DISCUSSION AND RESULT

In this study. which was conducted in order to investigate the effect of smoking on the blood parameters and respiratory function of the wrestlers. a statistically significant difference was found between the groups in terms of blood mean values ($p < 0.01$). RBC values of non-smokers were significantly higher than those who did not. In addition. HGB. HCT. PLT. LDL and triglyceride values of smokers were higher than non-smokers. while non-smokers had higher WBC and HDL values.

While studies have shown that chronic smoking causes an increase in platelet activation (11). MPV levels of smokers were significantly higher than non-smokers (20). In a study on Taekwondo athletes. it was reported that there was no statistically significant difference between the platelet. leukocyte. hematocrit and hemoglobin parameters in which the blood samples were evaluated before and after the camp (7). Asif Mohammad et al. investigated the effect of cigarette smoking on hematological parameters in 33-year-old Pakistani smokers and non-smokers. The study found that WBC. RBC. HGB and HCT values were higher in smokers than in non-smokers (4). Mashiko et al stated that no significant difference was seen in the study that they researched 20-day camp's effect on hematological parameters (22). In a study about increased red blood cell distribution range in healthy smoker individuals. Kurtoğlu et al. found that smoking has an important effect on an increase in HGB. HCT and RBC values (19.22). Ghezzi et al. Reported that smoking had a negative effect on lipid levels. and free radicals in cigarette changed lipid synthesis in lipid metabolism by targeting fatty acids (14).

The higher RBC values in smokers may be due to carbon monoxide present in cigarette smoke. Carbon monoxide is associated with Hb in red blood cells and leads to carboxyhemoglobin. Carboxyhemoglobin affects the oxygen level in the tissue catalyzing the bone and the bone marrow is activated to produce more red blood cells (25). In another study. it was reported that HCT and HB levels were higher in smokers. but this could compensate for the need for oxygen (2).

In this study. although there was a significant difference in the RBC values of the participants. the increase in the HGB values in favor of smokers being statistically significant can be explained with the number of the participants. LDL and TRIGLYCERIDE values of smokers were higher than the non-smokers (13). When the findings are compared with the literature findings; Although there were some opposing views. there was a statistically significant difference only between the RBC and non-smoker participants ($p < 0.05$); There was no statistically significant difference between WBC HGB. HCT. PLT. LDL. HDL and TRIGLYCERIDE values ($p > 0.05$). In this respect. the findings obtained from the study largely overlap with the literature findings.

Significant differences were found between the groups with respect to respiratory function values ($p < 0.01$. $p < 0.05$). FEV1. FVC. PEF and FEF 25/75 values of non-smokers are higher than those of the smokers (18). It was seen that there was no significant difference between the FEV1 / FVC values of the participants ($p > 0.05$).

In a study on non-smokers and non-smokers. FEV1. FVC. PEF and FEF25 / 75 levels of the smokers were significantly lower than the non-smokers (10). As a result of similar pulmonary function tests. it was found that smokers had lower respiratory functions than those who did not (34.21). In a study conducted on university students. while a significant decrease was observed in FEV1 and FEF 25/75 compared to non-smokers; smoking was found to cause mid-expiratory obstruction in young people (16).

Long-term smoking causes some physiological functions in the respiratory system (29). It causes oxidative damage in the lungs and other tissues through free radicals that are produced by the direct effect of radicals in cigarette smoke or by the production of macrophages and other leukocytes (9). The increased free radicals as a result of smoking cause a decrease in lung volumes and capacities in later periods (36). However. the relationship between smoking and respiratory diseases has been demonstrated by several epidemiological studies worldwide.32 Smoking for along term has caused many physiological conditions such as impaired lung volumes and capacities and cancer (6).

In this study. while it was observed that the pulmonary function values of the smokers were lower than those who did not ($p < 0.01$. $p < 0.05$). according to the results of pulmonary function tests applied to the participants. it was found that the lung volume and capacities of the cigarette smokers were lower than the non-smokers.

When the effects of smoking on the blood parameters and respiratory function were examined. it was found that there was a significant difference between the average values of blood and respiration according to the smoking status ($p < 0.01$). In the regression analysis. the RBC and HGB values of the smokers were found to be significantly higher. while the smoking status was found to have an effect of 35.2% on the RBC values of 33.9%. In addition. while the FVC and FEF25 / 75 values of the smokers were found to be significantly lower than those of the non-smokers. the smoking rate was found to have an -47.4% effect on for FVC and -65.7% for FEF25 / 75.

Carbon monoxide. one of the active substances found in cigarettes. replaces oxygen with hemoglobin and prevents the blood from carrying oxygen and leads to hypoxia in the tissues. 5Therefore. while there is a significant change in the volume and frequency of respiration during the exercise. it causes a rate in oxygen consumption (28). Sufficient hemoglobin is needed to maintain the maximal oxygen level equaled to effort in exercise. and respiratory insufficiency is among the conditions that elevate critical hemoglobin value (12). It may be considered that sporting performance will decrease due to the negativity caused by smoking in lung volume and capacities. In addition. increased HCT value due to RBC increase leads to increased blood volume while increasing the workload and on the athlete's heart in the same type of exercise. In this sense. performance loss is inevitable in the athlete.

In conclusion. it was determined that smoking in wrestlers has statistically significant but negative effects on some blood parameters and respiratory functions. For this reason. it is necessary to emphasize the importance of smoking in the wrestlers to ensure that both athletes and coaches demonstrate the required sensitivity.

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Perception of Trainers for The Athlete

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Abstract

The aim of this research is to determine the perceptions of the trainers in different sports branches on the athletes through metaphors. The sample of study consists of 72 trainers in different sports branches. For the collection of data in the study, "metaphor form" was prepared to determine the participants' views on the concept of athletes. In the metaphor form, the athletes were asked to complete the sentence of "*Athlete is like...; Because ...*" In this study, phenomenological design from qualitative research approaches is used. In the analysis of the data, content analysis technique was used. For the reliability of the analysis of the research data, the reliability coefficient was calculated between the participants and this value was found to be 93%. With the evaluation of the data, it was seen that the sports club members produced 32 metaphors. These metaphors were collected in 4 different categories. While the trainers were determined to develop metaphors most in the category of "*openness to development*" and "*value*" for the concept of athlete, these categories were followed by categories of "*responsibility*" and "*being hardworking*". The most produced metaphors of the trainers are *diamond, baby, sapling, bee, rough mine and gold*. Trainers often used live and tangible metaphors for the concept of athlete. Considering the data obtained, the participants pointed to the basic characteristics that should be in the ideal athlete. These characteristics represent a structure that has the capacity to develop and has a value and a sense of responsibility.

Keywords: Sports, Athlete, Trainer, Metaphor, Qualitative Research Method.

INTRODUCTION

Sport is the intense efforts to improve the physical and mental health of the individual, to fight within the dimensions of competition according to certain rules, to be excited, to be competitive, to be superior and to increase the power of success in the real sense and to increase it to the highest level in a personal sense(1). However, although it is carried out for many different purposes such as competition, pleasure, health, aesthetics, entertainment, game, advertising, propaganda, profession, science, leisure time, it is also important in terms of organizing personal and social relations. The basic element of sport is human. Therefore, it has become an indispensable social phenomenon in terms of whether it is to create a society with high productivity or to raise the young, creative and healthy youth of the future or to be a tool that can resist social segregation and alienation (2).

Nowadays, while increasing the sphere of influence on human life, sports is becoming more and more important in terms of place and importance in society. People who do sports in an individual sense develop in terms of physical and mental abilities. It is known that it strengthens the interpersonal social ties and socializes the individual in terms of its social aspect (3). It is possible to say that sportive activities contribute to the multi-faceted development of individuals. In particular, it is evident that it contributes to the development of personality structure of the individual, improves physical and mental health and contributes to display positive behaviors (4,5,6). Increased interest in physical activity and sport in recent years can be related to the positive contributions of sports to both body and mental health of the individual (7).

This growing interest in physical activity and sport has drawn attention to the importance of trainers who has the role of being an educator. It is because the trainer is an exemplary teacher for athletes, the person who demonstrates the good direction of influence on the team. At the same time, in addition to being a sociological person who implements effectively the training programs, which is prepared for the long run, to carry the athletes to success, and teaches athletes the life while implemeting the program, and s/he is also a person who is looking for new ways and methods to sustain the development of sports and athletes (8,9). In

short, trainers are important keystones in the development of sports and athletes. It is surely beyond doubt that for the trainers, the athletes are like a mine to be processed. There are many acquisitions that a good trainer can offer to the athlete and/or athletes. After a certain point, this process acquires a mutually continuity. For this reason, the point of view of trainers to athletes is important for opening a correct communication channel.

In the research, metaphors were produced in order to provide a different perspective on the concept of "athletes". Metaphor is an analogy that defines an object by imagination with the help of another object (10).

When the literature is examined, it is observed that metaphors related to many concepts are produced (11,12,13). However, while the number of studies examining the metaphors related to the concept of sports is limited (14,15,16), there is no research about the metaphors related to the concept of athlete. In these studies carried out with different sample groups, sports and sports branch concepts were examined through metaphors. However, a research conducted on the concept of athletes and trainers who have a very important role in the sport is not present in the literature. In this context, the aim of the research is to express the concept of athlete from the point of view of the trainers. For this reason, the research is important in order to fill the gap in the relevant field literature, to determine the opinions of the stakeholders involved in sports for the concept of athlete and to enable the trainers to express their opinions about the concept of athletes in a detailed manner.

MATERIALS & METHODS

In this study, phenomenological design, one of the qualitative research methods, was selected. The sample of this study conducted in 2019 consists of 72 trainers working in different sports branches (tennis, gymnastics, basketball) in Ankara. The study group was selected through criterion sampling method according to purposeful sampling method. In this context, the criteria such as the fact that the trainers are still working and willing to participate voluntarily were taken into consideration.

In this study, data were collected with semi-structured interview form which is used very frequently in metaphor studies(17,18,19). At this point, the trainers were asked to indicate and explain a metaphor describing the athlete. The trainers were asked to complete the sentence of "Athlete is like...; Because..." and as a result, it was determined that only one metaphor was specified by the participants and the explanations of these metaphors were made.

Data analysis is the process of exporting the meaning of data. In other words, it consists of statements of the participants and the combination and interpretation of what the researchers has seen and read (20). Therefore, in the data analysis of this study, numbers from 1 to 72 were first given to papers. Data were analyzed by content analysis method. Content analysis is the categorization of data (21). Content analysis was carried out in 8 stages. These are (1) examination of forms and elimination of inappropriate forms, (2) recompilation of forms, (3) numbering forms (4) examination of metaphors, (5) development of categories, (6) the stage of providing validity and reliability, (7) calculation of frequencies of obtained metaphors, and (8) interpretation of metaphors (22,23,24).

In the first stage, the trainers' expressions were investigated and whether there were any blank parts or not was examined in general and there was no form with missing part. *In the second stage*, the metaphors in the forms were listed and tabulated. *In the third stage*, the numbering from P1 to P72 was made after organizing the metaphors according to their frequency. *In the fourth stage*, the metaphors were re-examined. *In the fifth stage*, the metaphors for the concept of athlete were examined in terms of their common features. As the metaphors stated by the trainers were emphasized in a way that they could be included in several categories at the same time, the metaphors were placed in the relevant categories according to the trainers' statements.

The sixth stage is about the reliability and validity. In this stage, the process of analyzing the data obtained from the trainers and how the codes associated with the categories were directly presented to the reader with the trainers' statements. In the research, samples of trainer views were selected and included in the findings section (25). In order to ensure the reliability of the study, data were analyzed by 3 field experts and the results of the analysis were compared. In the reliability of data analysis, the formula developed by Miles and Huberman in 1994 was used. A total of 32

metaphors were produced and on 2 metaphors (*machine, work*) there were a dissensus. The mean reliability of the encoders was found to be 93% [30/(30+2)x100=93%]. According to these results, the research has the desired reliability level (26).

In the 7th stage, the distribution and frequency of metaphors developed by the trainers were calculated and the findings obtained were interpreted *in the last stage*.

FINDINGS

This section includes the metaphors of the participants working as a trainer in different sports branches, the categories and explanation examples.

Table 1: The Metaphors Developed by the Trainers for the Concept of Athlete

Metaphor Order	Metaphor Name	f	Metaphor Order	Metaphor Name	f
1	**Diamond**	9	18	**Child**	1
2	**Baby**	6	19	**Raw materials**	1
3	**Sapling**	5	20	**Statue**	1
4	**Bee**	5	21	**Dough**	1
5	**Rough Mine**	4	22	**Structure**	1
6	**Gold**	4	23	**Iron**	1
7	**Seed**	3	24	**Work**	1
8	**Ant**	3	25	**Ore**	1
9	**Tree**	3	26	**Aged Wine**	1
10	**Garden**	3	27	**Private Individual**	1
11	**Plant**	2	28	**Father**	1
12	**Coal**	2	29	**Waiter**	1
13	**Treasure**	2	30	**Lion**	1
14	**Staff**	2	31	**Responsible Individual**	1
15	**Manager**	2	32	**Machine**	1
16	**Parrot**	1			
17	**Paper**	1		**TOTAL OPION**	72

When Table 1 is examined, it is seen that the trainers produced 32 different metaphors for the concept of "*athlete*" and stated 72 opinions for this. *Diamond (32), Baby 68), Sapling (5), Bee (5), Rough mine (4) and Gold (4)* metaphors were the most stated metaphors. It is thought that according to frequencies, most of the metaphors are towards the fact that athletes are the individuals who are open to innovation and development. When the metaphors developed by the trainers in relation to the athlete concept are evaluated together with their explanations, the classification as four categories is shown in Table 2.

Table 2: Distribution of Metaphors Developed by Trainers according to Categories

Categories	Number of Metaphor (f)	%
1. Openness to Development	16	50,00
2. Value	7	21,87
3. Responsibility	6	18,75
4. Being Hardworking	3	9,37
TOTAL	32	100.0

According to Table 2, trainers indicated the metaphors under four categories for the concept of athletes. These categories are openness to development (16-50.00%), value (7- 21.87%), responsibility (6% 18.75) and being hardworking (3% 9.37%).

Table 3: Metaphors of the Category of "Openness to Development" and Explanations

Category	**Number of Metaphor (f=16)**
1. Openness to Development	Baby (6), Sapling (5), Rough mine (4), Garden (3), Tree (3), Seed (3), Plant (2), Coal (2), Parrot (1), Paper (1), Raw Material (1), Statue (1), Dough (1), Structure (1), Iron (1), Child (1)

Quotations from the description examples of trainers;
Baby; The athlete grows in the hands of a trainer, and if the trainer begins training the athlete from an early age, he keeps the athlete's technique, thoughts and all life in his hands (P20).
Sapling; When it is in the hands of a gardener who knows how to grows it well, it becomes a century-old tree (P23).
Rough mine; Its value increases as it is processed (P35).
Seed; You plant the seed in the field, you water it, you grow it and you get a product. You reach many people with your product (P18).
Parrot; The more his owner is interested in it, the more words it learns (P2).

When the total of 16 metaphors and explanations stated in the "*openness to development"* category in Table 3 are examined, it is understood that the participants stated that the trainers are an important element in training the successful athletes, emphasizing the aspects of the athletes that are open to continuous development.

Table 4: Metaphors of the Category of *"Value"* and Explanations

Category	Number of Metaphor (f=7)
2. Value	Diamond (9), Gold (4), Treasure (2), Ore (1), Aged Wine (1), Work (1), Private Individual (1)

Quotations from the description examples of trainers;
Diamond; It is very valuable (P37).
Gold; It never loses value (P44).
Aged wine; Over the years, its value increases (P47).
Treasure; It is sought everywhere but it is revealed difficultly (P55).

As shown in Table 4, a total of 7 metaphors are mentioned in the "*value*" category for the athlete concept. As stated in the explanations, it is understood that participants developed metaphors for athletes' characteristics of being a privileged and valuable individual.

Table 5: Metaphors of the Category of *"Responsibility"* and Explanations

Category	**Number of Metaphor (f=6)**
3. Responsibility	Manager (2), Personnel (2), Father (1), Waiter (1), Lion (1), Responsible Individual (1)

Quotations from the description examples of trainers;
Manager; Just as the manager has responsibilities to the organization and its employees, the athlete has responsibilities towards himself, his family, his trainers and the community (P61).
Personnel; S/he has responsibilities for the workplace where he works (P57).
Father; He sacrifices his own life and is responsible to his family and children. This is the case for the athlete (P56).
Lion; He has responsibilities for protecting his/her living space and is aware of this (P62).

As shown in Table 5, a total of 6 metaphors are mentioned in the category of "*responsibility*" for the concept of athletes. As stated in the statements, it is understood that the participants emphasize that the athletes are responsible especially to themselves and also their families, their trainers and even society.

Table 6: Metaphors of the Category of *"Being Hardworking"* and Explanations

Category	Number of Metaphor (f=3)
4. Being Hardworking	Bee (5), Ant (3), Machine (1),

Quotations from the description examples of trainers ;
Arı; While working, it makes honey and produces something (K64), it is hardworking and does its works day to day (P65).
Ant; It works for something constantly until it dies (P69).
Machine; Athletes are also working like machine (P72).

As shown in Table 6, a total of 3 metaphors are mentioned in the category of "*being hardworking*" regarding the concept of athletes. As it is understood from the explanations, it is understood that the participants emphasized the athletes' characteristics of being hardworking by likening them to bees and ants which are the most hardworking animals.

DISCUSSION & CONCLUSION

In this study, it was aimed to determine the emotions and thoughts of the participants, who are training in different branches, by means of analogy. According to the data obtained, the perceptions of the participants about the concept of athlete were interpreted.

It was concluded that participants produced a total of 32 metaphors related to the concept of athletes. These are the categories of *openness to development, value, responsibility and being hardworking*. A total of 16 metaphors were identified in the category of "*openness to development*". From the statements, such as: *He is like a Sapling, when it is in the hands of a gardener who knows how to grows it well, it becomes a century-old tree, it is like a Rough mine, its value increases as it is processed, it is like a Seed, you plant the seed in the field, you water it, you grow it and you get a product. You reach many people with your product,* it is seen that how important the trainer is in the career development of an athlete. The trainer is the person who tries to make the athlete work in unity and solidarity within the team[27]. S/he takes on the role of a craftsman for the development of the athlete. S/he plans and works in order to bring the athlete step-by-step to the targeted level within a certain process. The athlete is aware of this process and walks on the same path with his trainer to achieve his goal. The process is focused on process development through this communication channel maintaining mutually. In this context, it can be stated that trainers are an important building block when considering the development of athletes. When the studies carried out in the near disciplines are examined, it is seen that metaphors are produced under the theme of openness to development in the studies in which there are facts similar to the trainer and athlete relationship. In their study, with the theme of informative and formative teacher[28], Yılmaz, Esentürk, Tekkurşun-Demir & İlhan (2017) with the development provider theme[29], Demirtaş & Çoban (2014) with the theme of changing/ developing instructors emphasized that the participants produced metaphors about the fact of openness to development and stressed the importance of development in the educational process[30].

It is seen that participants produced 7 metaphors in the "*value*" category for the athlete concept. These metaphors formed the relevant category with the statements such as; *It is like a diamond, it is very valuable, it is like Gold, it never loses its value, it is like the aged wine, its value increases over the years, it is like the treasure, it is sought everywhere, but it is revealed difficultly*. From the analogies of valuable ores for the concept of athlete, it can be stated that the concept of athlete is a valuable fact for the trainers. In the literature, Demirtaş & Çoban (2014) determined also in their studies that the participants produced metaphors such as *Flower Garden, Angel, Mevlana and Daffodil* under the theme of value[30]. Another category that emerged according to the research results is the category of "*responsibility*". A total of 6 metaphors were produced in this category. Statements for the metaphors in the relevant category, such as; *s/he is like Manager, just as the manager has responsibilities to the organization and its employees, the athlete has responsibilities towards himself, his family, his trainers and the community, s/he is like a Personnel, s/he has responsibilities for the workplace where he works, s/he is like a father, he sacrifices his own life and is responsible to*

his family and children, s/he is like a Lion, he has responsibilities for protecting his/her living space and is aware of this, reveal the necessity of the acquisition of responsibility among the characteristics of the athletes as a duty when the athletes are evaluated with the point of view of the trainers..

The last category that the participants produced for the athlete concept is the category of "*hardworking*" and a total of 3 metaphors were produced. With metaphors, there are statements such as; *S/he is like a bee, it makes honey while working, produces something, s/he is like an ant, s/he works for something continuously until its death, s/he is like a machine, athletes work constantly like a machine*. When the metaphors produced by the participants in the relevant category were examined, it was revealed that the athletes should have a characteristic such as being hardworking. This is because the athlete must achieve a continuous rhythm of work in order to achieve a determined career goal. Otherwise, the temporary achievements will remain in the shadow of the targets. It is important for the trainers to draw attention to this issue in order for athletes to determine the parameters to be taken into consideration while aiming their own development. However, in the summer of the field, determined that the theme of being hardworking were revealed among the metaphors produced, and that being hardworking was important when dealing with a parameter related to the educational process[31,32].

As a result, trainers tried to express the concept of athletes with a different perspective through the metaphors they produced. Considering the data obtained, the participants pointed to the basic characteristics that should be in the ideal athlete. These characteristics represent a structure that has the capacity to develop and has a value and a sense of responsibility. It is possible to say that the characteristics stated are the acquisitions that each trainer demands from the athlete to have. In this context, the research described the characteristics, which the ideal athlete should have, with the point of view of the trainers. In addition, the most striking descriptions of the coaches for the concept of athletes were in the development parameter. They defined the concept of athlete as a phenomenon that developed through an accurate training process. However, in the studies to be carried out, it is recommended to plan metaphor studies for the concept of athlete from the point of view of all the stakeholders involved in the sport.

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Problems That Teachers Coincide with in Physical Education Lessons Who Changed Classroom Teaching Branch to Physical Education Teaching

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Abstract

The purpose of this study is to determine the problems faced by teachers in physical education lessons who pass from classroom teaching to physical education teaching. Interview technique, which is one of the qualitative research methods, was used in the research. The research group consisted of teachers who passed from physical education teaching to physical education teaching branch and working in various districts of Konya in the 2018-2019 Academic Year (n = 12 male, n = 1 female). "Personal Information Form" and semi-structured "Interview Form" developed by the researchers were used as data collection tools. The data were evaluated by content analysis method. As a result of the research, it was found out that classroom teachers who had to pass to physical education teaching by changing the field had to deal with many problems.

Key words: Classroom Teacher, Physical Education Teacher, Field Change, Problem

INTRODUCTION

Physical education lessons and sports activities affect the physical, mental, social and spiritual development of children. Therefore, physical activities are important not only for those with talent, but for the development of each individual. Providing a healthy lifestyle and guiding students in education is one of the main duties of not only physical education classes but also the school (28). However, physical education programs are limited by external factors such as school policies, parental safety and compliance rules, physical environmental conditions (8). However, in addition to inadequate materials and opportunities in physical education teaching, professional development opportunities not provided to teachers affect both physical education courses and other physical activity programs of the school (30). As a result of all these, physical education lessons continue to lose importance in school programs. In fact, it is increasingly important for physical education teachers to provide physical activity opportunities to children (29).

With the Law No 6287 dated 30.03.2012 and Law on the Amendment of Certain Laws in Primary Education and Education Law 4 + 4 + 4 compulsory education system has been introduced since the 2012-2013 academic year and this system causes nearly one-fifth of classroom teachers to fall into the norm. Although the Ministry of National Education has taken some measures, it has not prevented thousands of classroom teachers from surpassing the norm. The Ministry, which could not prevent the excess of norms in the field of classroom teaching, announced that classroom teachers could switch to their side areas if they wanted (18). In accordance with the opinion of the Ministry of National Education Board of Education and Training numbered 5110 dated 12.09.2012 and numbered 80 dated 07.07.2009, with this expression in the diploma of graduates for the classroom teachers they are entitled to pass to another branch; "it has been assigned to another field other than the field of graduation, the education constitutes a resource for more than one field and teachers who have completed higher education in a field other than the field will be able to apply for field change" (24).

The right to choose a side department, which is given to classroom teachers, has brought some problems both for themselves and their students. During their undergraduate education, it is inevitable that classroom teachers, who cannot be adequately educated and specialized about their subordinate fields, will coincide with many problems such as not being able to be experted for

related content, appropriate methods and techniques and the experience specific to the field as they are educators of a different discipline (10).

The purpose of this study is to determine the problems coincided by teachers in lessons who pass from classroom teaching branch to physical education teaching.

MATERIAL AND METHOD

Research Model

The Interview technique, which is one of the qualitative research methods, was used in the research. According to Merriam (2018), the point to be considered in qualitative research is to see events from the participant's window, not from the researcher's point of view. In the research, action research design, one of the qualitative research designs, was used. There is a tolerable feature in action researches. It is important that the researcher be close to the data and know the process closely. Except from this, it is possible to work for a long time in a specific process and to collect data on the problem being focused on. Thus, developments, changes and interactions with participants in the environment can be understood in detail and deep (32).

Research Group

The research group consisted of teachers who switched from physical education teachers to physical education teachers working in various districts of Konya in the 2018-2019 Academic Year, which was determined by purposive sampling method (23), which is one of the most probable sampling strategies used in qualitative research (n=12 Male, n=1 Female). Purposeful sampling methods have emerged within the qualitative research tradition and are among the most commonly used methods (32). This method is based on the assumption that the researcher wants to explore, understand, gain insight and that a selection of a sample from which most things can be learned is compulsory (23).

Data Collecting Tools

In this research, "Personal Information Form" and semi-structured "Interview Form" developed by the researchers within the scope of the research were used as data collection tools. In semi-structured interviews, questions are asked to the participant in a systematic and coherent order, but researchers have the freedom to go beyond them. For example, researchers can shorten the answers to the questions and ask the participants additional questions to deepen the content of the answers. Interviewing is a very effective method for gathering information for certain types of research as well as basing data on certain assumptions (3).

In the "Personal Information Form", which was prepared to collect qualitative data, contains 3 questions related to the duration of primary school teaching, physical education teacher service and gender independent variables. And in the semi-structured "interview form";

1. What would you like to say in order to teach the physical education course adequately and efficiently?

2. As a teacher who has been a classroom teacher for many years, can you explain your thoughts about how you feel during the physical education course?

3. What kind of problems do you encounter with school administration, teachers, students and parents in physical education classes?

three open-ended questions given as above.

Analysis of the Data

The data were evaluated by content analysis method. In content analysis, researchers examine communication products. In general, these are written documents or communication data recorded with technological systems. In an expanded sense, content analysis is a research method used to make repeatable and valid inferences from texts or other meaningful content to contexts of use (19).

According to Miles and Huberman (1994), the reliability of the content analysis method depends on the coding process. The most crucial stage of this process is to identify and clearly define themes. It is necessary to calculate the correlation between the results obtained by giving the interview data set to different researchers at a single time (31). In this frame, the data set, which was made into a written document, was given to another expert except the researchers and the correlation between the results gained from these three experts was calculated.

The reliability of the data was calculated by using Miles and Huberman's (1994) 'consensus theme / consensus + dissensus theme x 100' formula (31).

The result of formula is expected to be 70% and above. From the 32 codes which were proposed by three experts, 28 were approved, and 28 / 32x100 = 87.5 consensus was reached on the suitability of the codes. Over the 4 codes which there cannot be consensus built on are combined with other suitable codes.

RESULTS

Table 1. The Distribution Depending on Classroom Service Duration, Physical Education Teacher Service Duration, Gender and Interview Dates of Teachers who are Passing from Classroom Teaching to Physical Education Teaching Branch

Codes of participants	The duration of classroom teaching	The duration of physical education teaching	Gender	Interview dates
T1	17	6	Male	26.11.2018
T2	17	6	Male	26.11.2018
T3	16	6	Male	26.11.2018
T4	19	6	Male	27.11.2018
T5	19	5	Male	27.11.2018
T6	17	6	Male	27.11.2018
T7	18	5	Male	28.11.2018
T8	19	6	Male	28.11.2018
T9	17	6	Female	28.11.2018
T10	16	6	Male	29.11.2018
T11	18	5	Male	29.11.2018
T12	18	5	Male	30.11.2018

When Table 1 considered, the participants were given the codes T1, T2, T3, which are abbreviated by the teacher, in terms of the duration of classroom teaching, 2 participants for 16 years, 4 participants for 17 years, 3 participants for 18 years and 3 participants have done classroom teaching profession for 19 years. In terms of the duration of physical education teaching, 4 participants worked for 5 years and 8 participants for 6 years; In terms of gender, 1 participant is female and 11 participants are male.

The results belong to the participants' thoughts about adequate and efficient teaching of physical education course are given in Table 2.

Table 2. Results on Participants' Thoughts on Adequate and Efficient Teaching of Physical Education Lesson

Themes	Frequency (f)	Percentage (%)
Lesson Hours can be Increased	2	10.6
Diversification of Activities	6	31.6
Spreading of Small Scale Schools	1	5.2
Performing out the Job with Love and Feeling of Conscience	2	10.6
Lack of Field Substructure and Material	6	31.6
Students Should be Cared According to Their Level of Skills	1	5.2
In Popular Sport Branches Students Should be Informed	1	5.2
Total	19	100

When Table 2 is examined, one of the most frequently mentioned situations in the participants' thoughts about adequate and efficient processing of physical education course was the theme of "Lack of Field Substructure and Material". This theme is quoted as:

"… There are problems as material. So you don't have a ready field, you don't have a ready working area, you need a ball and you can even hardly have it. Because of the shortcomings, we can't be enough. For example, you will make them to somersault, but you do not have a cushion, play ball, but no ball ... There are many lackings, so you can not be sufficient…" (T6)

One of the most frequently mentioned situations was the theme of "Diversification of Activities". This theme is quoted as:

"In other words, we teach our first lesson topic without boring the students. Lesson 2 is an activity with them, so that the lesson will be more productive and fun… In other words, these things need to be diversified and applied in order to make the students entertain and to spend time in the lessons efficiently…" (T4)

One of the cases that the participants mentioned in the second frequency was the theme "Lesson Hours can be Increased". This theme is quoted as:

"…… You are trying to succeed in a class of 30 people in a 2-hour class a week, trying to make 6-7 themes in 2 course hours. You're having a hard time for learning outcome. That's why I think that lesson hours should be increased just like in European countries." (T9)

The second most frequently mentioned situation of the participants was the theme of "Performing out the Job with Love and Feeling of Conscience". This theme is quoted as:

"… As a matter of conscience, we can find the truth... I do not think that some teachers who have graduated from the department of physical education teachers work in schools as much as we do.... Some of them sit on the chair and by giving a ball and saying, Get this ball and play." (T3)

One of the situations that participants expressed at least frequently was the theme of "Spreading of Small-Scale Schools". This theme is quoted as:

"… Our school is crowded. For this reason, we have problems in terms of practice... At the same time 4-5 classes are having physical education lessons in the garden.... One hour lesson is being taught with about 200 people. If there was a smaller school, the course would have been more productive…" (T2)

One of the situations that the participants expressed at least frequently was the theme of "Students Should be Cared According to Their Level of Skills". This theme is quoted as:

"Physical education is a skill course… Not everyone can do the same level of certain movements and you can't get the same efficiency… I'm having a hard time here... For instance talented or not we care for the children privately and develop their levels…" (T7)

One of the situations that the participants expressed at least frequently was the theme "In Popular Sport Branches Students Should be Informed". This theme is quoted as:

"…I believe that physical education teachers should actively give children something in the popular and universal branches orum I believe that these branches should at least teach the rules… At least in the physical education lesson, there should be information given about popular sports..." (T11)

The results of the participants' thoughts about how they felt when they were teaching physical education lesson as a classroom teacher for years were given in Table 3.

Table 3. Results Related to Participants' Views on What They Feel When Teaching Physical Education Lesson as a Classroom Teacher for Years

Themes	Frequency (f)	Percentage (%)
Pleasure Happiness and Excitement	9	56.25
If You Love Students It Does not Matter	2	12.5
Expectations are Too Much	1	6.25
Classroom Teaching is So Different	2	12.5
Insensitivity to Physical Education Lesson is Upsetting	2	12.5
Total	16	100

When Table 3 is examined, the most frequently mentioned situation in the participants' thoughts about how they feel when they teach physical education lesson as a teacher who has been a classroom teacher for many years was the theme of "Pleasure Happiness and Excitement". This theme is quoted as:

"… Being a physical education teacher is more enjoyable. Children come to class willingly... As I see a change in children, they play in collaboration and I see that they are a little disciplined, I am happy, I enjoy and it gives me pleasure." (T12)

One of the second most frequently mentioned cases was the theme "If you love students, it does not matter." This theme is quoted as:

"… There is only a difference in teaching of the lesson. On the other hand; teacher psychology, student psychology, the relationship between teacher and student are the same. So there is nothing changing... Whether you are a class teacher or another branch teacher, it is the same to me after you love the child." (T2)

The second most frequently mentioned situation was the theme of "Classroom Teaching is So Different". This theme is quoted as:

"In general, I got more pleasure from primary school classroom teaching... because what makes me happy as an educator is when I get back from the children. Of course I enjoy playing football or playing volleyball among children in physical education classes, but nothing can replace classroom teaching..." (T8)

The second most frequently mentioned situation by participants was "Insensitivity to Physical Education Lesson is Upsetting". This theme is quoted as:

"… The insensitivity and indifference of both children and families to physical education lessons affect us a lot…" (T10)

The least frequently mentioned situation was the theme of "Expectations are Too Much". This theme is quoted as:

"… In the field of physical education, expectations are much higher than classroom teaching. The demands of students and administrators and the necessity of performing well in inter-school tournaments are exhausting us…" (T3)

Table 4 presents the results of the participants' opinions about what kind of problems they coincide with school administration, teachers, students and parents in physical education lessons.

Table 4. Results Related to Participants' Views on What Problems They Have Encounter with School Administration, Teachers, Students and Parents in Physical Education Lessons

Themes	Frequency (f)	Percentage (%)
There is a Prejudice that Physical Education Lesson will Decrease Academic Success	6	15.4
Physical Education Considered as an Unimportant Branch	7	17.9
There is a Discrimination Between Branches	2	5.1
There Should be Support Provided	3	7.7
There is Always a Success Expected	1	2.6
Clothing and Gender Issue is a Problem	2	5.1
There is No Problem	8	20.5
It is Important for the Administration to Love Sports	2	5.1
Opportunities Provided by State Limited	2	5.1
Students who do not Take Pleasure are Indifferent towards Lesson	2	5.1
There is an Impression like a Teacher Providing Discipline	1	2.6
Student Profile is Problematic	1	2.6
Administration does not want Participation to Activites What If Lessons Pass Empty	1	2.6
In a Bad Situation Guilt is Yours	1	2.6
Total	39	100

When Table 4 is examined, the most common situation that the participants in their thoughts about what kind of problems they encounter with school administration, teachers, students and parents in physical education classes was the theme "There is No Problem". This theme is quoted as:

"I didn't usually have problems with other teachers and the school administration. They provided what we wanted... Parents also want children to do sports... So we have no problems…" (T6)

The second most frequent situation of the participants was the theme of "Physical Education is Considered as an Unimportant Branch". This theme is quoted as:

"… Physical education is seen as a fatigue duty. They think we give the kids a ball and say lets play. This is really sad…" (T5)

The third frequent expressed situation by participants was the theme of "There is a Prejudice that Physical Education Lesson will Decrease Academic Success". This theme is quoted as:

"The school administration recently does not want exams, especially tournaments. Parents have the idea that my child lags behind the lessons... The idea that sports affects academic success prevails…" (T1)

The fourth most frequent situation of the participants was the theme "There Should be Support Provided". This theme is quoted as:

"… The school administration and parents need to be supported. I think that the parents should register their children in any branch and the school administration should open courses… Children love physical education very much. No one provides the necessary support on these issues." (T2)

One of the situations that the participants mentioned frequently was "There is Discrimination Between Branches". This theme is quoted as:

"… The perspectives of school administration on other branches differ from the perspectives on physical education. For example, at the weekends, physical education courses are not offered while other courses are opened. To me this is a discrimination..." (T4)

The fifth most frequently mentioned situation was the theme of "Clothing and Gender Issue is a Problem". This theme is quoted as:

"…Boys don't have much trouble, but girls do. Particularly in the conservative parent profile, we find it difficult to get our girls into competitions…" (T5)

The fifth most frequently mentioned situation of the participants was the theme "It is Important for the Administration to Love Sports". This theme is quoted as:

"… If the school administration is prone to sports and sports activities, our work is better, but if there is a little away from sports activities, there are problems…" (T4)

The fifth most frequently mentioned situation of the participants was the theme of "Opportunities Provided by State Limited". This theme is quoted as:

"… The state does not have a grant for schools to use in sports activities... The conditions of our schools are already limited. This is really a serious problem..." (T9)

The fifth most frequently mentioned situation of the participants was the theme of "Students who do not Take Pleasure are Indifferent towards Lesson". This theme is quoted as:

"…Physical education is actually a popular lesson for students, but it doesn't show much interest in children who are not talented. Teacher is it ok if I do not get dressed, teacher is it ok if I study, is it ok if do not do somersault, teacher I can not do this movement, such situations are really problem…" (T7)

One of the situations that participants expressed at least frequently was the theme of "There is Always a Success Expected". This theme is quoted as:

"First of all, the school administration expects success of course in inter-school tournaments. In this tournament's making degrees are tensing us of course…" (T3)

One of the situations that the participants expressed at least frequently was the theme "There is an Impression like a Teacher Providing Discipline". This theme is quoted as:

"… School administration and other teachers look at us as discipline provider… I mean it's like we're the only one…" (T7)

Another topic that participants expressed at least frequently was the theme of "Student Profile is Problematic". This theme is quoted as:

"… The student profile is extremely troubled... There are students who have never corrected their behavior. We have problematic students from adolescence. We are coincide with many different student profiles…" (T9)

One of the situations that the participants stated at least frequently was the theme "Administration does not want Participation to Activites What If Lessons Pass Empty". This theme is quoted as:

"… When we go to the inter-school competitions, the classes of our classes are empty and the lesson is not handled by the school administration. They don't want to send us to competitions anymore..." (T11)

At least one of the situations that the participants expressed at least frequently was "In a Bad Situation Guilt is Yours". This theme is quoted as:

"… Parents blame you of a possible bad situation during class. You are guilty as a result of foot sprains or any injuries…" (T12)

DISCUSSION AND CONCLUSION

In the Table 2, participants' thoughts about adequate and efficient processing of physical education lesson, it is stated that there are open areas and lack of materials in the gym or the areas where sports can be done. It is determined that there is a profession that needs to be done, that small-scale schools should increase in order to be more interested in students, that each student should be given special attention according to their abilities and universal sports branches should be taught to the students. These results point out that the teachers who have moved from physical education to physical education branch once more express the lack of sports facilities and equipment, which are frequently brought up for physical education classes, and think that physical education course hours should be increased and each student should be individually cared for, as in many other countries. Although they later moved to the physical education branch, it can be said that they point out the importance of doing every job with a feeling of love and conscience. Barnes (2002) found that the support of school equipment and equipment was important for changing the attitudes of classroom teachers towards physical education course. Güven and Yıldız (2014), Çiçek (2008) and Kangalgil (1999) determined that the most important problems faced by classroom teachers in physical education courses were sports facilities and equipment. McMullen et al. (2014) found that classroom teachers preferred easy-to-manage, fast, academically focused and fun activities for students.

In the Table 3, participants' ideas about how they felt when they were teaching the physical education course as a teacher who had been a classroom teacher for many years showed that they were happy and motivated in the process of physical education course, and that it was not important to which branch they were teachers, physical education and school management. They stated that they do not care, they miss classroom teaching and that classroom teaching has a different place and that school administrators and students have great expectations from them as physical education teachers. These results can be interpreted as the teachers who switch from classroom teacher to physical education branch enjoy while they are carrying out the lessons but they have difficulty in understanding the expectation of success in inter-school competitions despite having a negative point of view towards physical education course. Doğan (2000) found that the majority of classroom teachers love physical education. Contrary to the findings of the research, Arslan (2008) determined that almost half of the classroom teachers do not want to teach physical education lesson.

Besides, it can be said that physical education teachers can never replace classroom teaching it is because they cannot see the expected development of students through physical education lessons. The reason for this situation is that they do not have sufficient knowledge to teach physical education course. It can also be said that they preferred to change the field in order not to fall into the excess of norm in their schools during the period they worked as classroom teachers and to come to the more central schools they wanted. Yet, it cannot be said that classroom teachers willingly and fondly switched to physical education teaching. Cihangir (2017) has indicated out that the assignment status, the excess of norms, the possibilities of the area to be transferred and the value given to the branch teacher are higher as the reason for the transition from classroom teaching to secondary areas. Ersözlü et al. (2014) stated that they made field changes due to reasons such as lack of norm staff, priority in appointments, getting rid of the lesson load, and providing prestige. Kaya et al. (2013) specified that the teachers were moderately satisfied and the reason for dissatisfaction was the lack of knowledge of the field. Among the reasons for changing teachers' spouses, spousal status and avoiding being a surplus norm come first. Erdoğan (2014) found that the main area of competency perceptions of teachers who switched from classroom teacher to physical education teachers was lower than those of physical education teachers. Yıldız (2010) and Morgan and Hansen (2007) found that classroom teachers could not do physical education classes efficiently and adequately. Çıldır (2019) determined that classroom teachers themselves were insufficient for physical education and that this course should be taught by physical education teachers.

In Table 4, the participants' thoughts about what kind of problems they encounter with school administration, teachers, students and parents in physical education lessons; they did not have any problems, physical education was seen as an ignored and unnecessary course, physical education lesson affected students' academic success by affecting other courses. There is not enough support to the physical education course and discrimination is made when compared with the other courses, the

parents cause problems regarding the girls' going to the competitions, that the school administration's perspective is important in the provincial and regional competitions; the school administration's expectations of success in the inter-school competitions create stress. Moreover, they are dealing with problematic students due to adolescence, the lessons of empty passes with the concern that the school administration does not think warm to go to competitions, stated that they become guilty in all kinds of negativity in the lessons. These results show that although teachers who have moved from physical education to physical education have no problems in general, physical education is seen as an unimportant lesson, parents think that their children negatively affect their children's other courses, and they are always seen as a second class. It can be commented that there is no support for the development of the state, school administration, parents' physical education course and sporting activities. Faucette and Patterson (1989) found that classroom teachers stated that physical education was not considered as important as other subjects.

Considering that the classroom teachers who do not have any in-service training after changing their branch, they should either be returned to classroom teaching or have a comprehensive education and should be checked frequently. Many studies were found that classroom teachers need comprehensive training for physical education courses (20; 26; 11; 14). In addition, Yıldız (2010), Humphries and Ashy (2002), Pehlivan et al., (2003) and Jones (1999) stated that the physical education courses in the classroom teacher training programs were insufficient.

Field change has led to major problems in country education. The only way to correct this situation is to make the class teachers who made the field changes return back to their own branches. Ersözlü et al. (2014) stated that the problems they face in their new branches are inadequate knowledge in the field, classroom management problems and discipline, inability to adapt to adolescent students, and operational differences in school management. Özer et al. (2013) found that a significant number of classroom teachers who passed to their sub-fields felt more competent in classroom teaching. Gökyer (2014) stated that the teachers who made the change in the field took a few hours of specialization in the university years and those who passed to these fields caused poor quality in education.

As a result, it can be pointed out that although the teachers who have passed to physical education teaching branch, which is the sub-fields of classroom teaching, are generally happy, they do not have sufficient competence for physical education lesson.

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The Role of 21st century Learner Skills of Physical Education and Sports Teachers and Teacher Candidates on Teacher Skills

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A

Abstract

In this study, the comparison of 21st century learner and teacher skills of physical education and sports teachers and teacher candidates and the role of 21st century learner skills on 21st century teacher skills were examined. Research is in relational scanning model. The sample of the study consists of 171 physical education and sports teachers working in Kayseri province and 184 students who are physical education and sports education students of Erciyes University Faculty of Sport Sciences. The sample consisted of 171 physical education teachers and 184 teacher candidate (total N = 355) selected by random sampling method from the universe. In this research, 21st learner skills use scale developed by Göksün (2016) and 21st century teacher skills use scale developed by Göksün (2016) were used as the data collection tool. T-test and multiple regression analysis were used for data analysis. According to the findings, there was no significant differences in 21st century learner skills of teacher and teacher candidates, but significant differences were found in 21st century teacher skills. While the 21st century teachers' skills are predicted by innovative, cooperation and flexibility skills, the prospective teachers are predicted by cognitive skills.

Key words: 21st century learner skills, 21st century teacher skills, physical education and sports teacher and candidate.

INTRODUCTION

The rapid change of social, cultural, economic and technological developments in our age increases the importance of high level cognitive skills of individuals such as being able to develop high level of cooperation, effective communication, recognition of different cultures and thinking focused on solving problems. For many young people, schools are the only place where these competences and skills can be learned. In order to adapt to 21st century educational conditions and improve learning processes, it is only possible with teachers who know the learner skills well and can guide the teaching processes in line with these skills" (12, 14).

When the body of literatüre is examined "21st century learner skills were first expressed by Turkish Industrialists' Businessmen's Association (31). Theoretical structure has been gained in the body of literature by The Organization for Economic Development and Cooperation (OECD), the American School Librarians Society, (AASL standards) Trilling and Fadel (30) and Wagner (32)".

OECD New Millennium Learners: The OECD tackles 21st century skill competences in three dimensions: information, communication and ethical and social impact. Information size: includes two sub-dimensions, information as source and information as product. Information as a source is defined as finding information in a fast and effective way, organizing, evaluating the suitability for the work and storing it in digital environment for reuse. Skills related to this sub-dimension are information literacy, research, inquiry and media literacy. Knowledge as a product is defined as analyzing, interpreting, restructuring, producing new information and their skills are listed as creativity, innovation, problem solving and decision making (3). The communication dimension, which includes the sub-dimensions of effective communication and collaboration and virtual interaction, includes the

use of adequate available tools, the use of the right language, participation in digital culture, the ability of young people to use fluent and daily basic practices, and the ability to interact of friend and interest groups in virtual groups. Collaboration / teamwork and flexibility and compliance, critical thinking and communication are defined as skills of this sub-dimension. The ethical and social impact dimension are the third dimension includes social responsibility and social impact sub-dimensions. The social, cultural and economic effects of these concepts should be taken into consideration and it is thought that they have an impact on youth and youth have effects on actions (3).

AASL Standards: Areas within the framework of AASL standards; "1) research, critical thinking and information acquisition, 2) determining results, making decisions, adapting information to new situations and creating new information, 3) participation and sharing knowledge in an ethical and productive manner as part of a democratic society, 4) personal and aesthetic development "(1, 10). When the standards offered by AASL are examined, the necessity of verging individual skills such as creating new knowledge, productive participation and innovation emerges.

Trilling and Fadel (30): In their work, They sort 21 yy. skills as. "learning and innovation skills (learning to renew and learn)", "digital literacy skills (information media and information and communication technologies literacy)" and "career and life skills (readiness for professional life and attention to personal development)". Wagner (32): has classify 21st century skills under seven headings in terms of learners. He defined these skills as surviver skills ". According to Wagner (32) the skills that 21st century learners should have are "1) critical thinking and problem solving, 2) systems and interpersonal collaboration and leadership, 3) quick intelligence and adaptation, 4) entrepreneurship and taking, initiative 5) effective oral and written communication, 6) access to and analysis of information, 7) curiosity and imagination.

When the theoretical structure of 21st century learner skills is examined, it is seen that it consists of similar skills and competences. In addition to defining these skills, it is important to focus on how they should be taught. The discussions advocate that skills and competences should be taught in the content of the courses as integrated into the curriculum,not as separate subjects. In particular, the importance of developing and evaluating general skills and competences that help the child to transfer learning to other curriculum areas, future learning situations and life experiences is emphasized (3). Sanders and Rivers (25) alleged that the effective desing of the teaching process by a teacher who plays a key role in the teaching process can increases students' motivation to learn and improve performance, and 90% of learning can be provided, otherwise only 37% will be provided.

Teacher training systems are undergoing a transformation towards the understanding of technopedagogical content knowledge (TPACK). TPACK is a model that emerges from the interaction of three components based on technology, pedagogy and content knowledge (20). In this model, it a teacher's pedagogical approaches that he applies when presenting the content in the curriculum are stated as the acquisition of the curriculum by using technology effectively in these processes while making for work (12). However, it is seen that the facilities of the school are very important for this.

In our country, in 2018, MoNE (Ministery of National Education) teachers' general professional competencies were revised with a large scale participation (21). In the update, "field knowledge and field education knowledge competencies were added to the general competencies, so that a holistic and single text was created to cover the competences of each teacher in his / her own field". The general competencies of the teaching profession, which are updated in this context, are composed of three related and complementary competency areas, namely professional knowledge, professional skills and attitudes and values, and 11 competencies and 65 indicators related to these competences below them" (21).

The special field competencies of the physical education teachers who form the sample of the research are composed of six competency fields that are "a) planning and organizing the teaching process, b) ensuring and preserving the development of physical performance c) celebrating national holidays in accordance with their meaning and importance, d) monitoring and evaluating development performance, e) cooperation with the societyand school, f) professional development" and the 28 indicators below them (22). Melvin (15) emphasizes the necessity of the evaluation of that in what scales teachers use the skills identified in the criteria listed in the teaching activities. Only then,he

states that it can be reached to the judgement that there is an effective teacher.

As a result, it seems possible to say that learner skills and teacher skills are processes that affect each other.

When the body of literature is examined, there are studies on 21st century learner and teacher skills (7, 8, 9, 18, 24, 26, 29, 33, 34, 36). Göksün (10) did a doctoral dissertation on the 21st century on learner and teacher skills in education faculties.. However, there is no study on physical education and sports lesson teachers and candidates who are different from other courses. In this context, the comprasion of the levels of having 21st century learner and teacher skills of both the teachers and the prospective teachers and the revealing of the role of 21st century learner skills on 21st century tecaher skills are the aims of the study. It is thought to contribute to the body of literature.

METHOD

The research is in scanning model. The universe of the study consists of 580 physical education teachers working in secondary and high schools in Kayseri and 283 teacher candidates studying in Physical Education and Sports Education Department of Erciyes University Faculty of Sport Sciences. The sample consisted of 171 physical education teachers and 184 teacher candidate (total N = 355) selected by random sampling method from the universe. The mean age of teachers was 36.05 ± 7.38 years and their professional seniorities were 11.01 ± 6.82 years. 55.9% (n = 95) of the teachers work in secondary school and 44.1% (n = 75) in high school. The mean age of the students was 21.51 ± 2.29 years and their academic achievement averages were 2.89 ± .39. 26.2% (n = 45) of the students study in the second class, 44.2% (n = 76) in the third class and 29.7% (n = 51) in the fourth class.

Data Collection Tool

In the research, "21st century learner skills use scale and 21st century teacher skills use scale developed by Göksün (2016)" were used.

21st Century Learner Skills Scale

The scale was developed in Göksün (10) 's doctoral thesis. ''Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted in order to conduct validity and reliability analyzes of the data collection tool '' (10). 21st century. learner skills scale consists of 31 items and is in the form of a five-point likert. The scale has four sub-dimensions, cognitive (item number = 17, α = .877), collaboration and flexibility (item number = 6, α = .672), autonomous (item number = 6; α = .706) innovativeness (item number = 2; α = .818) skills. In this study, internal consistency coefficients were found to be α = .90 in cognitive sub-dimension, collaboration and flexibility α = .66, autonomous α = .70 innovativeness α = 80 and in the total scale α = .92.

21st Century Teacher Skills Scale

The scale was developed by Göksün (10). Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to the scale. 21st century the teacher skills scale consists of 27 items and is in the form of a five-point likert. The scale has five sub-dimensions, administrative skills (item number = 12, α = .852), technopedagogical skills (item number = 8, α = .629), affirmative skills (item number = 3; α = .419) flexible teaching skills (item number = 2 α = .752), generative skills (item number = 2; α = .714). In this research, it was found that in the sub-demiensions, administrative α = . 87, affirmative α = .73, generative α = .81 flexible teaching α = .80, technopedagogical α = .77 and in the total scale α = .92.

Statistical analysis

In the research, in the analysis of the data, in addition to descriptive statistical methods, Kolmogorow Smirnow test was used to determine whether the data showed normal distribution. The test results indicate that the data is not normally distributed. At this stage, kurtosis and skewness coefficients were examined to check whether the data provided other normality assumptions. The kurtosis and skewness coefficients of the data were found to be between +1.5 and -1.5. This is interpreted as the scores obtained from the study showed a normal distribution (28). For this reason, t-test, Pearson Moments Multiplication Correlation and multiple regression analysis tests were used for data analysis. The results were evaluated at 0.05 significance level.

FINDINGS

In this section, findings related to the data of teacher and prospective teachers are given.

Table 1. Results t-test on 21st Century Learner Skills Scale Scores in Teachers and prospective teachers.

Scale	Who		N	$\overline{X}$	Ss	t	p
Cognitive Skills	**Teacher**	**Candidates**	184	4.09	.58		
	Teachers		171	4.17	.37	-1.506	.133
Innovativeness Skills	**Teacher**	**Candidates**	184	3.91	.89		
	Teachers		171	4.06	.56	-1.954	.052
Collaboration and Flexibility Skills	**Teacher**	**Candidates**	184	3.75	.68		
	Teachers		171	3.74	.53	.274	.784
Autonomous Skills	**Teacher**	**Candidates**	184	3.77	.66		
	Teachers		171	3.69	.57	1.100	.272
Total Scale	**Teacher**	**Candidates**	184	3.88	.57		
	Teachers		171	3.92	.37	-.700	.484

When Table 1 is examined, it is observed that teachers and teacher candidates use the highest level of cognitive skills (X teacher = 4.17; X teacher candidate = 4.09). The subscales of 21st century learner skills. Cognitive skills (t = -1.506, p = .133; p> .05), innovativeness skills (t = -1.954, p = .052; p> .05), collaboration and flexibility skills, (t = .274, p = .784; p> .05), autonomous skills (t = -1.506, p = .133; p> .05) and the total scale (t = -. 700, p = .484; p> .05) no statistically significant difference was found.

Table 2. Results t-test on 21st Century Teacher Skills Scale Scores in Teachers and prospective teachers.

Scale	Who		N	$\overline{X}$	Ss	t	p
Administrative skills	**Teacher**	**Candidates**	184	4.05	.58		
	Teachers		171	3.89	.63	2.547*	.011
Technopedagogical Skills	**Teacher**	**Candidates**	184	3.74	.89		
	Teachers		171	3.51	.56	3.487*	.001
Affirmative Skills	**Teacher**	**Candidates**	184	4.49	.68		
	Teachers		171	4.38	.53	1.707	.089
Generative Skills	**Teacher**	**Candidates**	184	3.79	.66		
	Teachers		171	3.55	.57	2.036*	.043
Flexible Teaching Skills	**Teacher**	**Candidates**	184	3.68	.96		
	Teachers		171	3.69	.95	-.077	.939
Total Scale	**Teacher**	**Candidates**	184	3.95	.57		
	Teachers		171	3.80	.37	2.336*	.020

*p<.05

When Table 2 is examined, it is seen that teachers and teacher candidates use the highest level of affirmative skills (X-teacher = 4.38; X-teacher candiate = 4.49). Statistically significant differences were found between the subscales of 21st century teacher skills, administrative skills (t = 2.547, p = .011; p <.05), technopedagogical skills (t = 3.487, p = .001; p <.05), generative skills (t = 2.036, p = .043; p <.05) and in the total scale (t = 2.336, p = .020; p <05). Pre-service teachers have high average scores in the given skills. On the other hand, there were no significant differences in affirmative (t = 1.707, p = .089; p> .05) and flexible teaching skills (t = - .077, p = .939; p> .05).

In accordance with the objectives of the study, firstly, Pearson Moments Multiplication Correlation technique was used to reveal the relationship between the use of 21st century learner skills and the use of 21st century teacher skills of teachers and prospective teachers. In the table below, the correlation relationships between the variables of the teachers are given.

Table 3. Correlation relationships between the variables related to the predictions of 21st century teaching skills of teacher candidates in Physical Education and Sports Teachers (N=171)

	Cognitive	Innovativeness	Collaboration and Flexibility	Autonomous
21st Century Teacher Skills	.348**	.469**	.430**	.174*
	.000	.000	.000	.000

*p<.05, **p< .01

As seen in Table 3, significant relationships were found to be positively between the sub-dimensions of 21st century teacher skills and 21st century learner skills, cognitive skills (r = .348, p = .000), innovativeness (r = .469, p = .000), collaboration and flexibility skills r = .430, p = .000), autonomous skills (r = .174, p = .000). The regression results regarding the prediction of 21st century teachers skills according to the cognitive, innovativeness, collaboration and flexibility skills variables of physical education teachers' 21st century learner skill use sub-dimensions are given in Table 4.

Table 4. Results of Multiple Regression Analysis of Prediction of 21st Century Teacher Skills of Teachers'

Variables	B	Std.Error	Beta	t	p
Constant	.554	.484		1.145	.254
Cognitive skills	.093	.149	.055	.626	.532
Innovativeness Skills	.401	.079	.358	5.044*	.000
Collaboration and Flexibility	.353	.100	.296	3.525*	.000
Autonomous Skills	-.023	.088	-.021	-.265	.792
R=.557, R2=.311 F (4,166)=18.692, p=.000.					
*p< .05; **p< .01					

As it can be seen in Table 4, the sub-scales of 21 st century learner skills in the teacher study group predict 21st century teacher skills at significant level [F (4, 166) = 18.692, p <.000]. In the regression analysis, it was determined that all the predictive variables explained 31% of the total variance of 21st century teacher skills scores. When t-test results related to the significance of regression coefficients were examined, innovativeness (t = 5.044, p = .000; p <.05) and collaboration and flexibility (t = 3.525, p = .000; p <.05) skills subscales were significant predictors subscales and other subscales were not significant predictors (p> .05). Correlation relationships between the variables related to the predictions of 21st century teaching skills (Table 5) and Multiple Regression Analysis Results are given in (Table 6).

Table 5. Correlation relationships between the variables related to the predictions of 21st century teaching skills of teacher candidates (N=184)

	Cognitive	Innovativeness	Collaboration and Flexibility	Autonomous
21st Century Teacher Skills	.676**	.410**	.520**	.464**
	.000	.000	.000	.000

**p< .01

As seen in Table 5, significant relationships were positively found between the sub-dimensions of 21st century teacher skills and 21st century learner skills of the students, cognitive skills (r = .676, p = .000), innovativeness (r = .410, p = .000), collaboration and flexibility skills (r = .420, p = .000), autonomous skills (r = .465, p = .000).

Table 6. Results of Multiple Regression Analysis of Prediction of 21st Century Teacher Skills of Teacher candidates'

Variables	B	Std. Error	Beta	t	p
Constant	1.225	.220		5.577	.000
Cognitive skills	.519	.075	.550	6.941*	.000
İnnovativeness Skills	.040	.040	.065	.998	.320
Collaboration and Flexibility	.085	.064	.105	1.331	.185
Autonomous Skills	.034	.060	.041	.556	.579
R=.687, R2=.472 F (4-179)=40.067, p=.000					
*p< .05					

As it can be seen in Table 6, in the study group of teacher candidates, the sub-scales of 21st century learner skills significantly predict 21st century teacher skills [F (4, 179) = 40.067, p <.000]. In the regression analysis, it was determined that all the predictive variables explained 47% of the total variance of 21st century teacher skills scores. When t-test results related to the significance of regression coefficients were examined, it was found that cognitive skills (t = 6.941, p = .000; p <.05) were significant predictors and other subscales were not significant predictors (p> .05).

DISCUSSION & CONCLUSION

In this study, in addition to the comprasion of the level of having 21st century learner and teacher skills of physical education teachers and candidates and the role of 21st century learner skills on 21st century teacher skills were examined. The mean scores of 21st century learning skills of the teachers and prospective teachers who participated in the study were found to be above the middle level. They use the mostly the cognitive skills from 21st century learner skills. Teachers and candidates use skills to solve real-life problems less, such as autonomous skills, collaboration and flexibility skills. Göksün and Kurt (11). They have reached similar conclusions in the study on teacher candidates studying at universities in different regions of Turkey in various branches. Prospective teachers' 21st century learner skills are above intermediate level and the most commonly used skills are cognitive skills.

Şahin (26) in his study reported that candidate teachers received the highest score in the sub-dimension of alternative cognitive characteristics. The studies support our research. It can be thought that this is due to the fact that the theoretical courses in physical education teacher training programs are considerable amounts of. Teachers and candidates use their 21st century. skills "above the middle level". It was observed that the most commonly used skills of the teacher candidates were "affirmative skills". This skill "describes the exhibition of correct behaviours by transforming them into teaching skills of acceptive approaches ". It is thought that teachers and teacher candidates attach importance to reinforcement tendency because of their behavioral approach in the past. The study of Göksun and Kurt (11) support our research. Şahin (26) conducted a study on the levels of having the characteristics of "student of the new millennium of teacher candidates and stated that they had above-average in the skills mentioned. As a result, the fact that physical education teachers and candidates have a high level of teaching skills can provide them easinesses in their professional lives.

There was no significant difference among 21st century learner skills of physical education teachers and candidates who participated in the study. It can be said that teachers and candidates use 21st century learner skills at a similar level.

When the 21st century teacher skills of physical education and sports teachers and candidates were examined, In the total scale, the scores of teacher candidates were higher in administrative, technopedagogical and generative skill sub-dimensions. It can be said that the candidates use these skills more than the teachers. In the updates of the Turkish education system, in addition to national competency. some standards whose international validty were accepted were included. In this context, it is natural that prospective teachers have higher 21st century teacher skills compared to teachers. In the studies of the body of literature, it was emphasized that teachers and prospective teachers use technopedagogical skills inadequately

and they must improve them and the reason for that, it is stated that "deficiencies such as instructor, physical facilities and technological infrastructure in the institutions training teachers are effective (13, 16, 19, 27). In addition, Adıgüzel and Yüksel (2) in their study stated that "in the process of integration of technology into education, serious educational problems arise in terms of teachers, students and the educational environment. Bass (4) stated that most of this problem stems from the fact that "teaching technologies aren't supported with appropriate pedagogical approaches.

In accordance with the objectives of the study, firstly, relationship between the 21st century. teacher skills use and 21st century learner skills use sub-dimensions of teachers and prospective teachers were revealed. In the study, significant and positive relationships were found at medium level between the 21st century, learner skills sub-dimensions, cognitive, innovativeness, collaboration and flexibility and autonomous skills and the 21st century teacher skills. This result means that 'as the 21st century learner skills use of teachers and prospective teachers increases, the 21st century teacher skills use increases'. This finding can be interpreted as "good teachers are also good students".

Sanders and Rivers (25) state that "learner skills form teacher skills, and teacher skills will improve learner skills". A teacher must use all his/or her skillss in the a face of a group of student who use their learning skills at the highest level. Conversely, a teacher who uses all teaching skills can motivate the student to the lesson and make him participate in lesson.

In the teacher study group, as a result of multiple regression analysis on the prediction of 21st century teacher skills, it was determined that the predictive variables of cognitive, innovativeness, collaboration and flexibility, and autonomous skills explained 31% of the variance of 21st century teacher skills and the innovativeness and collaboration and flexibility skill dimensions of 21st century learner skills positively predicted 21st century teacher skills at significant level. The learner skilled teachers who have skills of the ability of using new technologies and have innovativeness and fexibility and cooperation are expected to be 21st century. teachers. Brun and Hinostroza (6) in their study emphasized the need to educate teachers who use new technologies effectively.

In the prospective teacher working group, multiple regression analysis was conducted on the prediction of 21st century teacher skills and it was determined that he predictive variables of cognitive, innovativeness, collaboration and flexibility, and autonomous skills explain 47% of the variance of 21st century teacher skills and the cognitive skills of the 21st century learner skills positively predict the 21st century. teacher skills at significant level. Billing (5) stated that "cognitive skills can solve many learning problems encountered in educational environments and can be transferred to skills such as cooperation, self-management and self-confidence. Young' (36) states that the 21st century learners have a generation conflict with their teachers, and this situation leads to cognitive skills work.

As a result, it is necessary to train individuals who are innovative, able to cooperate and who have flexibility skills. In this context, it is clear that teachers who cannot use the technology required by the age and cannot adapt to new developments, technologies and ideas will not have the chance to raise individuals who will be the architects of the future.

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