THE EFFECT OF SHORT AND LONG-TERM EXERCISE ON POSTURAL CONTROL OF SOCCER PLAYERS

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ABSTRACT

The purpose of research was to examine the effect of short and long-term exercise on postural control in male soccer players. Research Group (X_{age}=21,09±3,78 years; X_{length}=178,59±6,52cm; X_{weight}=73,06±7,43 kg) consists of 22 male soccer players. Tanita MC-980 brand analysis device for the body composition measurements of the research group. For postural control test were used force plate. For short-term exercise, the Wingate bicycle Ergometer was used for short-term exercise and shuttle run test was used for long-term exercise.

For lactate measurements before and after testing of athletes Nova Biomedical brand lactate plus was used for pre-test and post-test lactate measurements of the athletes. Polar Team2 was used to monitoring heart rate of the athletes. The postural control values of short and long-term exercise affect the control rate more in all directions; The short-term exercise is more affected by the overall and anterior-posterior control values and the medial-lateral control values in long-term exercise. As a result, the effects of two different exercises are examined individually; In the medial-lateral control values, the short-term exercise was determined to cause a greater increase in the overall and anterior-posterior controls of the long-term exercise.

Keywords: Postural Control, Exercise, Soccer

FUTBOLCULARDA KISA VE UZUN SÜRELİ EGZERSİZİN POSTURAL KONTROL ÜZERİNE ETKİSİ

ÖZ

Araştırmanın amacını erkek futbolcularda kısa ve uzun süreli egzersizin postural kontrol üzerine etkisini incelemek oluşturmaktadır. Araştırma grubunu (Xyaş=21,09±3,78 yıl; Xboy=178,59±6,52cm; Xva=73,06±7,43 kg) 22 erkek futbolcu oluşturmaktadır. Araştırma grubunun vücut kompozisyon ölçümleri için Tanita MC-980 marka analiz cihazı, postural kontrol testi için kistler marka force plate kullanılmıştır. Kısa süreli egzersiz için wingate bisiklet ergometresi uzun süreli egzersiz için mekik testi kullanılmıştır. Sporcuların test öncesi ve sonrasında laktat ölçümleri için nova biomedical marka Lactate plus cihazı, Kalp atım hızları için polar team kullanılmıştır. Kısa ve uzun süreli egzersizin postural kontrol değerlerini bütün yönlerde salınım oranını daha fazla etkilerken; kısa süreli egzersizin daha çok toplam ve anterior-posterior salınım değerlerini, uzun süreli egzersizde ise medial-lateral salınım değerlerinin daha çok etkilenmektedir. Sonuç olarak iki farklı egzersizin etkileri ayrı ayrı incelendiğinde; medial-lateral salınım değerlerinde kısa süreli egzersizin, toplam ve anterior- posterior salınım değerlerinde ise uzun süreli egzersizin daha fazla artışa neden olduğu belirlenmiştir.

Anahtar Kelimeler: Postural Salınım, Egzersiz, Futbol

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INTRODUCTION

As with many other disciplines, researchers say it is the most appropriate method of uncovering anthropometric, physiological, psychological and cognitive properties in order to uncover abilities at an early age in soccer. These features, along with the development of new assessment methods in the laboratory or on the field, are required to increase the chance of winning the best players in the future[1].

Postural control affects performance in soccer competitions as well as many branches. Although balance in soccer is not among the most important features of optimal performance, it is often thought to be a necessary factor to reduce the risk of injury[2].

Since each sport branch uses the lower extruding differently, postural control can vary between athletes in different sports branches. In the branches of soccer, basketball, handball and so on, athletes use their muscles intensely against gravity during training. For this reason, athletes in these branches are expected to exhibit superior stance compared to athletes in other branches. Postural control is digitized by measuring the displacement of the center of gravity, the displacement of the entire body, or the displacement of the foot pressure center, in other words, the change of the momentum around the ankle[3].

Maintaining a step stance on two legs requires finer control over a narrow support base of the position and movement of the center of gravity. Individuals exhibit perpendicular posture by combining vestibular, visual and somatosensorial information, and the stability of a person's posture is evaluated quantitiously through the control measurements of the pressure center [4].

At the foot pressure center during a steep stance, the following control factors; The control in the anterior-posterior and medial-lateral directions (the size of the control), the oscillating speed (the magnitude of the control of the unit time and the control speed) and are also evaluated by the scanned areas in these directions.

A general exercise requires energy, fluid movements, increased postural control due to the increase in heart and respiratory muscle contractions[5]. With fatigue resulting from exercise, the regulatory system of postural control affects the quality and function of the sensory knowledge, affecting motor control and neuromuscular, which includes changes in muscle and postural control. Causes the system to fail[6].

Assuming that postural control will worsen after each exercise protocol, we believe that worsening of postural controls after short-term exercise would be more than the worsening of prolonged exercise.

In this context, the aim of the research is to examine the effect of short and long-term exercise on postural control in male soccer players.

METHOD

This section includes the features of the research group and the collection of data, the tools used and the analysis.

Research Group

The descriptive statistical results of the Ankara province 3. League soccer team (n=22) that comprise the research group are given in table 1.

Table 1. Descriptive statistical results of the research group

Parameters	Mean	Sd
Age (year)	21.09	3.78
Length (cm)	178.59	6.52
Body weight (kg)	73.06	7.43
Muscle mass (kg)	48.24	10.75
Percentage of fat (%)	12.23	3.74
Body mass Index (kg/m^2)	22.89	1.77

Data collection Tools

The body composition measurements obtained from the research group, Wingate Exercise test, shuttle test, lactate measurement, heart rate and postural control test are described in this section.

Bioelectric Impedance Analysis (BIA) was conducted with Tanita MC-980 brand analysis device to determine the body compositions of athletes. The Monark E894 model bicycle Ergometer was used to create short-term exercise in athletes. Prosport Conconi Shuttle Run timer device is used for long-lasting exercise created with the shuttle test. The lactate Plus device, produced by Nova Biopedical, is used for the lactate measurements of players during exercise. Postural control test was conducted using the cysts brand Force Plate system to measure the postural control values of athletes.

Collection of data

The athletes were first signed, and the consent form was made with the necessary information about the tests. Bioelectric Impedance Analysis (BIA) was applied to determine the body compositions of athletes. After the resting situation, the heart rate and lactate measurements and postural control measurements were made, and data was recorded. Short and long-term exercise tests were applied on different occasions. A short-term exercise test performed with Wingate was conducted in the laboratory environment and the long-term exercise test given by the shuttle test was performed on the field. The athletes' lactate and postural control measurements were obtained immediately after the exercise tests. In all these processes, heart rate is followed and recorded.

Body composition measurement the athletes should not be present in severe physical activity 24 hours in advance, and a day before the tea, coffee, such as diuretics to consume a large number of beverages. The body composition measurements of athletes have been carried out with shoes and socks removed. According to the measurement results, many values such as body weight, body mass index (BMI), body fat ratio, fat mass were calculated by the system.

Short-term exercise test was created with a short-term exercise Wingate test. Athletes were asked to cycle through a 5-minute warm-up period for 30 seconds, with a maximum of 7.5% of its weight against resistance.

Long-term exercise is built with a shuttle test. Athletes run a 20-metre distance to turn around. Running speed is started at speeds of 8 km/h and each minute speed has increased to 0,5 km/h. The shuttle test is terminated when the

athlete misses the running signal twice in a row.

Postural control measurements; The feet were made in a bare way, double foot. The Sporcudan was asked to stop by providing 30 sec postural control on the Force plate platform, where its feet are parallel to the shoulder width. As a result of these measurements, the athlete has scanned the anterior-posterior and medial-lateral areas (mm) and the oscillating speeds in four directions (mm/sec).

Data evaluation

To find the difference between the postural control values taken before and after the exercise protocol applied to athletes, the SPSS 21 package program will be applied Two-way repeated measures ANOVA. The significance was set at 0.05

RESULTS

The following are the statistical procedures for the short and long-term exercise test results applied to the soccer players who comprise the research group.

The descriptive statistics of the heart rate and lactate values for the short and long-term exercise test were given in table 2.

Table 2. Descriptive statistical results of heart rate and lactate values before and after short and long-term exercise test

	Condition	Hearth Rate (beats/min) Mean±Sd	Lactate (mmol) Mean±Sd
Short-term	Pre-test	70.80 ±3.5	0.91 ±0.26
	Post-test	180.45 ±10.3	6.84 ±1.54
Long-term	Pre-test	72.65 ±6.4	0.86 ±0.34
	Post-test	192.25 ±9.7	10.17 ±1.67

When the table 2 was examined, long and short-term exercises showed close values in the results of hearth rate and lactate, and after prolonged exercise, the values of hearth rate and lactate were higher than for short-term exercise.

Descriptive statistical results of the postural control values before and after the short and long-term exercise test are given in table 3.

Table 3. Descriptive statistical results of postural control values before and after a short and long-term exercise test

Parameters	Short term Exercise			Long term Exercise		
	Pre-test	Post-Test	Difference %	Pre-test	Post-Test	Difference %
Total oscillation Path (mm)	242.64	531.18	118.9	284.71	441.50	55.1
Anterior-Posterior Oscillation Path (mm)	180.00	409.36	127.4	147.50	190.43	29.1
Medial-Lateral oscillation path (mm)	124.33	251.27	102.1	210.29	357.86	70.2
Total oscillation Speed (mm/sec)	8.09	17.70	118.9	9.49	14.71	54.9
Anterior-Posterior Oscillation rate mm/sec)	6.00	13.63	127.2	4.92	6.35	29.1
Medial-Lateral oscillation speed (mm/sec)	4.14	8.37	102.0	7.01	11.94	70.4
Total oscillation Area (mm ²)	212.77	981.18	361.1	416.21	915.43	119.9
Anterior-Posterior Oscillation Area (mm ²)	77.77	156.66	101.4	56.41	73.72	30.7
Medial-Lateral oscillation area (mm ²)	31.95	62.82	96.6	119.73	174.05	45.4

The percentage differences in the rate of change between the last test and pretest. With the measured postural control values of the research group in the pre-test situation, the measured values are examined as a result of short and long-term exercise; All parameters are seen to be more than long-term exercise in postural control after short-term exercise

ANOVA results are given in table 4 for mixed measurements that affect the postural control values of short and long-term exercise protocols applied to the research group.

Table 4. ANOVA results for the effect of short and long-term exercise protocols on postural control values

Parameters	Protocols	Mean	Sd	F	P
Total oscillation Path (mm)	Short Pre-test	242.64	66.159	5.441	.030
	Short Post-test	531.18	193.148		
	Long Pre-test	278.64	63.576		
	Long Post-test	441.00	107.207		
Anterior-Posterior Oscillation Path (mm)	Short Pre-test	180.00	44.274	42.547	.000
	Short Post-test	409.36	102.496		
	Long Pre-test	146.36	45.645		
	Long Post-test	187.91	47.080		
Medial-Lateral oscillation path (mm)	Short Pre-test	124.32	52.720	.325	.016
	Short Post-test	251.27	162.382		
	Long Pre-test	204.18	44.229		
	Long Post-test	359.45	92.06		

A statistically significant difference between the pre-test and final test values of the anterior-posterior and medial-lateral release after the short and long-term exercise protocol applied to the young soccer players forming the research group ($P < 0,05$). According to this findings, the short-term exercise in the medial-lateral control values has been determined to cause a greater increase in the overall and anterior-posterior controls of the long-term exercise.

ANOVA results are given in table 5 for mixed measurements that affect the postural control rate of the short and long-term exercise protocols applied to the research group.

Table 5. ANOVA results of short and long-term exercise protocols for the effect of postural control rate values

Parameters	**Protocols**	**Mean**	**Sd**	**F**	**P**
Total oscillation Speed (mm/sec)	Short Pre-test	8.08	2.20	5.457	.019
	Short Post-test	17.70	6.44		
	Long Pre-test	9.28	2.11		
	Long Post-test	14.68	3.56		
Anterior-Posterior Oscillation rate mm/sec)	Short Pre-test	6.00	1.47	42.357	.031
	Short Post-test	13.63	3.42		
	Long Pre-test	4.88	1.52		
	Long Post-test	6.26	1.56		
Medial-Lateral oscillation speed (mm/sec)	Short Pre-test	4.14	1.75	.343	.013
	Short Post-test	8.36	5.39		
	Long Pre-test	6.80	1.47		
	Long Post-test	11.99	3.08		

A statistically significant difference between the pre-test and final test values for the total, anterior-posterior and medial-lateral control rate after the short and long-term exercise protocol applied to young soccer players forming the research group (P< 0,05). According to this findings, the short-term exercise in the medial-lateral control velocity values has been determined to cause a greater increase in the overall and anterior-posterior controls of the long-term exercise.

ANOVA results are given in table 6 for mixed measurements for the effect of the short and long-term exercise protocols applied to the research group in postural control field values.

Table 6. ANOVA results of the effects of short and long-term exercise protocols on postural control area values

Parameters	Egzersiz Protokolü	Mean	Sd	F	P
Total oscillation Area (mm ²)	Short Pre-test	212.77	104.71	.675	.033
	Short Post-test	981.18	236.67		
	Long Pre-test	383.72	221.49		
	Long Post-test	892.09	248.67		
Anterior-Posterior Oscillation Area (mm²)	Short Pre-test	77.73	24.32	13.400	.027
	Short Post-test	156.66	26.08		
	Long Pre-test	54.38	27.70		
	Long Post-test	87.06	24.77		
Medial-Lateral oscillation area (mm²)	Short Pre-test	31.95	10.88	.629	.017
	Short Post-test	62.81	18.04		
	Long Pre-test	42.63	14.12		
	Long Post-test	116.57	21.14		

A statistically significant difference between the pre-test and final test values of the total, anterior-posterior and medial-lateral control areas after the short and long-term exercise protocol applied to young soccer players forming the research group (P< 0,05). According to this findings, the short-term exercise in the medial-lateral control area values has been determined to cause a greater increase in the overall and anterior-posterior control of the long-term exercise.

DISCUSSION

Muscle exercises, such as walking, running and cycling (or Ergometer exercises) performed in different densities and times, or performing this work, are physiological Can reduce the effectiveness of the posture regulatory mechanisms by causing changes and significant mechanical effects[7]. Based on this information in the literature that constitutes the purpose of our study, the effect of short and long-term exercise on postural controls in male soccer players is examined.

According to the preliminary findings of the study; The postural control values of short and long-lasting exercise affect the control rate in all directions more; The short-term exercise is more affected by the overall and anterior-posterior control values and the medial-lateral control values in long-lasting exercise. The findings from the research suggest that postural control will worsen after the exercise protocol in different intensity, but that subsequent worsening of short-term exercise would be more than the worsening of prolonged exercise.

The deterioration of postural control after exercise is often thought to be associated with long-term exercise. It also shows that the increase in the postural control in short-term intensive exercises is caused by hyperventilation more than muscle fatigue[8]. The excessive deterioration in the postural control as a result of short-term exercise in the high intensity of our work can be said to support this information in the literature.

Similar studies were examined;[9] demonstrated that the balance skills were significantly deteriorated in the postural control tests after exercise in single foot and double foot. This postural control, which is connected to exercise in their work, has revealed that worsening of people can increase the risk of disability. The results of short and long-term exercise in our study are supported by Johnston et al.[9] and the deterioration in postural control after exercise can increase the risk of disability for soccer players.

Studies on this subject [10,11,12] are examined to suggest that neuromuscular training programmes should contain a balance exercise component to reduce the risk of injury; Because of the increasing postural control of soccer-specific skills, it is more safely fulfilled. Gioftsidou et al.[13] suggested that preventive balance exercises should be done before soccer practice. In fact, balance exercises can cause improvements in balance ability when done after soccer practice, especially the lower extremity that is not dominant.

In another study; Nardone et al,[14] a 25-minute exercise in the treadmill (the subjects were approached by their maximum heart rate determined by the Karvonen equation) before and after the postural control values (control path and scanned area) Showed a significant increase after exercise.

Yaggie and Armstrong,[15], examined the effect on postural control of lower extremity fatigue on 16 males in the study of fatigue in a bicycle ergometer applied to the Wingate Test protocol, before and after test subjects postural Recorded the control values. The results were found to have significant effects on postural control and worsening postural controls after the test. The results of this study, which is similar to the short-term exercise protocol in our work as a work design, support the results of the change in postural control resulting from short-term exercise in our work.

In many studies, the postural control of local fatigue of lower extremities has been reported to be influenced by various forms [16,17,18,19]. These researchers, ankle dorsi flexor and planter flexor muscles were exhausted in various degrees and postural control measurements were performed using a force platform. All studies concluded that fatigue greatly influenced the postural control parameters.

Crowell [20] investigated the postural release after the protocols made on the jump, sprint and treadmill, in his study on male and female athletes. According to the resting situation, significant differences were observed in postural oscillating after exercise and concluded that this result caused fatigue occurring in the lower extremity.

Similar to the exercise protocols in our study, Fox [21] examined the effect of aerobic and anaerobic exercise protocols on postural controls on university students. The control rate and the scanned area parameters have been adversely affected after both exercise protocols, and after 8 to 13 minutes after exercise, it has been determined to be resting. The

findings in this study support the findings of our work.

CONCLUSION

As a result, short and long-term exercise has revealed that players are negatively affecting the postural control ability. The effects of two different exercises are examined individually; In the medial-lateral control values, the short-term exercise was determined to cause a greater increase in the overall and anterior-posterior controls of the long-term exercise.

Especially during the short-term exercise, the difference in the medial-lateral direction of control can be interpreted as a result of the exercise of the feet on individual bicycle pedals during the practice of exercises. In other words, players can conclude that long-term fatigue affects postural control more.

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