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THE COMPARISON OF PHYSICAL AND PHYSIOLOGICAL CHARACTERISTICS OF JUNIOR ELITE WRESTLERS

ABSTRACT

The purpose of this study to determine physical and physiological differences between selected and nonelected wrestlers to the national team. Forty eight elite junior wrestlers, (18-20 ages) who invited in Greco- roman national team camp, participated in this study. In order to determinate wrestlers' height, body weight and body composition was determined by using bioelectrical impedance. Wingate Anaerobic power test (WAnT) was used to determinate anaerobic performance. Hand grip and back – leg strength were determined using hand and back – leg dynamometers. İllinois agility test was used to determine agility feature. According to the results of independent t- test analysis, between the selected and unselected wrestlers to the national team, training experience, leg average power (W), average arm power (W/kg), back strength and agility level statistically significant differences were found . As a conclusion, taking the sport of wrestling in national team it can be said that to be factors training experience, anaerobic performance, strength and agility.

Key Words: Wrestler, Anaerobic Performance, Body Composition, Strength, Agility

GENÇ ELIT GÜREŞÇILERIN FIZIKSEL VE FIZYOLOJIK ÖZELLIKLERININ KARŞILAŞTIRILMASI

ÖZET

Bu çalışmanın amacı, genç milli takım kadrosuna seçilen güreşçiler ile seçilemeyen güreşçiler arasındaki fiziksel ve fizyolojik farklılıkları belirlemektir. Çalışmaya gençler grekoromen güreş milli takım kampına davet edilen 48 elit düzey güreşçi (18- 20 yaş) katılmıştır. Güreşçilerin, boy uzunluğu, vücut ağırlığı ve biyoelektrik impedans yöntemi ile vücut kompozisyonu analizi yapılmıştır. Anaerobik performans wingate anaerobik güç testi (WAnT) ile belirlenmiştir. El kavrama ve sırt – bacak kuvveti dinamometre kullanılarak tespit edilmiştir. Çeviklik özelliğinin belirlenmesinde illinois testi kullanılmıştır. T testi analiz sonuçlarına göre milli takıma seçilen ve seçilemeyen güreşçiler arasında spor yaşı ve bacak ortalama anaerobik güç (W), kol ortalama kapasite (W/kg), sırt kuvveti ve çeviklik düzeyleri arasında istatistiksel olarak anlamlı farklılıklar tespit edilmiştir . Sonuç olarak, güreş sporunda milli takım kadrosunda yer almada, spor yaşı, anaerobik performans, kuvvet ve çeviklik özelliklerinin etkili faktörler olduğu söylenebilir.

Anahtar Kelimeler: Güreşçi, Anaerobik Performans, Vücut Kompozisyonu, Kuvvet, Çeviklik

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INDRODUCTION

Wrestling is a complex sports branch, which is dominantly anaerobic and necessitates maximal power, strength, agility and flexibility for explosive attacks during the competition as well as psychologically and emotionally readiness (3, 7, 24). Wrestling competitions are extremely dynamic activities, which contains a lot of workload and repetitive explosive movements that contain each other (8). Studies indicate that general physiological profile of successful wrestlers is high anaerobic power and capacity, muscular strength, aerobic power above average, flexibility, fat free body structure at maximum level and in a mesomorphic structure somatotypically (8, 24). Besides, one of the problems trainers and athletes face is the difficulty in understanding physical and physiological factors which contribute to the success of the wrestling (12).

The use of physical fitness tests in evaluating present conditions enable wrestlers and trainers both to have the information about the present physiological capacity and to compare the reference values concerning similar age groups. At the same time, the evaluation of the present condition reveals the strengths and weaknesses of the athlete, which forms the basis to develop the optimal training programme (12). Besides, the pursuit of the general physical fitness level in the whole group and the analysis of the individual physical fitness profile enable to compare strong and weak aspects in preparing wrestlers.

The aim of this study is to determine the physical and physiological properties of the elite wrestlers who took part in the squad of the national team of Junior World Championship that differs them from those who didn't take part in the team.

MATERIAL AND METHOD

The athletes who ranked among the top three in their weight categories in the 2010 Junior Greco-Roman Championship and 48 elite young Greco-roman wrestlers between the ages 18-20, who were invited to the camp of National Team by the technical committee of the Turkey's Wrestling Federation, were the participants of this study. Those who accepted to participate in the test all read and signed the informed voluntary consent form, then, the form was filed. Ethics committee approval for the study was taken from the committee of the Medical Faculty of Kırıkkale University.

Test and Measurements

An electronic bascule with height measurement and with the sensibility of 0.01 kg was used for the measurement of the body weight and height of the athletes (Hüray bascule, Istanbul). The identification of body fat percentage was done through the bioelectric impedance method (Tanita Body Composition Analyzer TBF-418 Japan). Wingate test (WAnt) was applied in identifying anaerobic power and capacity of the wrestlers for both leg and arm. We implemented that 7.5% of body weight for leg and 5.5% of it for arm as load in wingate test. We applied 4-5-minute-warm-up protocol including two or three sprints with the pedal speed of 60-70 revolutions per minute longing 4-8 seconds. We implemented Illinois agility test to identify agility features. We used Takei hand grip (Takei A5001 Hand Grip Dynamometer) and Takei back and leg

dynamometer (Takei A5002 Bacl and Leg Dynamometer) for strength measurement.

Data analysis

We applied descriptive statistics (mean and standard deviation) for all data in statistical analysis. We used independent t test method to reveal the difference between the athletes those who selected the team and those who didn't in terms of their physical and physiological values. We accepted statistical significance as $p<0.05$.

RESULTS

The results of statistical analysis which compared the physical and physiological properties of those who joined the national team and those who didn't are presented below.

Table 1. Comparison of characteristic properties of the selected and nonelected wrestlers for the national team squad

	Selected (N=11) X±SD	Nonselected (N=37) X±SD	t	p
Age	19,3±1,0	18,8±1,0	-1,44	0,15
SE (year)	8,9±1,1	6,8±1,6	-4,01	0,00*
Height (cm)	173±0,1	173±0,1	0,06	0,95
Weight (kg)	82,5±22	76,5±16,6	-0,97	0,33
Fat %	9,6±5,2	10,7±4,7	0,68	0,49
BMI	27,3±5,6	25,4±3,9	-1,27	0,20

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

The only significant difference between the characteristic features of the wrestlers who were selected for the national team and those who were not was the sport experience (SE) of the wrestlers $P<0.05$. We didn't identify a statistically significant difference between the other parameters (height, weight, fat %, BMI) ($p>0.05$).

Table 2. Comparison of anaerobic power and capacity of the selected and nonselected wrestlers for the national team squad.

	Selected (N=11) X±SD	Nonselected (N=37) X±SD	t	p
Leg peak power (W)	1206±258	1039±292	-1,69	0,09
Leg peak power (W/kg)	15,3±2,3	14±2,7	-1,47	0,14
Leg average power (W)	611±144	518±135	-1,95	0,05*
Leg average power (W/kg)	7,4±0,7	7,0±0,9	-1,16	0,25
Arm peak power (W)	838±225	725±163	-1,83	0,07
Arm peak power (W/kg)	10,6±2,8	9,3±2,2	-1,49	0,14
Arm average power (W)	439±110	380±109	-1,58	0,12
Arm average power (W/kg)	4,9±0,6	4,4±0,7	-2,10	0,04*

P<0,05*

We identified a statistically significant difference in the values of leg average capacity (W) and arm average capacity (W/kg) of the wrestlers who were selected for the national team and those who were not ($p<0.05$). We didn't identify a statistically significant difference between the other parameters ($p>0.05$).

Table 3. Comparison of the power and agility of the selected and nonselected wrestlers for the national team squad

	Selected (N=11) X±SD	Nonselected (N=37) X±SD	t	p
Right hand grip strenght (kg)	54±8,0	49±8,0	-1,55	0,12
Left hand grip strenght (kg)	53±7,8	48±7,9	-1,78	0,08
Back strenght (kg)	163±22	144±22	-2,47	0,02*
Leg strenght (kg)	171±23	160±22	-1,52	0,14
Agility (s)	16,3±0,6	17,0±0,9	2,33	0,02*

P<0,05*

We identified statistically significant differences in the values of back force and agility of the wrestlers who were selected for the national team and those who were not ($p<0.05$). We didn't identify any statistically major difference between other parameters ($p>0.05$).

DISCUSSION AND CONCLUSION

We see that wrestlers who were chosen for the national team and those who were not have similar features in terms of age, height, body weight, body fat percentage (%), body mass index (BMI) when we analyse the findings of the study. In addition to this, we have determined that there are significant differences between their sport experiences (Table I). When the literature is examined, Pallares et al. (2011) have proved that elite and amateur wrestlers have similar height, BMI and body fat ratio values while there are significant differences between the sport experiences of elite wrestlers (7,6±1,9 ages) and amateur ones (5,7±2,4) (16). Karnincic et al. (2009) have put forward that elite wrestlers who take part in the national team and those who play only on club level have similar height, weight and BMI; on the other hand, they are different in terms of age (elite wrestlers, age 21,0±1,9), (club wrestlers, age 27,1±4,2) and wrestling experience (elite wrestlers 10,5±1,9 and club wrestlers 5,7±3,0 years) (10). In another study, Pallares et al. (2012) have proved training experience is one of the most critical factors to have success in wrestling (17). As a result of these findings, we can conclude the point these wrestlers differ from each other is not their characteristic features but their different sport experience (training experiences), which reveals that beginning sport earlier is an important factor for success in sport.

Body fat percent of the wrestlers who were chosen for the national team and those who were not is determined as %9,6±5,2 and %10,7±4,7 respectively according to the findings of this study (Table 1). While evaluating body composition for wrestlers before the competition and the season, it is put forward that body fat percentage as

minimum wrestling weight should be 7% for cadet and junior wrestlers and 5% for adults (4, 14, 22, 23). Yoon (2002) indicated that body fat percentage of world champions is less than 10%. He puts forward that ideal body fat percentage for a wrestler must be between 7-10% using by the principles of ideal diet and aerobic training (24). In studies made for the wrestlers, Mirzaei et al. (2009) ascertain that body fat percentage of young wrestlers (age=19,8 ±0,9) is %10,6±3,8; that of heavyweight wrestlers is 20,1% and that it is between %7,4-11,4 in other weight categories (12). Rahmani Nia et al. (2007) find out body fat level of Iranian junior (age 19,7±0,8) Greco-Roman wrestlers is %10,8±4,1 (18). Demirkan et al. (2011) determine body fat percentage of adult free and Greco roman wrestlers is %11,5±5,2 and %11±4,5 respectively (5). Akyüz et al. (2010) find out that body fat percentage of junior (age: 19 09±0,8) national team wrestlers is %9,8±3,0 (2). Mirzaei et al. (2011) conclude that body fat percentage of a wrestler who became the world champion four times in 55 kg is lower according to the Iran's national norms (%10 opposed to %8,4) (13). As a consequence of these studies, it can be seen that junior elite wrestlers have similar body fat ratios to the values indicated in literature.

It can be concluded from the findings of these studies that there are statistically significant differences between the wrestlers who were chosen and those who are not chosen in terms of leg average forces (611±144 - 518±135) and arm average forces (4,9±0,6 – 4,4±0,7) respectively (Table II) when their anaerobic power and capacities are analysed. Additionally, it is seen that wrestlers who were chosen for the national team have higher power and capacity compared to the wrestlers not chosen for the national team concerning other arm, leg anaerobic power and capacity values although no significant difference is found out (Table II). Studies reveal that elite wrestlers have higher power and capacity values than non-elite wrestlers when the anaerobic power and capacity values of wrestlers on different competition levels are compared (6). Horswill et al. (1989) assert that there are significant differences between elite and non-elite wrestlers, who are at the same age, weight and sport age, in terms of arm anaerobic power values (376±20 - 331±22) and leg anaerobic power values (540±25 - 467±29) respectively and put forward that maximum relative anaerobic power value is the biggest matter that differentiates successful wrestlers from less successful ones (9). In similar studies, Abellan et al. (2010) put forward that there are meaningful differences between elite wrestlers and amateur wrestlers concerning their arm anaerobic power values (maximum power: Elite 781±154 Amateur 643±140; average capacity: elite 523±83 amateur: 433±78) and claim that higher body anaerobic power and capacity is an important factor for the success in wrestling (1). Roemmich & Frappier (1993) did not find out any significant difference between successful and less successful wrestlers in terms of absolute anaerobic power value while successful wrestlers (16,5±0,3 W/kg) produce more power than less successful ones (15,2±0,4 W/kg) when relative anaerobic power values are mentioned (19). Yoon (2002) claims that anaerobic power and capacity of elite wrestlers are %13 more than non-elite ones that are at similar ages and have similar body weight and wrestling

experience (24). Sharon et al. (1993) find out that wrestlers have %18-26 more capacity value than adults that are not wrestlers when their average power values are compared, and 15-26% more capacity value when their top power values are compared (20). Horswill (1989) defines the general physiologic profiles of successful wrestlers as good anaerobic power (6,1-7,5 W/kg for arms; 11,5-19,5 W/kg for legs) and capacity (4,8-5,2 W/kg for arms and 7,4-8,2 W/kg for legs) (9). In other studies implementing similar protocols, Wozniak et al. (2006) find out that there are meaningful differences between adults (age=28,1±4,9) and the junior (age=18,1±1,2) wrestling in the national team of Poland concerning their top power and average capacity (top power: 7,1 ±0,3 - 5,9±0,7 w/kg; average capacity: 5,6± 0,2 W/kg - 4,7±0,4) (25). Finally, it is put forward that long-term training experience enables a significant increase in wrestler's arm anaerobic top power and average capacity performance. In addition, when literature results and findings of our study evaluated, it can be seen that anaerobic power and capacity is an important factor to perform well or to take part in successful groups in the sports that are dominantly anaerobic.

Former studies inform that the strength of isometric hand grip is one of the most critical determinants of success in wrestling (11, 15). According to the findings of these studies, there are statistically significant differences between wrestlers who were chosen for the national team and those who were not concerning their back power and agility features. Meanwhile, it can be seen that wrestlers that were chosen have higher power values than those who were not chosen (Table III). In studies taking place in literature, Pallares et al. (2011) state that isometric hand grip power of elite wrestlers is significantly higher than amateur ones at a ratio of 6,3-18,9% and elite wrestlers' isometric back power is %7-20 higher than amateurs', which is also a significant number (16). Roemmich & Frappier (1993) claim that right hand of successful wrestlers is %11,3 stronger than less successful ones and left hand of successful wrestlers is %13,3 stronger than less successful ones (19). Song and Garvie (1980) power serves as an advantage for successful wrestlers over less successful ones or for experienced wrestlers over beginners (21). They find out that there are significant differences especially in higher body power (24). Studies comparing power features of wrestlers at different competition levels reinforce the findings of our study. Besides, it can be seen that wrestlers who were chosen for the national team are more agile (Table III). The fact that there is not a study in literature which compares agility at different competition levels restricts our opportunity to discuss on this issue. However, when physical and physiological needs of wrestling is taken into account, it comes to the mind that agility at good level is a factor that should be present in wrestlers.

As conclusion, in the light of literature results and findings of this study, it can be claimed that sport experience, anaerobic power and capacity, strength and agility are the determinants to take a place in the successful group in wrestling

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