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## **Analyzing the Anthropometric and Performance Features of 16-18 Years-Old Female Wrestling and Karate Athletes**

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### **Abstract**

In this study, the objective was to examine the antropometric and some performance spesifications of 25 national women athletes in İzmir, ages between 16-18, wrestlers and karate doers. Of 25 athletes, 11 of them are National Female Wrestlers (age average:17,36, height:165 cm, weight:59,36 kg) and 14 of them are National Female Karate Athletes (age average:17,28, height:166 cm, weight:56,32 kg). Mann Whitney-U test was used in order to determine the variables and differences between two fields, wrestling and karate, for the values 20 m running, right hand grip strength, left hand grip strength, leg strength, vertical jump, standing jump, body measurements and fat measurements. For 20 m sprint, there were significant differences between these two sports fields ( $z=-4,218$ ;  $p<0,05$ ). Wrestlers had higher points than karate doers had in 20 m sprint test. In terms of other values, there was no difference between these fields. Body measurements were compared of athletes of two fields. There were significant differences between two fields in terms of scapular, waist, biceps extension, biceps flexion and fore arm flexion measurements ( $p<0,05$ ). When mean ranks examined, wrestlers have wider measurements than karate doers do. Fat measurements were compared. There were significant differences between athletes of two fields for the values biceps, sub-scapula, abdomen, supra-illiak, quadriceps and ( $p<0,05$ ). When mean ranks examined, wrestlers have higher body fat percentages than karate doers do. At the end, differences were determined in terms of physical structure and motoric system suitable for characteristics of both fields.

**Keywords:** Karate, Wrestling, Antropometry, Performance

## Introduction

Sports is the main element of social, cultural and economic development of humanbeing in the world. Sports ensures adaptation of individuals to social life by knowledge, talent, self confidence and body and mind development. Besides, it is a power for intersocietal dialog and provides competition and happiness. For healthy societies and future generations, sports should be a habitual behaviour for youngs, so that would bring responsibility, good communication skills and habits and peace. For that reason, communities should canalize young generations to the sports (Cicioglu, et al, 1998; Stone & Oliver, 2009; Russell, et al, 2011).

Technology development and sporting development are parallel to each other. With deveoping technologies, the competition among athletes and countries increases, so in order to raise highly talented athletes, individual and combat sports have been chosen (Mcmillian, et al,2006). When successfull teams and countries in sports examined, more conscious sporting people and scientific studies and programmes appear (Gökdemir, 1999). In this context, body structures and motoric development levels of young athletes should be determined and evaluated. So, individual and combat sports are important to increase youngs athletes' physical performance and social life adaptation. Hence, sports scientists examine body compositions and physical profiles of athletes, besides physiological profiles (Fox et al, 1988; Greenberg et al,2004, Kuter & Öztürk, 1992)

Regular excercise and sports affect antropometric and motoric developments of children and youngs and sports science studies different sporting fields comparatively. In our country, wrestling and karate appear widely chosen fields, therefore the effects of these two fields on young people motoric development process are crucial.

In this context, this study investigates antropometric and motoric development levels of female athletes in terms of these two fields.

## Materials and Method

25 national female athletes participated in this research, between 16-18 age intervals and in wrestling and karate fields. Before measurement, athletes had warm up exercises. Measurements were taken 3 times and best figures were recorded. For record, measurement forms were prepared and all values were recorded on those forms.

Height and weight and body mass index measurments: First, ages of athletes were determined, then, body weights were measured with shorts and barefoot and by Tanita bascul, with 0,01 kg precision. Heights were measured by Tanita height scale in terms of cm.

20 m sprint test: Participants, after 25 minute warm up, were waited for ready for running on 20 m measured ground. And then they run with the highest speed. Measurements were done by newtest photocell. Test was applied three times for each subject and the best figure was recorded.

Right-left hand grip strength test: That was done by hand grip dynamometer while subjects standing. Dynamometre was adjusted for hand measurements of the participants, arms were straight and dynamometer didn't touch the bodies. Measurements were performed for each hand three times and the best figures were recorded.

Vertical jump test: Vertical jump meter was used. Subject with two legs at the same time jumped up and fell down on marked ground and didn't step forward. Three times they jumped and the best values were recorded.

Leg dynamometer: Subject climbs up the dynamometer, stands upright, bends knees with 115-125 degrees angel. Legs are vertical. Each test was performed three times and between each test there was a one minute rest and the best measurement was recorded.

Standing jump: With both legs at the same time, with no speed at the start, subjects jump and the distance was measured. Again, three times test and the best figure recorded.

Body measurement: Measurements were performed buy unflexible tape measure. Head, shoulder, thigh, calf, quadriceps, biceps extension, biceps flexion, forearm extension, forearm flexion, waist measurments were recorded.

Body fat measurement: That was done by skinfold caliper. Subscapula, biceps, triceps, abdominal, pectoral, supra-illiak, quadriceps and Calf measurements were done from sub surface skin. The values on caliper was read after 4 seconds. Subjects were standing. Body fat measurement percentage formulas for determination were as follows:

Green-Yuhazs= $5,783+0,153x(\text{Triceps}+\text{Subscapula}+\text{Abdomen}+\text{Suprailiak})$ .

Lange=  $(\text{Biceps}+\text{Triceps}+\text{subscapula}+\text{pectoral}+\text{suprailiak}+\text{quadriceps}) \times 0,097+3,64$ .

Statistical Analysis: SPSS program was used for the evaluation of results. Besides, in order to determine the differences and variables between thetwo field athletes, Mann Whitney-U test was used.

## Findings

**Table 1.** Mean of the Participants Related to Their General Features

Sport Branch	N	Mean (Age)	Mean (Height)	Mean (Weight)
Wrestling	11 (%44)	17,36 ± ,674	1,65 ± ,061	59,36 ± 6,607
Karate	14 (%56)	17,28 ± ,611	1,66 ± ,064	56,32 ± 6,822

In the Table 1, there are means of age, height and weight of the participants. According to this, it is understood that, %56 of the participants (n=14) who are Karate players, in addition; wrestlers's age mean are1 7,36 ± .674, karetes's height means are 1,66 ± ,064 and also wrestlers's weight means are 59,36 ± 6,607.

**Table 2.** Mann Whitney-U test Results According to Sprint, Strength and Jump of Participants

	<b>Sport Branch</b>	<b>N</b>	<b>MeanRank</b>	<b>U</b>	<b>Z</b>	<b>P</b>
20m Sprint	Wrestling	11	20,00	0,000	-4,218	0,00*
	Karate	14	7,50			
Right-Hand Grip Strength	Wrestling	11	14,23	63,500	-0,740	0,46
	Karate	14	12,04			
Left-Hand Grip Strength	Wrestling	11	14,64	59,000	-0,986	0,32
	Karate	14	11,71			
Leg Strength	Wrestling	11	11,77	63,500	-0,740	0,46
	Karate	14	13,96			
Vertical Jump	Wrestling	11	12,05	66,500	-0,579	0,56
	Karate	14	13,75			
Standing Long Jump	Wrestling	11	11,91	65,000	-0,657	0,51
	Karate	14	13,86			

In table 2 consist of the Mann Whitney-U test results of the participants's sprint, strength and jump values according to their sport branch. Analyze results show that there is significant difference between the sport branch of the participants and their 20 m sprint values ( $z=-4,218$ ;  $p<0,05$ ). When we look at the mean rank points that wrestler's 20m sprints values are higher than karates. The others values are no significant difference between the sport of participants.

**Table 3.** Mann Whitney-U test Results According to Perimeters of Participant's Parts of Body

	<b>Sport Branch</b>	<b>N</b>	<b>Mean Rank</b>	<b>U</b>	<b>Z</b>	<b>P</b>
Head	Wrestling	11	13,41	72,500	-0,251	0,80
	Karate	14	12,68			
Shoulder	Wrestling	11	16,68	36,500	-2,226	0,02*
	Karate	14	10,11			
Waist	Wrestling	11	16,86	34,500	-2,330	0,02*
	Karate	14	9,96			
Thigh	Wrestling	11	15,45	50,000	-1,485	0,15

	Karate	14	11,07			
Biceps Extension	Wrestling	11	17,36	29,000	-2,654	0,01*
	Karate	14	9,57			
Biceps Flexion	Wrestling	11	16,82	35,000	-2,320	0,02*
	Karate	14	10,00			
Forearm Extension	Wrestling	11	16,50	38,500	-2,126	0,03*
	Karate	14	10,25			
Forearm Flexion	Wrestling	11	15,41	50,500	-1,482	0,14
	Karate	14	11,11			
Quadriceps	Wrestling	11	13,82	68,000	-0,494	0,62
	Karate	14	12,36			
Calf	Wrestling	11	13,09	76,000	-0,055	0,96
	Karate	14	12,93			

In table 3, there are Mann Whitney U test results according to their parts of body perimeters. According to the results of the analysis, the participants' part of body perimeters by sport branch showed a significant difference in shoulder, waist, biceps extension, biceps flexion and forearm flexion ( $p < 0,05$ ). When we look at the mean rank points that wrestler's all values are higher than karates.

**Table 4.** Mann Whitney-U test Results According to Skinfold Measurement of Participant's Parts of Body

	Sport Branch	N	Mean Rank	U	Z	P
Biceps	Wrestling	11	20,00	0,000	-4,225	0,00*
	Karate	14	7,50			
Triceps	Wrestling	11	9,91	43,000	-1,875	0,61
	Karate	14	15,43			
Pectoral	Wrestling	11	15,73	47,000	-1,662	0,10
	Karate	14	10,86			
Sub-Scapula	Wrestling	11	17,41	28,500	-2,666	0,08*
	Karate	14	9,54			
Abdomen	Wrestling	11	19,64	4,000	-4,017	0,00*
	Karate	14	7,79			

Supra-Illiak	Wrestling	11	20,00	0,000	-4,221	0,00*
	Karate	14	7,50			
Quadriceps	Wrestling	11	18,91	12,000	-3,567	0,00*
	Karate	14	8,36			
Calf	Wrestling	11	19,23	8,500	-3,764	0,00*
	Karate	14	8,11			

In table 4, there are Mann Whitney U test results according to their parts of body's skinfold measurements. According to the results of the analysis, the participants' part of body skinfold measurements by sport branch showed a significant difference in biceps, sub-scapula, abdomen, supra-illiak, quadriceps and calf ( $p < 0,05$ ). When we look at the mean rank points that wrestler's all values are higher than karates.

### Discussion and Conclusion

In this study, the differences in antropometric and motoric development levels of female karate and wrestling athletes.

56% of subjects (N=14) were karate doers. The age average of wrestlers was  $17,36 \pm .674$ . (Bourgois, et al, 2001 ), in their study with female oarswomen, age average was  $17. 5 \pm 0. 8$ , height average was 163. 7, weight average was 55. 8. (Ozbar, et al, 2004), in their study related to Turkish National female boxers, found out that height average was  $166. 07 \pm 5. 39$ cm, weight average was  $54. 71 \pm 7. 34$  kg. Moreover, height average of karates was  $1,66 \pm ,064$  and weight average of wrestlers was  $59,36 \pm 6,607$ . Body weight is one of the main elements to determine the performance in sports. Besides, it is one of the antropometric preconditions to choose and develop athletes (Sevim & Savaş, 1993). Our research population age averages is similar to the related literature.

Sprint, strength and jump values were taken by Mann Whitney-U test. There are significant differences between two fields in terms of 20 m sprint ( $z = -4,218$ ;  $p < 0,05$ ). According to mean ranks, wrestlers have higher points than karates do. For the other values, there were no differences between wrestling and karate. Günaydın et al., in their study, age average was,  $19,67 \pm 2,50$ , 18 female wrestlers had  $3,26 \pm 0,16$  sn in 20 m sprint test ( Gunaydın, et al,2000). Kalkavan and friends found out that there are significant relationships between athletes and antropometric variables and vertical jumps. The results of our study are parallell with previous studies (Kalkavan, 1999).

Skinfold measurements of the bodies were compared. Biceps, sub-scapula, abdomen, supra-illiak, quadriceps and calf values were different between two fields ( $p < 0,05$ ). Wrestlers have greater and significant skinfold values than karates do. Albayrak reported that judo female athletes of Marmara University team have 25.02% body fat percentage (Albayrak, 1991). Kuru and Cicioğlu found that 20 female Türkish National judo athletes participated in V. International Boğaziçi Judo tournament  $\%12,6 \pm 5,9$  body fat percentage, and 39 foreign athletes have  $\%12,4 \pm 3,6$  fat percentages (Kuru & Cicioğlu,2000). DeCreeve and friends stated that 17 female judo athletes have  $\%16,3 \pm 3,3$  body fat percentage (Decree, at al,1995). Jackson and friends noted that standart body fat percentage is 31% much for 20-29 age group, 20-28% is medium, 16-19% is good and 16% and less is very good (Jackson at al,1995). Acar (1995) found that female soccer players have  $\% 24.02 \pm 3.8$  fat percentages (Acar,1995). Zorba

(2000) said that fat free body mass and strength and endurance have close relationship. The body fat percentages of our study is parallell with those kinds of previous literature (Zorba,2000).

As a result; antropometric spesifications and fat percentages measurements are in favour of wrestlers, however, some motoric spesifications such as strength and jump are in favour of karates. Motoric features affect each other and athletes use their dominant talents, besides, athletes have physical changes in accordance with their sports fields, and after training motoric and antropometric features may change. Moreover, wrestling needs strength, endurance and those needs bring spesific body features, also food and environment is important.

### **Conflict of Interest**

The authors have not declared any conflicts of interest.

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