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Anthropometric Profile, Wingate Performance and Special Judo Fitness Levels of Turkish Cadet Judo Athletes[1]

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Abstract

Background: Judo is an Olympic sport where physical fitness is of great importance as well as technique and tactics. Physical and physiological conditions of the athletes are very important for a better judo performance and there is still a need for more data related to these determinants. The aim of this study was to investigate relationship between body composition, some performance variables and Special Judo Fitness level of Turkish cadet judo athletes. Materials and Methods: 10 female and 10 male cadet judo athletes (Aged 14.8±0.2) voluntarily participated in this study. Body compositions of the athletes were determined with bioelectrical impedance device (Tanita MC-980). Squat and active jumps were carried out by using Optojump and a treadmill (Monark) was used for Wingate anaerobic power test. Special Judo Fitness Test (SJFT) was carried out to evaluate judo specific performance. Statistical significance was set at a $p<0.05$ level and data are expressed as mean±standard error of the mean and Pearson product correlation was used to verify the relationship between variables. Results: Perfect negative correlation between SJFT index and total throw numbers ($r=-0,94$; $p<0,01$), moderate positive correlation between total throw numbers and peak power ($r=0,38$;$p<0,05$), moderate negative correlation between squat jump, active jump and fat percentage ($r=-0,45$, $-0,55$ respectively; $p<0,01$), large and very large negative correlation between peak power, average power and fat percentage ($r=-0,66$, $r=-0,73$ respectively; $p<0,01$) were found. Discussion: In conclusion, the more anaerobic power judo athletes have the better SJFT index they present. Moreover, lower fat percentage means better anaerobic performance. Thus, more anaerobic based trainings should be included to training programs and lowering body fat can be advised.

Keywords: Judo, Special Judo Fitness Test, Cadet Athletes, Performance

[1] 6. Uluslararası Bilim Kültür ve Spor Kongresi'nde sözel bildiri olarak sunulmuştur.

Introduction

Judo is a combat sport that was appeared in the Olympic Games in Tokyo 1964 (Ceylan and Balcı, 2017). Judo is a weight-categorized sport, thus, the athlete must achieve excellent physical fitness while maintaining an optimal body mass. The anthropometric profile of judokas is, therefore, a relevant factor for success in competition and for performance in specific judo tests. Athletes should present high levels of technique, tactics and physical fitness in order to be successful (Franchini et al., 2011). Some physical fitness and anthropometrical variables are of great importance for high-performance in judo competition (Franchini et al., 2011). As judo is a weight-classified sport, it has been suggested that high-level judo players should present low body fat (Franchini et al., 2011; Kim et al., 2011; Kubo et al., 2016). Moreover, Sterkowicz et al., 2011 stated that cadet judo athletes have less than 15% fat percentage. Callister et al. (1991) reported that body fat percentage of high-level judo athletes were lower than those worse qualified in USA ranking. Franchini et al. (2007) observed that body fat percentage was negatively related to number of throws during the Special Judo Fitness Test, while fat-free mass was reported to affect anaerobic performance in judo athletes (Kim et al., 2011).

Some performance tests were developed and used commonly to evaluate physical fitness of a specific sport. Being one of these tests, Special Judo Fitness Test (SJFT) is used to evaluate aerobic and anaerobic performances of judo athlete (Franchini et al., 2011). The Wingate is the most non-specific test used to evaluate the anaerobic performance of judo athletes, while the Special Judo Fitness Test is the judo-specific test most frequently used to assess mixed anaerobic and aerobic performance in judo athletes (Franchini et al., 2011). In fact, Special Judo Fitness Test classificatory tables were elaborated to evaluate male (Franchiniet al., 2009) and female judo athletes (Sterkowicz-Przybycien and Fukuda, 2014).

Despite many studies concerning anthropometrical and physiological variables to judo performance for senior and junior judo athletes, to our knowledge there is not enough study in the literature presenting and comparing physical and physiological profiles of Cadet Judo athletes. Thus, the aim of this study was to investigate relationship between body composition, some performance variables and Special Judo Fitness level of Turkish cadet judo athletes.

Materials and Method

10 female and 10 male cadet judo athletes (Aged 14.8±0.2) voluntarily participated in this study. Body compositions of the athletes were determined with bioelectrical impedance device (Tanita MC-980). Squat and active jumps were carried out by using Optojump and a treadmill (Monark) was used for Wingate anaerobic power test. Special Judo Fitness Test (SJFT) was carried out to evaluate judo specific performance. Statistical significance was set at a $p<0.05$ level and data are expressed as mean±standard error of the mean and Pearson product correlation was used to verify the relationship between variables. Correlation coefficients were classified according to Hopkins (2018).

Results

Physical characteristics of male and female cadet judo athletes are represented in table 1

Table 1. Physical characteristics of male and female cadet judo athletes

Variables	Mean±SD
Age (year)	14.8±0.2
Mass (kg)	56.8±3.1
BMI (kg/h^2)	21.4±0.8
Height (cm)	162.2±1.7
Fat (%)	21.1±1.4

The performance and physiological response to the Special Judo Fitness Test are shown at table 2.

Table 2. SJFT performances of male and female judo athletes

Variable	Mean±SD
Throws in A (rep)	6±0.7
Throws in B (rep)	10±1.3
Throws in C (rep)	9±1
Total throws (rep)	25±2.5
Heart rate A set (bpm)	165±16
Heart rate B set (bpm)	184±4
Final heart rate (bpm)	188±3
Heart rate 1-min (bpm)	150±10
SJFT Index (bpm/throw)	13.5±1.5

The performance during Wingate anaerobic test (Want) are shown at table 3.

Table 3. Performance of Cadet male and female judo athletes during WanT

Variable	Mean±SD
Peak Power (W/kg)	10.8±1.7
Mean Power (W/kg)	4.1±1.3
Fatigue Index (%)	61.3±12.1

The relationship between Special Judo Fitness Test, body composition and WanT are shown at table 4.

Table 4. The relationship between Special Judo Fitness Test, body composition and WanT

	Total throw	Index	Fat%	Fat mass	Squat jump	Active jump	PP (W/kg)	AP (W/kg)	MP (W/kg)
Index	-,94**								
Fat%	-,37	,33							
Fat mass	-,32	,28	,86**						
Squat jump	-,02	-,07	-,45*	-,32					
Active jump	,18	-,24	-,55**	-,36	,91**				
PP (W/kg)	,38*	-,33	-,66**	-,50*	,59**	,71**			
AP (W/kg)	,31	-,33	-,73**	-,54**	,74**	,83**	,82**		
MP (W/kg)	,00	-,04	-,34	-,28	,37	,41*	,24	,59**	
Fatigue index (%)	,15	-,10	,04	,07	-,06	-,04	,24	-,21	-,88**

There was a significant nearly perfect negative correlation between total throw and SJFT index (r=-0.94, p<0.01) as expected. There was a moderate negative (r=-0.45), large negative (r=-0.55), large negative (r=-0.66), very large negative (r=-0.73), moderate negative (r=-0.34) between fat percentage and squat jump, active jump, PP, AP, respectively. There were also large correlations between fat mass and PP and AP (r=-0.50, r=-0.54, respectively). Nearly perfect (r=0.91), large (r=0.59), very large (r=0.74) correlations were found between squat jump and active jump, peak power and average power, respectively.

Discussion

The main findings of this study were: (1) large and very large significant correlations were found between fat percentage and anaerobic performance variables of cadet judo athletes and (2) higher peak power means more total throw during SJFT performance.

As judo is a combat sport where competitors are divided by weight classes, it is very important to maintain optimal body composition. Therefore, judo athletes attempt to minimize fat percentage, total body mass and maximize the amount of lean tissue. The results of the present study in terms of physical characteristics of the cadet judo athletes are similar to those of Franchini et al., 2011 and Torres-Luque et al., 2015. When the results of body fat percentage of our sample are compared to other studies with World and Olympic level judo athletes, judo athletes in the present study had more fat percentage which adversely affects judo specific performance .

Anaerobic performance is of great importance for judo performance (Detanico et al., 2012) and thus judo athletes are expected to have a high level of anaerobic capacity. The findings of our study related to anaerobic performance of the athletes were found similar to the results of Ceylan and Balcı (2017) and Franchini et al, 2011. Because high level of anaerobic performance leads to more throw numbers, less index during SJFT performance (Sterkowicz et al., 1999), judo athletes from all competitive levels and age should have a high level of anaerobic power to present a better competitive performance. In parallel to our findings, previous studies (Franchini et al., 2007; Sterkowicz et al.,1999) found significant correlation between anaerobic performance and SJFT performance. This result can be interpreted as higher anaerobic output results in better SJFT performance.

Finally, there are similar correlations found in the literature by previous studies (Arazi et al., 2017; Casals et al., 2017; Franchini et al., 2007; Franchini et al., 2009; Kim et al., 2011). Lower body fat percentage and increased fat-free mass is relevant to anaerobic performance of judo athletes (Arazi et al., 2017; Franchini et al., 2005; Kim et al., 2017). These physical characteristics are also relevant to a mixture of aerobic and anaerobic performance measured in the SJFT (Arazi et al., 2017; Franchini et al., 2007). Moreover, previous studies (Drid et al., 2012; Franchini et al., 2009) indicated a positive relationship between Wingate and SJFT variables, probably due to the fact that both tests rely predominantly on anaerobic pathways (Franchini et al., 2011)

In conclusion, this study determined the relationship between physical characteristics and SJFT and WanT performances of elite judo athletes from Turkish cadet judo athletes. We found large correlations between fat mass and PP and AP (r=-0.50, r=-0.54, respectively) and nearly perfect (r=0.91), large (r=0.59), very large (r=0.74) correlations between squat jump and active jump, peak power and average power, respectively.

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