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The relationship between body composition and aerobic fitness of junior free style wrestlers

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Abstract

Aim: The aim of the present study was to investigate the relationship between body composition and Aerobic Fitness of junior free style Wrestlers.

Method: one hundred fifty (N=150) male junior free style wrestlers were participated as subjects and they were further divided into five groups according to their weight categories, each group was comprised of thirty wrestlers. BMI can be categorized according to the WHO. Body fat percentage was estimated by using Durnin and Womersley equation and Body weight was measured with weighing machine. Cardiovascular endurance was assessed by Havard Step test of junior free style wrestlers.

Results: A statistical significant positive correlation was found between weight and BMI, skinfold thickness and %BF. Fitness index was observed negatively significant relationship with weight, percent body fat and BMI.

Conclusion: it is concluded that the free style wrestling is a weight classified sports and the fitness level of wrestler is most useful in this sports therefore the correlation of fitness index of the wrestlers with body composition is important. The results of the present study also demonstrated the effect of age, height, weight, BMI, and percentage body fat on the aerobic fitness of junior free style wrestlers.

Keywords: Free style, wrestling, skinfold, anthropometry, strength, fat percentage, aerobic fitness

Introduction

A sport of wrestling has a strong tradition that precedes the first Olympic festival in 776 B. C., when Zeus wrestled Kronas for the possession of the earth (Gallagher, 1951). Since then the sport of wrestling continues to grow in popularity because of the discipline and mental toughness it requires to be successful in the sport. Unfortunately, the sport has also been associated with the stigma of “cutting weight” and the practices that accompany the process of competing at designated weight classes. Like the sports of judo, boxing, and competitive weight lifting, wrestling requires its athletes to compete at specific weights or weight classifications. Typically, these weight classifications differ by approximately 7-11 pounds depending on age and style of wrestling. It is common knowledge in present day of wrestling that wrestlers compete in weight classes below their “normal” weight. The purpose of this practice is to gain advantages in strength, speed, and leverage over their opponents (Steen & Brownell, 1990).^[22] The changes in regulation of wrestling have forced several modifications in the fitness requirements of successful wrestlers, which as a result caused an evolution in the training methods (Yoon 2002; ^[23] Horswill 1992; ^[7,8] Sharratt et. al., 1986)^[21]. Wrestling has been described as an intermittent physical event which produces great strength and muscle power demands of both the upper and lower body (Hubner-Wozniak et. al. 2004; ^[6,10,13] Kraemer et. al. 2001; Horswill et. al. 1992 & 1989; Sharratt et. al. 1986).^[21] They generally want to minimize the body fat level and the total body weight without losing their body strength and power (Yoon, 2002).^[23] However, no relation was shown between the percentage of fat mass (%FM) and the level of wrestling success (Yoon, 2002; ^[23] Horswill 1992).^[7, 8] The aim of the present study was to investigate the relationship between body composition and Aerobic Fitness in different weight categories of junior free style wrestlers. The present investigation was to study the relationship of body composition and Fitness index in different weight categories of junior free style wrestlers.

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Material and Methods

The study was conducted on 150 male junior free style wrestlers (age between 18-20 years) of five different groups i.e. Group 1- 46-50 kg junior free style wrestlers, Group 2- 55kg junior free style wrestlers, Group 3- 60kg junior free style wrestlers, Group 4 – 66kg junior free style wrestlers, Group 5 – 74kg junior free style wrestlers. The aim of the study was explained to each participant and signed informed consent was obtained from the participants. The body composition of junior free style wrestlers was estimated as per the method described by Durmin and Womersley (1974). [3] BMI can be categorized according to the WHO (Laquatra, 2004). [6, 10, 13] Body weight was measured with weighing

machine. Aerobic fitness was estimated by Harvard Step Test of junior free style wrestlers. The Harvard Step test is a test of aerobic fitness, developed by Brouha *et al.* (1943) in the Harvard Fatigue Laboratories during WWII. Karl Pearson’s coefficient of correlation was used to find the relationship among age, weight, BMI and body composition variables of free style junior wrestler in five groups according to their weight. To determine the differences between the mean of the various variables among different groups, one way Analysis of Variance (ANOVA) was used. Scheffe Post Hoc test was also used to identify the location of significant differences among the different groups. The level of significance was $p < 0.05$.

Table 1: Mean± SD of age, height, weight, BMI, % body fat and fitness index of different groups

Variable(s)	Group 1 (n=30)	Group 2 (n=30)	Group 3 (n=30)	Group 4 (n=30)	Group 5 (n=30)	Total (n=150)
Age (year)	18.13±0.77	18.73±0.69	18.53±0.68	18.50±0.68	18.67±0.47	18.51±0.65
Height (cm)	166.69±2.62	168.00±2.62	168.46±3.24	168.95±2.79	171.80±4.37	168.78±3.12
Weight (kg)	51.50±1.33	55.70±1.41	61.50±0.88	66.33±1.40	74.25±3.22	61.85±1.64
BMI	18.54±0.65	19.74±.77	21.69±0.90	23.25±0.85	25.18±1.43	21.68±0.92
% Body fat	9.10±1.67	10.32±2.13	11.92±1.43	12.71±2.28	14.88±3.06	11.78±2.11
Fitness index	61.24±19.63	51.26±17.94	45.66±10.86	43.59±10.23	43.24±12.20	48.99±14.17

Results

Table 1 shows that the mean age of group1, group2, group3, group4 and group5 was 18.13±.77 year, 18.73±.69 year, 18.53±.68 year, 18.50±.68 year and 18.67±.47 year. The mean height of the subjects of group1, group2, group3, group4 and group5 was 166.69±.2.62cm year, 168.00±.2.62cm, 168.46±.3.24cm, 168.95±.2.79cm and 171.80±4.37cm. The mean weight of the subjects of group1, group2, group3, group4 and group5 was 51.50±.1.33kg, 55.70±.1.41kg, 61.50±.88 kg, 66.33±.1.40 kg and 74.25±3.22 kg. The mean body mass index of the subjects of group1, group2, group3, group4 and group5 was 18.54±.65 Kg/m², 19.74±.77Kg/m²,

21.69±.90Kg/m², 23.25±.85Kg/m² and 25.18±1.43Kg/m² respectively. The mean percent fat of the subjects of group1, group2, group3, group4 and group5 was 9.10±1.67%, 10.32±2.13%, 11.92±1.43%, 12.71±2.28% and 14.88±3.06 %. The mean Fitness index of the subjects of group1, group2, group3, group4 and group5 was 61.24±19.63, 51.26±17.94, 45.66±10.86, 43.59±10.23 and 43.24±12.20. Further, the analysis of variance (Table 2) revealed that the variance in the mean values of age, height, weight, BMI, % body fat and Fitness index of junior free style wrestlers among different groups was statistical significant.

Table 2: Analysis of variance of age, height, weight, BMI, % body fat and Fitness index among different groups

Variable(s)	Groups	Sum of Squares	Mean Square	F	Sig.
Age	Between Groups	6.50	1.627	3.63	.008
	Within Groups	64.96	.448		
Height	Between Groups	427.42	106.855	10.43	.000
	Within Groups	1484.95	10.241		
Weight	Between Groups	9562.39	2390.600	706.97	.000
	Within Groups	490.31	3.381		
Body mass index	Between Groups	849.94	212.485	230.09	.000
	Within Groups	133.90	.923		
Percentage Fat	Between Groups	594.57	148.644	30.86	.000
	Within Groups	698.32	4.816		
Fitness index	Between Groups	6855.706	1713.926	7.940	.000
	Within Groups	31299.427	215.858		

*significant at the 0.05 level

Table 3 shows a positive statistical significant relationship among percent body fat, height, and weight of combined (N=150) groups of junior free style wrestlers. A positive statistical significant relationship was also found between

weight, percent body fat and BMI. Fitness index was observed negatively significant relationship with weight, percent body fat and BMI (Table 3).

Table 3: Correlation among age, height, weight, BMI, % body fat and Fitness index variables of combined group (N=150)

Variable(s)	Height	weight	Body mass index	Percentage fat	Fitness index
Age	.076	.168*	.160	.080	-.232
Height		.483**	.167*	.257**	-.222**
Weight			.944**	.722**	-.418**
BMI				.717**	-.390**
Percentage fat					-.463**

*significant at the 0.05 level

Discussion

The results of the present study shows that the body fat percentage of the wrestlers of different groups were in the acceptable range according to the WHO (Laquatra, 2004).^[6, 10, 13] In other words, we can say no obesity was observed in different group of junior free style wrestlers. The maximum body fat percentage was observed in group 5 (higher weight category) and minimum in group1 (lower weight) wrestlers. Thus, a trend of increased in body fat percentage from lower body weight group1 (46 kg- 50kg) to higher body weight group5 (74kg) of wrestlers was observed. The maximum lean body mass percentage was observed in group1 and minimum lean body mass percentage was observed in group 5. Thus, a trend of decrease in lean body mass percentage was observed from lower body weight group1 (46-50kg) to higher body weight group5 (74kg). Saygin (2014).^[4, 19, 20] also reported that the percentage body fat has different values in all three classes like lightweight, middle weight and heavy weight wrestlers. According to Saygin (2014).^[4, 19, 20] the maximum body fat was observed in heavyweight wrestlers when compared to lightweight wrestlers and middleweight wrestlers. Francihini *et al.* (2014)^[4, 19, 20] also reported that the highest skinfold thickness values were observed in heavyweight judo athletes as compared to lightweight and middleweight judo athletes, in other words, heavy weight judo athletes has more fat percentage than lightweight and middle weight. The mean value of various anthropometric variables body mass index was increased from lower body weight (group1) to higher body weight (group 5). Selda (2014).^[5, 19, 20] also reported that there was a significant difference in the body mass index of different weight categories of Greco roman and free style wrestlers and the body mass index was higher in heavy weight Greco roman and free style wrestlers as compared to the lower and middle weight greco roman and free style wrestlers. Selda (2014).^[5, 19, 20] reported that both heavy weight Greco roman and free style group wrestlers was taller than the lower weight and middle weight wrestlers and a similar trend of body height was also found in the present study (i.e. junior free style wrestlers). Body fat includes lipids from adipose tissues and other body tissues. In general, lot of wrestlers attempt to have a very low percentage of body fat, as they are matched by body-weight prior to each meet. Eventually, optimal body composition is one of the major concerns of the wrestlers. Coaches and wrestlers consider %Fat as a factor that must be taken under control. It is believed that lower %Fat values are more advantageous for wrestlers. Fat Free Mass rather than %Fat may be a predictor of performance in wrestlers. Changes in performance of wrestlers are primarily related with Fat Free Mass in male wrestlers (Kelly *et al.*, 1978;^[11] Roemmich and Sinning, 1996; 1997).^[17]

In the present study the fitness index of 50 kg weight categories wrestlers were in low average range the wrestlers of all different groups was in the poor range when compared it with the norms of fitness index as athletes (Ryhming, 1953).^[18] According to Graf *et. al.*, (2004)^[6, 10, 13] that the cardiovascular fitness of the subjects were differed significantly from one another in the various body mass index categories, with the subjects of normal weight possessing a higher cardiovascular fitness level as compared to the overweight or obese subjects. Aerobic capacity observed decreased progressively as the body mass index of the subjects was increased. These results correlate with other studies that researched the same variables. Saygin (2014)^[4, 19, 20] reported that the value of VO₂ max (cardio vascular fitness)

was observed maximum in light weight when compared with heavy weight and middle weight wrestlers. Bovet *et al.* (2007) also examined the relationship between physical fitness variables VO₂ max and body mass index. They showed that there is a strong negative correlation between physical fitness and overweight in adults. McGavok *et al.* (2009)^[15, 16] studied the relationship between cardiovascular fitness and overweight and showed that cardiovascular endurance was negatively significant related with body mass index so if increased body mass index is significantly related to reduce cardiovascular endurance fitness. Napradit and Pantaewan (2009)^[15, 16] examined the relationship between anthropometric indices and physical fitness. They came to the conclusion that body mass index was negatively related with cardiovascular fitness. Masoud (2011).^[14] studied a negatively correlation of vo2 max related with percentage body fat and weight. A similar result were also found in the present study that is lower weight category free style wresters (Group 1) were higher fitness index score than middle and heavy weight freestyle wrestlers (Group 5). Horswill *et al.* (1989)^[9] also reported that successful wrestlers had significantly lower body fat values compared to unsuccessful wrestlers. Duncan & *et al.*, (2006).^[2] Reported that athletes of lesser weight makes the heart beat improved and the heart will be capable to beat effectively. So this may be the reason that in present study the fitness index score was good the in lower weight category as compared to other weight category of junior free style wrestlers. In literature a number of studies have reported a significant negative relationship between cardiovascular fitness, anthropometric variables and body composition components. Overall, the results of the present research work show a negative relationship of cardiovascular fitness and body composition like percentage fat and BMI.

Conclusion

From the results of the present study, it is concluded that the body fat percentage of the wrestlers of different groups was in the acceptable range i.e. obesity was not observed in them. Further, it is concluded that the wrestlers of lower body weight category (group1) were better in anthropometric variables than higher body weight category (group 5) like body fat percentage, body mass index. Fitness index of group 1 was found higher than other groups of junior free style wrestlers. A positive relationship was also observed between weight, age, height, BMI and % body fat. Fitness index was observed negatively significant relationship with weight, percent body fat and BMI. Higher percentage fat wrestlers was observed lower fitness level in this study.

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