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Effect of the percentage body fat on speed and flexibility of junior free style wrestlers

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Abstract
Aim: The aim of this study was to examine Effect of the Percentage body fat on Speed and Flexibility of Junior Free Style Wrestlers according to their weight categories.
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. Body fat percentage was estimated by using Durnin and Womersley equation, Speed was measured with 10m Shuttle and flexibility was measure with sit and reach test.
Results: A positive relationship was also observed percentage body fat related with Shuttle run timing and percentage body fat was also found negative relationship with flexibility.
Conclusion: It is concluded that the free style wrestling is a weight classified sport; therefore the correlation of body composition of the wrestlers with Speed and flexibility is important. The results of the present study also demonstrated the effect of age, height, BF %, Speed and flexibility on the weight categories of junior free style wrestlers.

Keywords: Free style, wrestling, anthropometry, speed, fat percentage, flexibility

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) [5]. In the ancient Olympic Games wrestling was an important part and is still one of the most popular events of the modern Olympic Games. Nowadays, in the Olympics, two wrestling styles are therefirst is Greco-Roman, a classic style in which only upper body moves are allowed and the participants are not allowed to apply the leg techniques, and second is Freestyle, in which upper and lower body techniques are allowed. Both wrestling styles are based on a weight class system, so weight categories are defined in which the different participants participate. The aim of the weight categories is to protect the competitors' health, limiting as much as possible the risk of injuries, as well as balancing out the physical characteristics between wrestlers and therefore increasing the performance percentage that depends on technical, tactical and psychological skills (Hubner *et al*., 2004) [7]. 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) [11]. 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; Horswill 1992; Sharratt *et al*., 1986) [13, 6, 10].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; Kraemer *et al*. 2001; Horswill *et al*. 1992 & 1989; Sharratt *et al*. 1986) [7, 8, 6, 10].

They generally want to minimize the body fat level and the total body weight without losing their body strength and power (Yoon, 2002) [13]. However, no relation was shown between the percentage of fat mass (%FM) and the level of wrestling success (Yoon, 2002; Horswill 1992) [13, 6]. The aim of the present study was to observe Effect of the Percentage body fat on Speed and Flexibility of Junior Free Style Wrestlers. The present investigation was to study the relationship of % body fat, Speed and flexibility in different weight categories of junior free style wrestlers.

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 fat of junior free style wrestlers was estimated as per the method described by Durnin and Womersley (1974) [3]. Speed was measured with 10m Shuttle and flexibility was measure with sit and reach test. Body weight was measured with weighing machine. Flexibility was measure with Flexomeasure. Karl Pearson's coefficient of correlation was used to find the relationship among age, weight, % Body fat, Speed and Flexibility 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, % Body fat, Shuttle run and Sit and reach test 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
% 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
Shuttle run (m)	11.62±0.96	11.74±0.87	11.92±1.05	12.06±1.00	12.33±1.40	11.93±1.05
Sit and reach test	4.96±1.55	4.32±1.39	4.30±1.42	3.97±1.33	3.86±1.17	4.28±1.37

Results

Table 1 shows that the mean age of group1, group2, group3, group4, group5 and Total was 18.13±.77 year, 18.73±.69 year, 18.53±.68 year, 18.50±.68 year, 18.67±.47 year and 18.51±.0.65 years. The mean height of the subjects of group1, group2, group3, group4, group5 and Total was 166.69±.2.62cm year, 168.00±.2.62cm, 168.46±.3.24cm, 168.95±.2.79cm, 171.80±4.37cm and 168.78±.3.12cm. The mean weight of the subjects of group1, group2, group3, group4, group5 and Total was 51.50±.1.33kg, 55.70±.1.41kg, 61.50±.88 kg, 66.33±.1.40 kg, 74.25±3.22 kg and 61.85±1.64 kg. The mean percent fat of the subjects of group1, group2, group3, group4, group5 and Total was 9.10±1.67%, 10.32±2.13%, 11.92±1.43%, 12.71±2.28%, 14.88±3.06%. and 11.78±2.11. The mean Shuttle run of the subjects of group1, group2, group3, group4 group5 and Total was 11.62±0.96, 11.74±0.87, 11.92±1.05, 12.06±1.00, 12.33±1.40 and 11.93±1.05. The mean Sit and reach test of the subjects of group1, group2, group3, group4 group5 and Total was 4.96±1.55, 4.32±1.39, 4.30±1.42, 3.97±1.33, 3.86±1.17 and 4.28±1.37. Further, the analysis of variance (Table 2) revealed that the variance in the mean values of age, height, weight, % Body fat and Sit and reach test of junior free style wrestlers among different groups was statistical significant.

Table 2: Analysis of variance of age, height, weight, % Body fat, Shuttle run and Sit and reach test 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		
Percentage Fat	Between Groups	594.57	148.644	30.86	.000
	Within Groups	698.32	4.816		
Shuttle run	Between Groups	9.314	2.328	2.009	.096
	Within Groups	168.029	1.159		
Sit and reach test	Between Groups	22.038	5.510	2.888	.024
	Within Groups	276.603	1.908		

*significant at the 0.05 level

Table 3 shows a positive and highly statistical significant relationship among percent body fat with Shuttle run timing of combined (N=150) groups of junior free style wrestlers. A negatively and highly statistical significant relationship was also found with Sit and reach test (Table 3).

Table 3: Correlation among age, height, weight, % Body fat, Shuttle run and Sit and reach test of combined group (N=150)

Variable(s)	Shuttle run	Sit and reach test
% Body fat	.275**	-.281**
Shuttle run		-.170

*significant at the 0.05 level

Discussion

The results of the present study shows that the mean body fat percentage of the junior free style male wrestlers of different groups was in range of 9 to 15% and it was in the acceptable range when we compared it with values of body fat percentage for wrestlers as reported by Asker and Michael (2010) [2]. Asker and Michael (2010) [2] reported the preferred acceptable range of body fat percentage of wrestlers between 5 to 16%. In other words, we can say no obesity was observed in junior free style male wrestlers of different groups of the present study. 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. Saygin (2014) [9] also reported a similar trend of body fat percentage of wrestlers that is the percentage body fat has different values in all three classes of wrestlers like lightweight, middle weight and heavy weight. According to Saygin (2014) [9] the maximum body fat percentage was observed in heavyweight wrestlers as compared to lightweight wrestlers and middleweight wrestlers. 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).The skinfold thickness measurements were also significantly different in different groups of junior free style wrestlers. The maximum skinfold thickness was observed in 74 kg weight category than those of other weight categories junior free style wrestlers. Francihini *et al*. (2014) [4] also reported that the maximum 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. According to Armstrong *et al*., (2006) [1] the size of the skinfold thickness measurements in obese and overweight children was also significantly different that is the skinfold thickness is larger in overweight and obese than those of normal-weight children. According to Truter *et al*., (2010) [12] studied that the flexibility of normal weight subjects was higher than compared to overweight and obese subjects and negatively relationship was observed between flexibility and body mass index and also found a negatively relationship between fat percentage and flexibility. A similar relationship among flexibility and body mass index was observed in present study that is group 1 (50kg) junior free style wrestlers were observed more flexible as compared with others groups of junior free style wrestlers. A negative relationship was also observed between flexibility and anthropometric variables % Body fat of junior free style wrestlers. A positive relationship was observed between fitness index and step test duration, percent lean body mass, sit and reach test (flexibility), push-up but a negative relationship with percent body fat, shuttle run time, recovery pulse rate, body mass index and wait-to-hip ratio.

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 wrestlers (group 5) like body fat percentage. Flexibility and Speed was also observed better in the wrestlers of lower body weight category (group1) as compared to higher body weight category (group 5) junior free style wrestlers. A percentage body fat was also observed positive relationship related with Shuttle run timing and percentage body fat was also found negative relationship with flexibility. Higher % body fat wrestlers group 5 wrestlers were taking much timing in shuttle run as compare to the wrestlers of lower body weight category (group1). Flexibility was also found lower in higher percentage fat wrestlers. So the % body fat was found much effected on speed and flexibility in our study.

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