The Effect of Two Semester Wrestling Training on University Students' Body Composition and Some Motoric Characteristics

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Abstract

The aim of this study was to examine the changes in the body composition and motor characteristics of the students attending the wrestling lesson in one academic year (8 months). The study included 19 male wrestler students with an average age of 21.20±1.61 years. Body weights, body circumference measurements, regional muscle strengths, anaerobic strength skinfold thicknesses and body fat percentages were measured twice before the start of the wrestling training at the beginning of the academic year. SPSS 20.0 package program was used to analyze the data obtained at the beginning and end of the season. In the evaluation of pretest and posttest measurements, wrestler students' body weights, BMI, shoulder circumference, chest circumference, bicep circumference (ext), bicep circumference (flx), hip circumference, upper leg circumference, vertical jump distance, long jump distances, Anaerobic power capacities There was a statistically significant difference between the back force, leg strength, biceps, triceps and abdominal skin folds (p<0.05). As a result, it was determined that wrestling training taken by university students in a training process had a positive effect on muscle strength and anaerobic power levels and a positive effect on the development of body circumference measurements.

Keywords: university students, wrestling training, body composition

1. Introduction

In recent years, an increase has been observed in the studies investigating the body composition of Athletes. Determining the physical and physiological characteristics of the athletes whose body compositions and performance will be affected and observing their changes throughout the season is an important factor in the development of sporting success by shaping effective training programs.

Physical structure, which is one of the factors affecting performance, is physical properties in other words. Because physical structure or physical properties affect the presentation of physiological capacities. The physical structure is an important indicator of an athlete's high-level performance. Moreover, appropriate physical characteristics affect an athlete's performance positively (Maud & Foste, 1995). Therefore, athletes often experience working to achieve elite athletes 'ideal' body type (Sundgot-Borgen & Torstveit, 2011). It can affect the performance of the body's tissue composition deeply, especially in weight class sports. In addition, changes in muscle size become an important evaluation parameter during preparation for high-level competitions (Ackland et al., 2012).

It is stated that the high rate of sport branches-specific fat in athletes, muscle fibrils limit the contraction strength and contraction speed (Morehouse & August, 1973). They also observed that athletes' body composition is of great importance in terms of disability and that athletes with high body fat ratio have a higher risk of sports injury and the recurrence rate of existing injury (Akhmedov et al., 2006). The biggest problem for athletes is the body fat they can carry without affecting their performance. In endurance sports, bodyweight above normal is a disadvantage for the athlete since it will reduce oxygen consumption per kilogram (Martin & Drinkwater, 1991).

The physical structure is only one of the factors affecting performance and success. The physical structure, combined with other performance indicators such as strength, strength, flexibility, speed, endurance and quickness, which have the necessary motoric properties for the sports branch, positively affect the success of the athlete. In all sports, the impact of force on success is accepted by all. Especially in weight sports such as wrestling,

the quality and quantity of force gain more importance.

In this study prepared in the light of this information, the changes in the body composition and some parameters that will affect the performance of wrestlers consisting of national athletes representing Kyrgyzstan in national and international competitions were examined during the 3-month preparatory season.

2. Method

The study included 19 male wrestlers who studied at the university and also regularly participated in wrestling training (Table 1). Measurements were recorded twice, at the beginning and at the end of the academic year (after 8 months). Voluntary consent form was taken from athlete students and the latest version of the Helsinki declaration was respected.

2.1 Bodyweight, Height, Body Mass Index (BMI) Measurements

Bodyweight of the participants was measured in a sensitive (Angel brand) scale up to 20 grams. Length measurements of the participants were measured with a Holtain sliding caliper with 1mm measuring range. BMI values were calculated with the following formula using body weight and height (Pekcan, 2008).

BMI Formula:

$$BMI (kg/m2) = Body\ weight\ (kg)/Length\ (m^2).$$

2.2 Skinfold Thickness and Body Fat Percentage Measurements

Skinfold thicknesses were measured on the right side of the body with HOLTAIN brand skinfold caliper (Tamer, 1995). Body fat percentages were determined according to the LANGE formula.

Body Fat Percentage was determined by measuring skinfold thickness at 6 sites (chest, triceps, subscapular, suprailiac, abdomen, and thigh) and percentage fat calculated using the following formula (Gledhill & Jamnik, 2003; Özer, 1993).

$$Percentage\ fat = (\Sigma\ skinfolds \times 0.097) + 3.64$$

2.3 Anaerobic Power Test

The vertical jump performance of the participants was measured using a fixed platform with a precision of 0.1 cm prepared on the wall. The longest distances that participants could reach the platform first were recorded. He then made his knees bounce to the maximum with a 90-degree bend. The jump was repeated 3 times and the best score was recorded. An anaerobic power calculation was calculated using Lewis Formula (Özkan et al., 2010). Three trials were given. The maximum value among the 3 readings was used to calculate the anaerobic power by the Lewis formula.

Lewis Formula:

$$Anaerobic\ Power = \sqrt{4.9}\ x\ body\ weight\ (kg)\ x\ \sqrt{high\ jump\ distance\ (m)}$$

2.4 Body Circumference Measurements

Body circumference measurements (Neck, Shoulder, Chest, Biceps-ex, Biceps-flx, Waist circumference, Hip circumference, Upper leg circumference, Lower leg) (table 3) were made with an anthropometric tape measure (Gulick Meter) with ± 1mm precision.

2.5 Statistical Evaluation

Data has been analyzed by SPSS 20.00 package program. In the analysis, it was checked whether or not the data fulfilled the parametric test assumption. The paired sample t-test was used for the data providing the parametric test assumption. Significance level was taken as $p<0.05$

3. Results

Table 1 shows the averages of changes in the body composition and strength characteristics of the wrestler student athletes, measured at different times and included in the study.

Table 1. Paired sample t-test results before and after wrestling trainings (n:19)

Variable	1.measurements mean±sd	2. measurements (after 8 months) mean±sd	t	p
Age (Year)	21.20±1.61	-	-	-
Length (cm)	174.30±5.99	-	-	-
Body Weigh (kg)	74.05±9.37	75.00±9.05	2.43	0.03*
BMI (body mass index)	24.27±1.71	24.59±1.58	2.39	0.03*
Body fat (%)	9.25±1.33	8.90±1.11	1.65	0.12
Neck Circumference (cm)	38.68±1.55	39.13±1.67	1.85	0.08
Shoulder Circumference (cm)	116.18±5.49	117.23±5.41	2.29	0.03*
Chest Circumference (cm)	96.26±5.81	96.86±5.84	5.11	0.00*
Biceps Circumference-ext (cm)	29.28±2.12	30.20±1.94	5.90	0.00*
Biceps Circumference-flx (cm)	31.47±1.92	32.92±2.29	4.89	0.00*
Waist Circumference (cm)	78.86±5.81	79.84±5.73	1.92	0.07
Hip Circumference (cm)	95.55±6.93	96.47±6.34	3.10	0.01*
Femur Circumference (cm)	35.50±2.45	36.60±2.28	4.91	0.00*
Lower Leg Circumference (cm)	21.78±1.48	21.89±1.54	0.45	0.65
Vertical jump (cm)	0.62±0.16	0.77±0.13	5.59	0.00*
Anaerobic power (kgm/sn)	127.69±17.49	130.56±20.06	2.22	0.04*
sup-kapula skinfold (mm)	11.94±4.11	11.21±4.33	1.54	0.14
Triceps skinfold (mm)	10.01±2.19	9.18±2.05	2.54	0.02*
Biceps skinfold (mm)	5.45±1.75	4.97±1.57	2.63	0.02*
Chest skinfold (mm)	8.56±3.31	8.02±2.63	1.56	0.14
Suprailiak skinfold (mm)	9.15±4.55	8.68±2.59	0.45	0.65
Abdomen skinfold (mm)	14.36±3.83	12.23±3.04	3.57	0.01*
Thigf skinfold (mm)	12.78±4.12	11.86±3.20	1.15	0.27

$p<0.005$.

The results of the first measurement of wrestling students and the second measurements made after 8 months are given in (Table 1). According to these results, there was a statistically significant difference between body weights, BMI, shoulder circumference, chest circumference, biceps circumference (ext), biceps circumference (flx), hip circumference, upper leg circumference measurements of biceps, triceps and abdominal skin folds ($p<0.05$).

Table 2. Some motoric features paired sample t-test results before and after wrestling trainings (n: 19)

Variable	1. measurements mean±sd	2. measurements (after 8 months) mean±sd	t	p
Vertical jump (cm)	0.62±0.16	0.77±0.13	5.59	0.00*
Anaerobic power (kgm/sn)	127.69±17.49	130.56±20.06	2.22	0.04*
Long jump (cm)	227.78±9.52	240.94±11.48	9.36	0.00*
Flexibility (cm)	36.44±3.84	36±3.36	0.81	0.43
Claw strength (kg)	51.14±6.10	52.37±5.73	1.22	0.24
Back strength (kg)	120.94±20.83	124.10±19.52	2.76	0.01*
Leg strength (kg)	139.47±32.95	151.57±34.32	5.84	0.00*

$p<0.005$.

The results of the first measurement of wrestling students and the second measurements made after 8 months are given in (Table 2). According to these results, there was a statistically significant difference between Vertical jump distance, long jump distances, Anaerobic power capacities, Back force, leg force measurements ($p<0.05$).

4. Discussion

As it is known, the physical and physiological characteristics of the athletes that are monitored during the season are important factors in shaping effective training programs. The data obtained from the athletes during the preparatory season gives tangible data about the successful or unsuccessful season.

In the study, the average body weight values measured in the university team and at the beginning of the preparatory period of the wrestlers participating in international competitions were recorded as 74.05±9.37 kg. At the end of the season, the average body weight was measured as 75±9.05 kg and an increase of 1 kg was observed, although it was not statistically significant. The increase in body weight averages was thought to be effective in significantly increasing BMI and body circumference measurements (Shoulder, Chest, Biceps-ex, Biceps-flx, hip and upper leg). Our research findings are consistent with the previously reported results by (Cicioğlu et al., 2007; Aslan, 2013; Gökdemir et al., 1999).

Also, Anaerobic power averages measured 127.69±17.49 kgm/s at the beginning of the season increased significantly at the end of the season and increased to 130.56±20.06 ($p<0.05$). In addition to the vertical leap, which is important for the determination of anaerobic power, Durarak long jump scores were found to increase statistically significantly at the end of the season compared to the pre-season ($p<0.05$). The average of the wrestlers' back forces at the beginning of the season 120.94±20.83 kg was determined as. At the end of the season, it was measured as 124.10±19.52 kg and it was observed that it increased significantly ($p<0.05$). Leg force, another force parameter, is 139.47±32.95 kg at the beginning of the season and with the positive effect of the training, at the end of the preparatory season, 151.57±34.32 kg. It has been determined that the average is ($p<0.05$). It was thought that the significant increase in the leg forces of the wrestlers brought about an increase in the anaerobic power. Indeed, the average measurement of the upper leg circumference was 35.50±2.45 cm at the beginning of the season, 36.60±2.28 cm at the end of the season. It was measured and found to be significantly excreted ($p<0.05$).

In a study on the subject, Welsman et al. (1997) reported a significant relationship between leg muscle volume and anaerobic performance. Another study stated that the width of the thigh circumference and consequently was effective in producing higher anaerobic power in excess of muscle fibers (Grant, 1996). This result is important to support our research findings. As it is known, one of the most important motoric features for wrestling athletes is muscle strength. In a study, it has been stated that body parts must have the necessary muscle strength in order to apply mobility skills and techniques (Aydos et al., 2009). In addition, they reported that forearm and leg strength were important factors in success in mid-level wrestlers (Cisar et al., 1987). The significant increases in the strength and anaerobic power parameters obtained in our study results can be interpreted as a concrete indication that the preparatory period training of the athletes was efficient. In similar studies, it was reported by many researchers that regular wrestling trainings caused an increase in regional muscle strength (Cicioğlu et al., 2007).

The average skinfold thickness measured from the wrestlers' Pazu, Triceps and abdominal regions was also significantly lower at the end of the training season compared to before ($p<0.05$). In addition, body fat rates decreased at the end of the season compared to the beginning of the preparatory season. However, this decline was not statistically significant. In our study, body fat percentages were obtained by using skinfold thickness. Accordingly, there is a lot of research on long-term training that body fat rates tend to decrease (Burke et al., 1986; Demirel et al., 2015; Karakas et al., 2005; Stamford, 1983). The reduction in skinfold thickness was thought to be due to the increase in muscle mass occurring in environmental measurements. Thus, in our study (Shoulder, Chest, Biceps-ex, Biceps-flx, hip and upper leg) circumference measurements increased significantly at the end of the season ($p<0.05$). The increase in muscle mass brings with it a decrease in the fat rate. In a study conducted in this direction, Utter (2001) investigated the change of body composition in high school wrestlers as a result of a research that revealed a significant difference in wrestlers in body mass and lean muscle mass in high school wrestlers. He reported that the rate of lean muscle mass continued throughout the season, while body mass loss occurred.

5. Conclusion

As a result, it was concluded that the increase in body environmental measurements with the effect of training may be effective in the increase of anaerobic power and muscle strength properties with the increase of muscle volumes.

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