

Performance Development Of Wrestlers In Sport Education Centre

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Abstract

The aim of this study is to determine the changes in the physical and motoric characteristics of wrestlers in wrestling education Centers in the first year. The average age of the wrestling training center wrestlers was 12.05 years in the first measurement and the last measurement was 13.05 years. There was a significant change in age and height of wrestlers in one year period ($p < 0.001$). The change in body weights was found to be insignificant ($p > 0.05$). The changes in squat jump, long jump, hand grip strength, flexibility, shuttle pull, 30 meter speed, aerobic and anaerobic power values of the wrestlers were significant in one year period ($p < 0.05$ and $p < 0.001$). There was no significant difference in throwing health ball in one year period ($p > 0.05$). In the present study, the differences between the average max V02, 30 meter sprint, number of shuttles in 30 seconds and sit and reach flexibility values of wrestlers within a year were found to be statistically significant ($p < 0.05$ and $p < 0.001$). Conclusion: Motor performance parameters of speed, abdominal strength, flexibility, anaerobic strength and aerobic endurance values of the wrestlers increased during the one year period. There was no significant increase in shoulder - arm throw strength. Particular attention should be given to arm traction movements, in addition to pushing from arms and shoulder area exercises during wrestlers' training.

Key words: Wrestling, Education, Development

INTRODUCTION

Wrestling is a sports branch which requires the existence of various functional characteristics together. In wrestling, muscular strength, speed reaction time, agility, nerve and muscle coordination, static dynamic balance, high anaerobic capacity, and optimal high aerobic capacity are important factors that play a role in performance. Various scientific studies have reported that the most used energy system in wrestling is ATP-CP and lactic acid system. The aim and content of wrestling training is to develop these characteristics (5, 16). In wrestling, athletes have to make very

quick movements in short periods of time. In addition to aerobic strength, anaerobic strength is also important. In addition, success depends on body strength to a great extent in wrestling. Strength is very important especially in defense and also in offense while practicing techniques or resisting techniques and making counter moves. In wrestling, flexibility is a very important factor for success. Flexibility enables the wrestler to move to a great extent and creates positive effect in practicing the techniques. Speed and reaction speed are important factors influencing the wrestlers' success. During competition, a wrestler performs attacks, defence,

and counterattacks and has to perform these attacks in a quick way (2, 7, 23). With the increase in international competition, recognising both their own and their opponents' body compositions in terms of endurance, strength and condition has become a must for success in Turkish athletes. The success of the athlete depends on the development of strength, speed, flexibility and jump technique performance (14). Physical fitness; Many parameters affect age, height, body weight, aerobic and anaerobic power, body component, flexibility, resting heart rate and blood pressure (12,17). Structural and motoric characteristics of wrestlers are the most important determinants of performance. In order to be able to realize performance development in wrestling in the most effective way, suitable training programs are needed in addition to children's being suitable for universal structural model determined for wrestling. In Turkish wrestling, wrestling training centres have a significant place in reaching success. Factors which are effective in determining the concept of talent in sport can be listed as status of health, anthropometric characteristics, motoric characteristics, techno motoric characteristics, ability to learn, being ready for efficiency, emotional characteristics, cognitive characteristics and social factors (13,14). Eurofit tests applied to children of different age groups can be about determining general health and diet conditions, assessing exercise habits and providing data about children's anatomic and functional characteristics (6, 8). The success of wrestlers is determined according to athletes' physical characteristics, style and motivation, position during competition and the ability of moving and deciding in the most correct way. Determination and development of the characteristics of wrestlers for success can be possible only through scientific tests and studies. Determination of physical and physiological characteristics and monitoring the development of these characteristics is an important factor for success in wrestling (2). Physical characteristics and motor performance parameters vary by age and gender. Families and coaches can make successful planning if they know the differences in the physical characteristics and motor performances of children according to age and gender (16). Even the colours used in the field of sports have different effects on athletes (23).

The aim of this study is to find out the changes during the first year in physical and motoric

characteristics of wrestlers admitted to wrestling training centres.

METHOD:

Participants: A total of 39 wrestlers between the ages of 12 and 13 who were having regular training in the provinces of Samsun and Sivas participated in the study. Participation occurred on a voluntary basis. The first measurement of the wrestlers was taken within the first week they came to wrestling training centres. The second measurement was taken a year later.

Training program of wrestlers in wrestling training center: Between May and June, plays and basic techniques in wrestling were taught. Between July and August, basic techniques, skills and condition moves were taught. Between October and November, basic techniques, tactics and endurance moves were taught. In December and January, basic techniques, tactics and endurance moves were continued. In February, March and April, matches for techniques, tactics and competitions were made. There were trainings for five days a week (A training of 550 hours a week). Loading intensity was kept between 50-60%. Trainings included 20 minutes of gymnastic based warm-up, 40 minutes of basic-technique work out and 10 minutes of stretching.

Measurements: Grip force: Hand dynamometer was adjusted to the hand measurements of wrestlers. The wrestlers extended their arms straight without bending their elbows. The dynamometer was tightened with the arm on the side with an angle of 10-15 degrees from the shoulder. The best performance was taken after two trials with both hands (11).

Squat Jump: A full jump was performed with the knees of the wrestlers 90 degrees bent in squat position and the hands on the waist (1).

Anaerobic Power: Vertical jump distance was used to find out anaerobic power. The formula is as below.

$$P = \sqrt{4.9 \times \text{Weight} \times \sqrt{D}} \quad P = \text{Anaerobic Power (kgm/sec)} \quad D = \text{Vertical jump distance (m)}$$

$$\sqrt{4.9} = \text{Standard time}$$

Standing long jump: Behind a marked line, the wrestlers stood with their feet open shoulder wide and jumped forward. Both hands were taken backwards before jump. With the forward movement of the arms, a jump was made as forward

as possible and to the farthest distance. The best of the two trials was taken (18,21).

Throwing health ball: Health ball is 2 kg. The wrestlers threw the ball by opening their knees at shoulder width just behind the starting line. The health ball was grabbed with both hands and taken to the back of the head. After bending the trunk slightly backwards, the arms were thrown forward and the wrestlers tried to throw the ball at the farthest point from the head. The better of the two trials was recorded (21).

30 sec. shuttle: It was performed while the wrestlers were lying on their backs with their knees bent 90 degrees, hands on the back of the head and the soles touching the ground to make the highest number of repetitions in 30 seconds. The highest number of repetition was recorded (17,21).

30 m. Sprint: The start and finish lines of the ground were determined on a straight line to cover 30 meters. Photocell was placed to the start and finish line (21). The wrestlers started when they were ready and they tried to pass the finish line in shortest time possible. The best degree was recorded after two trials (1,17).

20 Meters Shuttle run test and VO2 max.: The wrestlers ran 20 meters round. Administration of the test: It starts with the speed of a slow run (8 km/h)

and the wrestler starts to run with the sound of the first signal. He should approach the line until the

sound of the second signal. When he hears the second signal, he goes back to the start and this running speed continues with signals increasing at 0,5 km/h each minute. When the wrestlers hear the signal, they adjust their tempo to be on the other side of the court with the second signal. The initial speed increases gradually. If the wrestler misses a signal sound and reaches the second one, the test continues. The test ends if the wrestler misses two signals in a row. Maximal VO2 value was calculated in ml/ kg/min, indirectly based on the shuttle run test and from the assessment table (22).

Statistical analyses: SPSS 23.0 program was used to analyse the data. Normality was examined with Kolmogorov-Smirnov test. It was found that the data obtained were distributed normally. Independent samples t test was used to compare the differences in average. Significance level was taken as $p < 0,05$.

RESULTS

Average values of the wrestlers' physical and motoric characteristics, standard deviations and comparison results are presented respectively in the tables below.

Table 1. Changes in anthropometric characteristics of wrestlers

Variables	Measurement	n	Average	St deviation	t-test
Age (Years)	First measurement	39	12,05	1,23	-3,57**
	Last measurement	39	13,05	1,23	
Height (cm)	First measurement	39	151,13	10,08	-2,38*
	Last measurement	39	156,49	11,04	
Weight (kg)	First measurement	39	45,53	12,41	-1,88
	Last measurement	39	50,94	13,04	

** $p < 0.001$

Ages are 12.05 years at the first measurement and 13.05 years at the last measurement. Height were determined as 151.13 cm in the first measurement and 156.49 cm in the last measurement. Body weights were 45.53 kg at the first measurement and 50.94 kg at the last measurement.

Table 2. Changes in some motoric characteristics of wrestlers according to years				
Variables	Measurement	Average	St deviation	t-test
Squat jump (cm)	First measurement	25,51	6,41	-2,16*
	Last measurement	30,20	5,38	
Vertical jump	First measurement	26,13	7,41	-2,29*
	Last measurement	32,45	7,54	
Long jump (cm)	First measurement	161,31	20,28	-3,23**
	Last measurement	176,77	21,92	
Right hand grip strength (kg)	First measurement	21,77	7,67	-3,39**
	Last measurement	28,24	9,12	
Left hand grip strength (kg)	First measurement	21,82	7,55	-3,45**
	Last measurement	28,31	8,97	
Health bal throwing (cm)	First measurement	517,44	150,81	-1,82
	Last measurement	580,52	156,11	
Sit-reach flexibility (cm)	First measurement	18,52	4,77	4,36**
	Last measurement	24,92	4,94	
30 seconds shuttle (n)	First measurement	21,71	4,27	-3,94**
	Last measurement	25,79	4,85	
VO ₂ max (ml/kg/min)	First measurement	47,74	2,74	-4,61**
	Last measurement	49,53	2,60	
30 metre sprint (sec)	First measurement	5,27	0,36	10,58**
	Last measurement	4,82	0,43	
Anaerobic power (kg.m/sec)	First measurement	51,37	17,62	-3,24*
	Last measurement	63,76	19,68	

** p<0.001

While Squat jump was 25.51 cm in the first measurement, it increased to 30.20 cm in the last measurement. The vertical jump, on the other hand, increased from 26.13 cm in the first measurement to 32.45 cm in the last measurement. While the long jump was 161.31 cm in the first measurement, it increased to 176.77 cm in the last measurement. While hand grip forces were around 21 kg in both hands in the first measurement, it increased to 28 kg in the last measurement. While the Sit-reach flexibility value was 18.52 cm in the first measurement, it increased to 24.92 cm in the last measurement. While the 30-meter sprint value was 5.27 seconds in the first measurement, it increased to 4.82 seconds in the last measurement.

DISCUSSION

When the body profiles of the wrestlers in athlete training centres were examined, average squat jump was found as 24.18 cm in 12-year-old wrestlers and as 29.21 cm in 15-year-old wrestlers (23). Average age of the wrestlers in wrestling training centre was found as 12.05 years in the first measurement and as 13.05 years in the last measurement. While average height was found as 151.13 cm in the first measurement, it was found as 156.49 cm in the last measurement; average weight was found as 45.53 kg in the first measurement and as 50.94 kg in the last measurement. The changes in ages and heights of wrestlers within a period of one

year were found to be significant ($p < 0.001$), while the changes in weights were found to be insignificant ($p > 0.05$). The fact that there was no significant increase in weight can be because they were in the period of starting to lose weight.

Squat jump value was found as 27.55 cm in 14-year-old wrestlers (4) and as 29.26 cm in 15-year-old wrestlers (5). In the present study, average squat jump value was found as 25.51 cm in the first measurement and as 30.20 cm in the last measurement.

When the body profiles of wrestlers in wrestling training centres were examined, average active jump (vertical jump) was found as 25.87 cm in 12-year-old wrestlers and as 31.27 cm in 15-year-old wrestlers (23). In the present study, average vertical jump value was found as 26.13 cm in the first measurement and as 32.45 cm in the last measurement.

When the body profiles of wrestlers in athlete training centres were examined, long jump value was found as 167.51 cm in 12-year-old wrestlers and as 198.90 cm in 15-year-old wrestlers Tekelioğlu et al. (23). Aslan et al., (2) found the average standing long jump value as 184.2 cm in the first measurement and as 182.7 cm in the last measurement within a period of one year. Average standing long jump value was found as 181.94 cm in 14-year-old wrestlers (4) and as 197.95 cm in 15-

year-old wrestlers Bayraktar et al.,(5). In the present study, the average standing long jump value was 161.31 cm in the first measurement and 176.77 cm in the last measurement. The changes in squat jump and long jump values of wrestlers within a year were found to be significant ($p < 0.05$ and $p < 0.001$). The significant difference between the first and last test values of the wrestlers in squat and jump tests can be due to the trainings they undergo in addition to the fact that they had grown up.

Average hand grip strength of wrestlers in athlete training centres was found as 23.33 kg in right hand and as 22.60 kg in left hand in 12-year-old wrestlers and as 37,04 kg in right hand and as 36.24 kg in left hand in 15 -year-old wrestlers (23). In their study, Aslan et al., (2013) found average hand grip strength as 26.1 kg in the first measurement and as 34.8 kg in the last measurement in wrestlers between the ages of 13 and 15. In one study, Bayraktar et al.,(5) found hand grip strength as 32.65-32.47 kg in right and left hand, respectively in 14-year-old wrestlers. In another study, Bayraktar et al.,(5) found hand grip strength as 37.98-37.58 kg, respectively in 15-year-old wrestlers. In the present study, while the average hand grip value was found as 21.77 kg for the right hand in the first measurement, it was 28.24 kg in the last measurement and it was found as 21,82 kg for the left hand in the first measurement and as 28.31 kg in the last measurement. The difference between the first and last test hand grip values of the wrestlers within one year was found to be significant.

In athlete training centres, average health ball throwing value was found as 465 meters in 12-year-old wrestlers, while it was found as 703 meters in 15-year-old wrestlers (23). Aslan et al. (2013) found average health ball throwing value in 13-15-year old wrestlers as 554 cm in the first measurement and as 612 cm in the last measurement. In a study, Bayraktar et al. (5) found average health ball throwing distance as 729 cm in 15-year-old wrestlers. In the present study, first measurement for average health ball throwing was found as 517.44 cm and last measurement was found as 580.52 cm. No significant difference was found between first and last measurement average health ball throwing values within a year ($p > 0.05$). The result that the change in health ball throwing was insignificant can be due to the fact that trainings are in the form of pulling most of the time. It can be recommended to include pushing and hand grip workouts in addition to pulling workouts.

In one study, Bayraktar et al. (4) found average max V02 value as 48.87 ml/kg/min in 14-year-old wrestlers, while in another study Bayraktar et al. (5) found average max V02 value as 51.19 ml/kg/min and anaerobic strength value as 73,63 kgm/sec in 15-year-old wrestlers. In the present study, average max V02 value of the wrestlers was found as 47.74 ml/kg/min in the first measurement and as 49.53 ml/kg/min in the last measurement. In their study, Aslan et al. found average anaerobic power value as 71.5 kgm/sec in the first measurement and as 79.5 kgm/sec in the last measurement in 13-15-year-old wrestlers. In the present study, anaerobic power values were found as 51.37 kgm/sec in the first measurement and as 63.76 kgm/sec in the last measurement.

In their study, Aslan et al. (2) found average 30 meter sprint value as 4.98 sec in the first measurement and as 4.97 sec in the last measurement in 13-15-year-old wrestlers. 30 meter sprint value was found as 4.94 sec in 14-year-old wrestlers (4) and as 4.76 sec in 15-year-old wrestlers (5). In the present study, while the average 30 meter sprint value was found as 6.07 sec in the first measurement, it was found as 5.11 sec in the last measurement.

When the body profiles of wrestlers in athlete training centres were examined, it was found that the average number of 30 seconds shuttles was 27.81 in 12-year-old wrestlers, while it was 32,25 in 15-year-old wrestlers (23). In their study, Aslan et al., (2) found the number of 30 seconds shuttles as 23.9 in the first measurement and as 27.4 in the last measurement within the period of a year. In one study, Bayraktar et al.,(5) found the average number of shuttles in 30 seconds as 31.98. In the present study, while the average number of 30 seconds shuttles was 21.71 in the first measurement, it was found as 25.79 in the last measurement.

In their study, Gül et al. (10) stated that there was a significant difference in sit and reach flexibility test in terms of years. In their study, while İmamoglu et al. (13) found the average sit and reach test value as 17.90 cm in 41 kg wrestlers, they found it as 22.06 cm in 37 kg wrestlers. While Özal (20) found the average flexibility measurement in 1999-2000 academic year wrestling training centre exam as 15.63 cm in children who passed the exam, they found it as 11.49 cm in children who failed the exam. Bağcı (3) found the average flexibility performance in 12-14-year old wrestlers as 20.85 cm in the first

measurement, they found it as 24.35 cm in the last measurement. In the present study, while sit and reach flexibility value was found as 18.52 in the first measurement, this value was found to increase to 24.92 cm in the last measurement. The flexibility values in our study were found to be different from the values in other studies. The reason for this can be anthropometric differences, age and weight differences and measurement differences between wrestlers.

In their study, Aslan et al. (2) found that hand grip strength, health ball throwing distance, 30 seconds shuttle, anaerobic power and 0 meter sprint values improved significantly in 13-15-year old wrestlers. On the contrary, they found that there was no significant improvement in vertical jump, standing long jump and 30 meter sprint values. While Cicioğlu et al. (7) found improvement in 30 second shuttle and flexibility of 15-17-year old wrestlers within a season, they stated that there was no improvement in terms of aerobic endurance and 20 meter sprint values. Gökdemir et al. (9) found significant improvement in hand grip strength and anaerobic power. Ziyagil et al. (25) found significant improvement in hand grip strength and flexibility values, while they did not find any improvement in aerobic endurance. In the present study, the differences between the average max V02, 30 meter sprint, number of shuttles in 30 seconds and sit and reach flexibility values of wrestlers within a year were found to be statistically significant ($p<0.05$ and $p<0.001$).

Conclusion: Among the motor performance parameters of the wrestlers, increases were found in sprint, abdominal strength, flexibility, anaerobic strength and aerobic endurance values within a year. No significant increase was found in shoulder-arm strength. Emphasis should be placed in pushing from the arm and shoulder area workouts in addition to arm pulling movements of wrestlers in their trainings.

REFERENCES

1. Açıkada C. Atletizm Yetenek Modeli Raporu, Atletizm Federasyonu Eğitim Kurulu Yayınları, Ankara. 2008.
2. Aslan C.S., Karakollukçu M., Gül M., Fişne M. 13-15 Yaş Güreşçilerin Fiziksel ve Motorik Özelliklerinin Bir Yıllık Değişimlerinin Karşılaştırılması, Spor Hekimliği Dergisi, 2013: (48):1-7.
3. Bağcı, O. 12-14 Yaş Arası Güreşçilerde 8 Haftalık Kuvvet Antrenmanının Bazı Fiziksel Uygunluk Parametrelerine Etkisi. Selçuk Üniversitesi Sağlık Bilimleri Enstitüsü Yüksek Lisans Tezi, 2016.
4. Bayraktar I., Deliceoğlu G., Kahraman E., Kamiloğlu D. A Investigation of Some Motor Attributes Which Are Effecting the Endurance and the Velocity of Young Athletes and Wrestlers, Uluslararası Hakemli Akademik Sağlık ve Tıp Bilimleri Dergisi, 2012a:2 (2):47-55.
5. Bayraktar I., Deliceoğlu G., Yaman M., Yaman Ç. The Comparison of Some Physical and Physiological Parameters of Sprinters And Throwers with Same Age Wrestlers, Uluslararası Hakemli Akademik Sağlık ve Tıp Bilimleri Dergisi, 2012b:3(2):36-45.
6. Chasan, K., Toksöz, İ., Sut, N. Physical Condition Evaluation of Students Between 8-11 Ages of Age By Eurofit Tests. SporHekimliği Dergisi, 2010, 45(1): 25-34.
7. Cicioğlu Hİ, Kürkcü R, Eroğlu H, Yüksek S. 15-17 yaş grubu güreşçilerin fiziksel ve fizyolojik özelliklerinin sezonsal değişimi. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, 2007: (5): 151-156.
8. Erikoğlu, Ö., Güzel, N.A., Pense, M., Örer, G.E. Comparison of Physical Fitness Parameters with EUROFIT Test Battery of Male Adolescent Soccer Players and Sedentary Counterparts, International Journal of Science Culture and Sport (IntJSCS), 2015: 3(3): 43-52.
9. Gökdemir K, Çeker B, Cicioğlu İ. Çabuk kuvvet antrenmanlarının 16-17 yaş grubu güreşçilerin bazı fiziksel ve fizyolojik parametreleri üzerine etkisi. Selçuk Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi, 1999: (1): 36-43.
10. Gül, M., İmamoglu, O., Özdal, M., Doğan, A. Güreş Eğitim Merkezi Güreşçilerinin Fiziksel ve Fizyolojik Özelliklerinin İncelemesi. II. Uluslararası Geleneksel ve Olimpik Güreşler Sempozyumu, 14-15 Eylül, Kahramanmaraş, 2012: 21.
11. Günay M., Tamer K., Cicioğlu İ. Spor Fizyolojisi ve Performans Ölçümü, Baran Ofset, Ankara, 2006.
12. Güneş S., Koca F., İmamoglu O. The Effect of 8 Weekly Alpiant Discipline Basic Ski Training on Balance, Flexibility, Quickness and Durability in Children 8-10 Age Groups, Turkish Studies, 2019: 14 (1): 381-393.
13. İmamoglu O., Yamak B., Çebi M., İslamoğlu İ. Antropometric and Motoric Characteristics of Certain Selected Primary School Student Wrestlers, The Journal of International Social Research, 2018: 11 (59):1469-1474.
14. İmamoglu, O., Çebi M., Yıldız M. The Research Of Consecutive Sprint, Jump and Leg Strength Relationships in U15 Football Players, The Journal of International Social Research, 2018 : 11(58):913-918.
15. İmamoglu M., Şener O.A. Comparison of Children's Motor Performances by Age and Gender, Universal Journal of Educational Research 2019:7(1): 10-15
16. Kabadayı M., Eski T., Bayram L., Yılmaz A.K., Mayda M.H. (2017). Analysis of The Factors Which Influence Participation Of University Students in Recreational Activities, European Journal of Education Studies, 3 (12):161-171.
17. Koca F., Güneş S., İmamoglu O. Investigation of The Effect of 8 Weekly Alp Discipline Basic Skiing Training on Force and Advanced Spring in Children 8-10 Age Group, Turkish Studies Social Sciences, 2019:14(3): 755-768.
18. Mackenzie B. 101 Performance Evaluation Tests, Elektrik Word plc, London, 2005.
19. Mirzaei, B., Curby D.G., Rahmani-Nia F., Moghadasi M. Physiological Profile of Elite Iranian Junior Freestyle Wrestlers, Journal of Strength and Conditioning Research, 2009: 23 (8): 2339-2344.
20. Özal, M. 1999-2000 Yılı Güreş Eğitim Merkezleri Sınavlarına Katılan Sporculara Uygulanan Testlerin Kazananlar ve Kaybedenler Açısından Araştırılması. Gazi Üniversitesi Sağlık Bilimleri Enstitüsü Yüksek Lisans Tezi, Ankara, 2001.

21. Pekel H.A. Atletizmde Yetenek Aramasına Bağlı Olarak 10-12 Yaş Grubu Çocuklarda Bazı Değişkenler Üzerinde Normatif Çalışma, , Gazi Üniversitesi Sağlık Bilimleri Enstitüsü Doktora Tezi, Ankara,2007.
22. Tamer K. Sporda Fiziksel-Fizyolojik Performansın Ölçülmesi ve Değerlendirilmesi, 2. Bası, Bağırhan Yayımevi, Ankara,2000.
23. Tekelioğlu A.,Hazır M.,Kabak B.,Ufuk P. “Vücut kompozisyonu”, Sporcu Eğitim Merkezlerindeki Sporcuların Sağlık ve Performans Profilleri, (Editörler: Işık Bayraktar, Gökhan Deliceoğlu), Gençlik ve Spor Genel Müdürlüğü Sağlık İşleri Daire Başkanlığı, Ankara, 2010: 86-125
24. Yamaner F., İmamoğlu G.,(2018). Sport Performance Colors Power and Effect, Turkish Studies, 13 (15): 509-520
25. Ziyagil MA, Zorba E, Kutlu M, Tamer K, Torun K. Bir yıllık antrenmanın yıldızlar kategorisindeki Serbest Stil Türk Milli Takım güreşçilerinin vücut kompozisyonu ve fizyolojik özellikleri üzerine etkisi. G.Ü. Beden Eğitimi ve Spor Bilimleri Dergisi,1996:1(4): 12-19.