

The Effect of Beginner Badminton Trainings on Anaerobic Power and Muscle Strength

¹Öztürk Ağırbaş, ²Eser Ağgön, ²Mehmet Yazıcı and ²Sibel Tetik

¹Bayburt University, School of Physical Education and Sport - Turkey

²Erzincan University, School of Physical Education and Sports, Erzincan - Turkey

Abstract: This aim of study was to determine the effects of 12 week badminton exercises both on anaerobic power and muscle strength. For this aim, 28 male volunteers, without health problems, whose average of age is 14.86 ± 0.53 years and average of length is 169.43 ± 5.57 cm and average of body mass is 62.14 ± 12.98 kg, participated in the study. Then, related parameters were measured before and after the applications. As the gained data showed normal distribution, "Paired Samples t-test" was applied in statistical program SPSS 15. There was significant differences among the pre-test and post-test values of leg strength, back strength and right hand grip $p < 0.01$. There was no significant differences among the pre-test and post-test values of anaerobic power, left hand grip and 30 seconds shuttle test ($p > 0.05$). As a result, basic badminton training exercises are believed to be important to increase the value of certain strength parameters.

Key words: Badminton • Anaerobic Performance • Muscle Strength

INTRODUCTION

Sports activities become diversified day by day in a more planned and comprehensive way; thus, participation of children and young individuals into sports activities increase. Children and teenagers generally start doing sports activities due to factors such as school, friend, teacher, family and surrounding environment. Thanks to sports activities they started, the children can obtain qualities such as a sound physical and mental structure and being aware of their own physical limits by learning better about their own bodies. A study conducted by Karacabey and Yılmaz indicated that while children's development is connected to external factors such as hereditary qualities, biological clock, nutrition and environment, physical activities have also a positive effect on this development [1]. Racket sports are also among physical activity groups that positively affect this development.

Depending on the type, volume and frequency of application, exercises have a significant role in aerobic or anaerobic performance and strength parameters [2]. According to Akgün, anaerobic power is a type of power that is used in various fields of sports at times and it is significant in sportive performance. Strength is one of

motor skills determining the performance in sports [3]. In general, it can be defined as 'the ability to withstand a resistance or the skill to bear up against a resistance at a certain extent' [4, 5]. Badminton is a branch of sport where legs, arms and upper body are used in a complicated way. If it is considered in terms of strength and muscular endurance; lack of strength and endurance in arms and body will show up towards the end of a long series of shots or game. Both attention and the power in shots decreases and the figure changes [6]. According to Çimen the strength can be increased with exercise. The muscle strength goes up with regular contractions against a resistance over the usual level. For a rapid increase, the muscle should be flexed regularly against a heavy resistance and the resistance should be increased as the strength decreases [7].

This aim of study was to determine the effects of 12 week badminton exercises both on anaerobic power and muscle strength.

MATERIALS AND METHODS

28 male volunteers participated in this study whose average of age is 14.86 ± 0.53 years, average of height is 169.43 ± 5.57 cm and average of body mass is 62.14 ± 12.98

kg. Subjects were provided basic badminton training exercises 90 minutes a day, 3 times a week for 12 weeks. Measurements were taken two times, before and after practices. Height was measured and recorded in cm's with a measurement tool and body mass was measured with electronic scale and recorded in kg's.

Anaerobic powers of subjects were evaluated with use of Bosco's jump meter [8]. Anaerobic power was calculated according to Lewis formula by using jump distance and body mass [9, 10]. Measurement of left and right hand powers were conducted with Takei Kiki Kogya brand hand dynamometer while subjects remained standing. Back and leg power was calculated by adjusting Prosport-TMR HBD 1000 brand dynamometer basing on heights of subjects. 30 seconds sit-up test was implemented in order to measure abdominal strength of subjects [11]. The data acquired from the study were subjected to descriptor statistics test in SPSS 15.0 for Windows statistics package program. Kolmogorov-smirnov test was used to determine whether the data were distributed normally. Afterwards, "Paired Samples T-Test" was applied in order to compare the values before and after exercise.

Participants were made to perform badminton practices 90 minutes per day, 3 times a week for 3 months. In a daily workout, after 15 minutes of warm-up exercises, participants carried out 60 minutes of badminton practice and 15 minutes of stretching and cool-down exercises at the end. Daily workout program was as such;

Week 1: Basic stance. Feet movements. Methods of approaching to the ball for shooting.

Week 2: Basic gripping moves. Teaching how to grip a racket and basic stance.

Week 3: Basic shooting moves: Teaching preparation stance, juggling practices, educational games regarding juggling.

Week 4: Basic shooting moves: Teaching forehand grip, teaching backhand grip

Week 5: Teaching serving types, high serving practice (forehand grip)

Week 6: Teaching serving types, low serving practice (forehand grip) educational games

Week 7: Blocking moves: A shot against shots, teaching directions and techniques of running

Week 8: Blocking moves: Strong shot against a strong shot. Side steps, teaching and practicing chip shot.

Week 9: Finishing Shots: Point-winning shot, stepping practices, practice of game on the net, dunking practice.

Week 10, 11 and 12: Offense and defense drills aimed at match and repetition of techniques.

RESULT

Pre-test and post-test values of the study that was conducted in order to analyze the effects of basic badminton training practices on anaerobic performance and various muscular strengths of boys are given in Table 1.

Table 1: Pre-test and post-test measurement values of anaerobic power and various muscular strengths of subjects

Variables (n=28)	Measurements	Mean	Sd	t	p
Vertical Jump (cm)	Pre - Test	50.36	5.65	0.559	0.585
	Post - Test	49.64	6.54		
AnaerobicPower (kg.m/sn)	Pre - Test	96.87	16.91	-1.395	0.186
	Post - Test	98.10	16.89		
BackStrength (kg)	Pre - Test	84.18	14.81	-2.959	0.011**
	Post - Test	93.68	13.04		
LegStrength (kg)	Pre - Test	94.39	21.33	-4.551	0.001**
	Post - Test	127.39	23.18		
Right Hand Grip Strength (kg)	Pre - Test	37.86	5.45	-3.454	0.004**
	Post - Test	40.61	6.32		
LeftHand Grip Strength (kg)	Pre - Test	35.75	5.23	-1.955	0.072
	Post - Test	37.54	5.01		
30 snSit-upTest	Pre - Test	23.57	4.86	-.876	0.397
	Post - Test	24.14	4.93		

* p< 0.05 ** p < 0.01

When the table is reviewed, while statistically significant differences were determined between pre-test and post-test values ($p < 0.01$) of back, leg and right hand strengths as a result of 12 weeks basic badminton training practices, there is not a significant change in left hand strength and 30 seconds sit-up test values ($p > 0.05$).

DISCUSSION

This study was carried out in an attempt to determine effects of 12 weeks basic badminton trainings on children's anaerobic power and various muscular strengths. As a result of 12 weeks badminton practices, there was not determined any change in values of 30 seconds sit-up test where children's vertical jumping and accordingly anaerobic power and strength were measured (Table 1). It is observed that the exercise program performed in our study did not make a significant change (Table 1). Revan and *et al.* reported that vertical jumping distance of Turkey National badminton team is 47.1 ± 6.8 cm and their anaerobic power values are 102.6 ± 16.2 kg.m/s [12]. In a study they performed, Sarıkaya and Gürer stated that vertical jumping distance of badminton players, who have average age of 21.90 ± 2.65 and perform physical exercises actively, is 48.75 ± 1.78 cm and their anaerobic power values are 101.03 ± 10.04 kg.m/s [13]. When results of this study are compared with our study, it is observed that these values are substantially close to the results of our measurements even though those studies were conducted on older subjects. In another study, it was stated that table tennis trainings also do not create a significant difference in anaerobic power and 30 seconds sit-up test values. It is seen that results of other studies in the literature support our study.

In our study, statistically significant increases were established in leg and back strengths (Table 1). In their study where they compared certain physical and physiological qualities of Turkish male athletes, who has an age average of 101.03 ± 10.04 kg.m/s and participated in European Badminton team championship, Poyraz and *et al.* stated that values of leg strength are 113.62 ± 12.74 kg [14]. Şahin established significant increases both in leg and in back strength values as a result of regular trainings in children between ages of 12-14 [16]. Along with especially the rapid growth occurring during adolescence, it is an expectable situation to see significant increases in strength parameters even in trainings of shorter period in muscle groups that are supported by exercise. Our study and results of other studies support this situation.

While a significant increase was determined in right hand strength of children as a result of 12 week badminton practices, there was not a significant change in left hand strengths values (Table 1). In their study named effect of 18-30 age period in athlete and sedentary males on anaerobic power and flexibility, Aslan and others determined anaerobic power as 133.23 ± 15.87 kg-m/s in athletes and as 120.13 ± 22.68 kg-m/s in sedentary males [17]. In his study, Şahin established back strength of university badminton players, who participated in the research, as 128.53 ± 25.81 kg, leg strength as 176.66 ± 58.29 kg, left hand strength as 44.87 ± 7.56 kg and right hand strength as 49.44 ± 8.95 kg [18]. In the study conducted by Yıldız and *et al.*, right hand strength of national male badminton players was found 29.69 ± 3.70 kg, left hand strength was found 25.50 ± 5.91 kg [20]. In another research, it was indicated that table tennis practices increase right and left hand strengths significantly [15]. Badminton is among fields of sports which are played with rackets and require use of hands and arms [21]. Mainly use of hands and arms affect big and small muscle groups in these limbs. As a natural result, there were increases in hand strengths as it is stated in this study. In previous studies, Şenel and *et al.* stated vertical jumping distances in male badminton players as 46.6 cm [22] as 53 cm [23] as 52.1 cm in male table tennis players [24] as 51.2 cm in male tennis players in 1st league and as 45.4 cm in male tennis players in 2nd league [25]. While some of the resources in review of literature indicate similar results that are in parallel with our study, some others state different results in certain parameters. We are of the opinion that the similarities and differences in literature results originate from differences in participant subjects' age groups, anthropometric and physiological qualities, application period and study types.

Results: As a result, it is seen that 12 week basic badminton training program brought a substantial contribution in certain parameters of boys in terms of strength. Therefore, it is thought that children in this age group can perform such sports activities for a healthy development and the same situation can apply to girls as well.

REFERENCES

1. Karacabey, K. and S. Yılmaz, 2004. The Conditions To Gain Maximum Efficiency in Turkish Physical Education, Eastern Anatolia Region Research, 3(3): 76-80.

2. Koç, H., 2010. Combined Training Program Effects on Aerobic and Anaerobic Capacities in Male Handball Players, Turkish Kick Boxing Federation, Journal of Sport Science, 3(2): 1309-1336.
3. Akgün, N., 1989. Exercise Physiology. Gökçe Ofset Matbaacılık, Ankara, 3(2): 66.
4. Dündar, U., 1994. Training Theory. Bağırhan Publisher, 4. Edition, Ankara.
5. Mathews, D., 1973. Measurement in Physical Education. Wth. Ed. WB. Saubders Co, Philadelphia, USA.
6. Omesegaard, B.O., 1996. Physical Training For Badminton. Mailingbeck A/S, Denmark, pp: 37-51.
7. Çimen, O., 1994. Effect of Quickly Strength Training On Some Motoric Parameters of Table Tennis Players aged 16-17 Years. Gazi University Institute of Health Sciences, Ankara.
8. Bosco, P., P. Luthanen and V. Komin, 1983. A Simple Method For Measurement of Mechanical Power In Jumping. European Journal of Applied Physiology, 50: 273-282.
9. Tamer, K., 2000. Measurement and Evaluation of Physical- Physiological Performance in Sports, Bağırhan Publishing House, Ankara.
10. Köroğlu, Y., C. Aksoy, Ö. Atar and H. Koç. 2016. An Examination of The Relationship Between 2d:4d Finger Length Proportions and Anaerobic Power in Athletes, European Journal of Applied Sciences, 8(4): 203-208.
11. Şipal, M.C., 1986. Eurofit Bedensel Yetenek Testleri El Kitabı, Publication of Turkish Prime Ministry G.S.G.M Foreign Relations Department, Publication Ankara.
12. Revan, S., M. Aydoğmuş, Ş.S. Balcı, P. Pepe and H. Eroğlu, 2007. The Evaluation of Some Physical and Physiological Characteristics of Turkish and Foreign National Badminton Team Players, Niğde University Journal of Physical Education and Sport Sci., 1(2): 63-70.
13. Sankaya, M. and B. Güreş, 2015. Comparison of The Active Badminton and Tennis Players' Certain Physical Characteristics, The Journal of Academic Social Science, 3(21): 554-560.
14. Poyraz, A., O. Baş, Y. Ocak, İ. Yıldırım and Y. Tortop, 2015. The Comparison of Some Physical and Physiological Parameters of The Athletes Having Participated in The European Badminton Championship, Journal of Sports and Performance Researches, 6(2): 121-133.
15. Ağgön, E. and Ö. Ağırbaş, 2015. The Effect of 12 Week-Table Tennis Training on Body Compositions, Anaerobic Performance and Muscle Strength of Boys, İnönü University Journal of Physical Education and Sport Sci., 2(2): 12-20.
16. Şahin, O., 2007. The Effect of Regular Exercise Training Exercise To Children Aged 12-14 Years of Age Period On Some Physical And Physiological Features. Master's Thesis, Selçuk University, Institute of Health Sciences, Department of Physical education and Sports, Konya.
17. Aslan, S.C., H. Koç and Y. Köklü, 2011. The Effects of 18-30 Years of Age Period on Strength, Anaerobic Power and Flexibility in the Sportsmen and Sedentary, Erciyes University Journal of Health Sciences, 20(1): 48-53.
18. Şahin, Z., 2013. The Examine of Some Physical And Physiological Parameters At Turkish Universities Badminton Team Coverage At Training And Movement Science Program, Master's Thesis, Gazi University, Institute of Health Sciences, Department of Physical education and Sports, Ankara.
19. Aydaş, F., S. Savaş and A. Uğraş, 2002. Comparison of The Selection Physical And Physiological Characteristics of The Turkish National Boxing Team Members With Two Different Boxing Teams. Gazi University Journal of Physical Education and Sport Sci., 7(2): 11-22.
20. Yıldız, S., Y. Taşkıran and K. Sertbaş, 2003. The Examine Of Some Physical And Motor Skills of National Badminton Player 11-15 Age Female And Male, Racket Science Symposium, 31 Ekim – 01 Kasım 2003, Kocaeli.
21. Hare, D., 1992. Principles of Sports Training. Sport Verlag: Berlin.
22. Şenel, Ö., N. Atalay and F. Çolakoğlu, 1998. Anthropometric, Body Composition and Some Performance Variables of Turkish National Badminton Players. Gazi University Journal of Physical Education and Sport Sci., 3(2): 15-20.
23. Lieshout, K.A., 2002. Physiological Profile Of Elite Junior Badminton Players In South Africa. Department of SPA. O. and Movement Studies, Rand Afrikaans University, Yüksek Lisans Tezi, Johannesburg.
24. Çimen, O., İ. Cicioğlu and M. Günay, 1997. The Physical And Physiological Profiles Of Male and Female Young National Table Tennis Players. Gazi University Journal of Physical Education and Sport Sci., 2(4): 7-12.
25. Gelen, E., Ö. Saygın, M. Karahan and K. Karacabey, 2006. Comparison Of Physical Fitness Properties Of Tennis Players In 1st and 2nd League Division. Fırat University Journal Of Health Sciences, 20(2): 119-127.