THE COMPARISON OF SOME PHYSICAL AND PHYSIOLOGICAL FEATURES OF ELITE YOUTH NATIONAL AND AMATEUR BADMINTON PLAYERS

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ABSTRACT

The aim of this study was to compare some physical and physiological features of elite and amateur badminton players. The sample of the study were totally 31 Turkish badminton players in 2010-2011 season; consisting of Youth National male players (n=16, age: 16.8±1.5) and amateur level male players (n=15, age: 16.3±0.8) from Sport High School. After the body composition of players were determined, agility test, sit and reach test, multiple reaction test, hand grip strength test and wingate anaerobic power test were applied to them. "Independent T-test" was applied for comparisons among independent groups. After statistical analyses, it was determined that elite players had higher values in height (cm), agility (second), right hand grip strength (kg) (p<0.01), body fat percentage and fat free mass (kg) (p<0.05) than amateur players.

As a result, it was seen that the elite and amateur level badminton affected the height, agility, hand grip strength and body composition (lower body fat percentage and higher fat free mass) of players positively.

Key Words: Badminton, physical and physiological characteristic, elite

GENÇ ELİTİMİLLİ VE AMATÖR BADMİNTONCULARIN BAZI FİZİKSEL VE FİZYOLOJİK ÖZELLİKLERİNİN KARŞILAŞTIRILMASI

ÖZET

Bu çalışmanın amacı elit ve amatör Badmintoncuların bazı fiziksel ve fizyolojik özelliklerinin karşılaştırılmasıdır. Araştırmaya, 2010-2011 yılında Türkiye Badminton Federasyonu'na bağlı lisanslı genç milli erkek (n=16,yaş:16.8±1.5) badmintoncular ile Spor Lisesinde badminton sporu yapan amatör düzey erkek(n=15,yaş:16.3±0.8)olmak üzere toplam 31 badminton sporcusu katılmıştır. Sporculara vücut kompozisyonunun belirlenmesinin yanı sıra fiziksel ve fizyolojik testlerden;çeviklik testi,otur-eriş testi, çoklu (multiple) reaksiyon test, el kavrama kuvvet testi ve wingate anaerobik güç testi uygulanmıştır. İstatistiksel analizler için bağımsız gruplar arası karşılaştırmalarda "Indepentend T- test" istatistiği uygulanmıştır. Yapılan karşılaştırmalar sonucunda elit sporcuların amatör sporculara göre boy (cm), çeviklik (sn) ve sağ el kavrama kuvveti (kg) değerlerinde p<0.01 düzeyinde; yağ %, ve yağsız beden kütlesi (kg) değerlerinde ise p<0.05 düzeyinde anlamlı farklılıklar tespit edilmiştir.

Sonuç olarak, benzer yaş grubunda, elit ve amatör düzey yapılan badminton sporunun, bireylerin boy, çeviklik, el kavrama kuvveti ve vücut kompozisyonu (düşük yağ % ve fazla yağsız beden kütle miktarı) değişimi üzerinde sporcunun gereksinimleri doğrultusunda değişim sağladığı düşünülmektedir.

Anahtar kelimeler: Badminton, fiziksel ve fizyolojik karakteristik, elit

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INTRODUCTION

Among the indoor games, badminton occupies a place of pride both as an individual as well as team sport. Scientific pedagogies and innovative approach have made the game more performance oriented than ever before (33). With the technical, tactical and training sides of the game, some other sides consisting of physical features, quick reflex and rhythmic movements have rendered the game a dynamic sport.

Badminton, like other racket sports, has in common a rapid succession of mostly short-term maximal or submaximal efforts and short recovery phases. In these sport branches, speed, resistance, strength, coordination, reaction, anticipation have been accepted as prerequisites of game skills and technical success (4).

It has been very important to determine the some specific features and parameters developing the performance of badminton players.

There have been a lot of studies in the literature aimed at determining the physical and physiological features of badminton players (28,10,18,37,19,30). Besides, some other studies have conducted to determine the relationship between the activity of lower extremity muscle group and stroke performance (32,31).

So it has become significant to determine some performance features of elite and amateur badminton players comparatively, to investigate the tests applied to form an elite level player profile and to measure from the point of physical and physiological features peculiar to badminton.

The determination of physical and physiological features peculiar to badminton has been thought as an important matter and most of the studies have been conducted in this way. A lot of studies for different age groups and categories measuring the physical profiles, explosive muscle strength, aerobic-anaerobic power of players have been published (36,2,9,26). In addition to these, the psychological demands of players have been tried to determine by the researchers during the trainings and games (13,6,7).

In the literature review, it has been understood that the significant studies have been aimed at determining a profile and the comparison of elite and non-elite players has not investigated immensely. So in this study, it has been aimed to compare some physical and physiological features of elite youth national and amateur level badminton players.

MATERIAL AND METHOD

Participants and Protocol

The sample of the study were totally 31 Turkish badminton players in 2010-2011 season; consisting of Youth National male players (n=16, age: 16.8±1.5) and amateur level male players (n=15, age: 16.3±0.8) from Sport High School.

The athletes were informed about the aim of study, their desire and motivation levels were tried to be enhanced.

They were also informed about the tests and they were wanted to fill the volunteer participation form and each measurement device was familiarized to them before the test.

Physical Performance Tests

The physical and physiological features of players have been tried to determine with these tests.

Anthropometric Measurements

Height and Weight Measurement: The height of players was measured by "Soehnle 5003". Body weight was also measured by an electronic scale to the nearest 0.5 kg.

Body Composition Measurement

Body Fat Percentage: Tanita "BC 418 MA" bioimpedance segmental body composition analyser (BiA) was used to determine the body composition of subjects.

Motor Tests

505 Agility Test: 505 Agility Test (12) was used to determine the agility levels of players. The players were wanted to try the test twice and to perform their best.

Flexibility Test: Sit and reach test was applied to determine their flexibility values.

Hand Grip Strength Test: In measurement period, the subjects were applied to a digital dynamometer (Takei TKK 5101; Takei Scientific Instruments, Tokyo, Japan). After the dynamometer was fitted for the hands of players, they tried the test three times. The tests were applied for each hand in standard position (applying strength to dynamometer with palm in sitting position) and the best score was recorded (8, 20).

Reaction Time Test: "Sport Expert Mps 501" multiple reaction test was applied to the subjects to determine the upper extremity reaction time (38).

Anaerobic Power Test: Wingate anaerobic power test (Monark 894E) was applied to determine the anaerobic power and resistance. Load was 0,75 gr/kg for the subjects.

Statistical Analysis: SPSS 17.0 package program was used for statistical analyses. "Independent T-test" was applied for comparisons among independent groups. The confidence interval was accepted as $p<0.05$ and $p<0.01$.

FINDINGS

Table 1. The Anthropometric Features of Elite and Amateur Badminton Players

Variables	Elite (n=16) Mean	Sd.	Amateur (n=15) Mean	Sd.	p
Age(year)	16.8	1.5	16.3	0.8	.345
Height(cm)	175.2	7.2	168.0	7.2	.009**
Weight(kg)	67.4	9.8	63.8	11.1	.355
Body Fat %	13.9	4.7	17.5	3.5	.026*
Fat Free Mass(kg)	57.9	8.3	52.2	7.4	.054*

** (p<0.01),*(p<0.05)

In the comparison of anthropometric features of elite and amateur badminton players, it was understood that elite players had higher values in height, body fat percentage and fat free mass than amateur players (p<0.01), (p<0.05), (Table 1).

Table 2. The Comparison of Some Physical and Physiological Features of Elite and Amateur Badminton Players

Variables	Elite (n=16) Mean	Sd.	Amateur (n=15) Mean	Sd.	p
Hand grip right(kg)	45.4	8.8	37.7	6.5	.010*
Hand grip left(kg)	41.4	8.4	38.5	8.5	.353
Agility (sn)	2.5	0.2	2.7	0.2	.001*
Flexibility (cm)	35.7	7.8	34.5	6.5	.641
Multiple reaction (sn)	0.5	0.01	0.5	0.03	.148
Peak power (w/kg)	11.6	1.5	11.2	2.3	.604
Average power (w/kg)	6.3	0.8	6.0	1.2	.423
Fatigue index %	81.5	6.6	78.8	4.4	.214

*(p<0.01)

In the comparison of physical and physiological features of elite and amateur badminton players, it was seen that elite players had higher values in right hand grip (kg) and agility (sn) than amateur players (p<0.01), (Table 2).

DISCUSSION

In this study, it was aimed to compare some physical and physiological features of Elite and Amateur Badminton Players. There were significant differences among height, body fat percentage and fat free mass values of youth elite and amateur badminton players (Table 1). In the comparisons, it was understood that elite players were taller, had lower body fat percentage and more fat free mass than amateur players (Table 1). In a similar study conducted by Ooi et al (28), it was seen that elite players were taller, heavier and

stronger. In another study conducted by Kafkas et al (19), there were significant differences in body fat percentage values (national players: 8,75±1,91, amateur players: 16,81±1,61) of same height and age group of junior national and amateur players, besides, national players were stronger and faster. The results of this study and literature review (19. 28) has showed that the age to start sport and the level (elite – amateur) of the individuals in the same age group have affected the physical development of them significantly. In some studies in order to determine the body composition of badminton players, Revan et al (30), found that the body fat percentages of elite Turkish and foreign national team badminton players were %10,7 and 11,2, respectively. In addition to that, Lieshout (22), indicated that the body fat percentage of male badminton players was between %10 and %15. Andersen et al (2) noted that average body fat percentage of 35 elite male badminton players was 12.9±0.5, the fat free weight of them was 68.8±0.9 kg. In a study on 10 elite badminton players by Majumdar et al (24), it was understood that the body fat percentage of them was 12.1±3.4. In another study by Lieshout & Lombard (23), it was seen that the body fat percentage of elite male badminton players was 9.6±1.6. When this study was compared to the other studies in the literature, the findings about body fat percentage of elite players (13,9±4,7) have showed similarity with the other studies (24,22,2,28). Besides, because of the fact that elite badminton players had lower body fat percentage and more fat free mass than amateur players, it was understood that the physical activity and the level of players led to important changes in body composition.

In this study, after the right hand grip strength values of players were investigated, it was seen that elite players were stronger than amateur players (p<0.01), (Table 2). Kafkas et al (19), found in the study on 11 year old badminton players that elite players (18,43±4,16 kg) had significantly higher values than amateur players (13,97±1,05 kg) in hand grip strength. When the values of Kafkas et al (19), were compared to this study, it was

determined that elite and amateur players had lower values in hand grip strength, so it could be said that the hand grip strength had considerably developed with the age and maturity level.

In a study by Cohen et al (11), on 15 year old adolescents, the hand grip strength of males was 39.0±7.9 kg. Although this result showed similarity with the findings of amateur badminton players in this study, the strength values of elite players were higher. So it could be said that elite level sportive activities had considerably improved the hand grip strength of individuals.

In a study by Yıldız (34), on men and women national badminton players, it was seen that the right hand grip strength of men players was 31.36±4.56 kg, the left hand grip strength of them was 29.22±5.86. Therefore the right hand grip strength values of badminton players were higher than the left hand grip strength values. With this result, it could be said that the right hand was more dominant than the left hand for badminton players.

When the reaction times of elite and amateur players were compared, there was no significant difference (p>0.05), (Table 2). Polat (29), found that the reaction time of control group was 0.8±0.1 sn, badminton group was 0.6±0.0 sn after 12 week badminton trainings and there were significantly differences between two groups. When the findings of Polat were compared to this study, it was possible to say that the reaction time values of players (elite 0.5±0.01 and amateur 0.5±0.03) were lower. This could be because the age group was different and national players had higher values in reaction time.

In this study, it was found that there was no significant difference in flexibility variable (p>0.05), (Table 2). In a similar study, Kafkas et al (19), found that there was no significant difference between elite (21,9±7,3 cm) and amateur badminton players (17,7±2,6 cm) in flexibility. So it could be said that flexibility was not a determinant of being an elite level player. Besides, with the development of flexibility, it has been widely known that the sport injuries have been largely prevented. Lieshout &

Lombard (23), found that the flexibility value of 14-18 year old male badminton players was 32.0±7.0 cm. This result has showed similarity with our study.

After the comparisons, it was seen that there was no significant difference between the anaerobic power of elite and amateur players (p>0.05), (Table 2). Nevertheless, it is understood that the anaerobic power values of elite players were higher (Table 2). In a similar study by Ooi et al (28), it was determined that there were no significant difference between the anaerobic power of elite and non elite badminton players. This could be because anaerobic power was not a determinant of being an elite level player in different game levels. Besides, anaerobic power is needed to be improved, due to the fact that there have been some conditions in the game like that short time quick attack, effective defense and sudden reverses. In the literature, it was noted that elite players had higher values in anaerobic power than non elite players in different levels (14). Horswill et al (17), found that there were significant differences in arm anaerobic power values (376±20 W - 331±22 W) and leg anaerobic power values (540±25 W- 467±29 W) of elite (n=18) and non elite (n=18) wrestlers, who were in the same age group, same weight and sport age. Abellan et al (1), noted that there were significant differences in arm anaerobic power values (peak power: Elite 781±154W- Amateur: 643±140 W, average capacity: Elite 523±83 W- Amateur:433±78W) between the elite and amateur wrestlers and the anaerobic power had an important role in the success of a wrestler. Franchini et al (15), said that there were also significant differences in arm average anaerobic capacity (5,73±0,77– 5,36±0,75) and peak power W/kg (7,63±0,98– 7,00±1,30) values between the elite and non elite judoists. Kounalakis et al (21), determined that the arm anaerobic peak power and average capacity values of elite and amateur handball players were 7,6±0,8 W/kg – 6,7±1,1 W/kg and 5,3± 0,6 W/kg – 4,7±0,9 W/kg respectively and it was understood that elite handball players had significantly higher values. With these results,

considering the physiological demands of sport branches, it could be said that anaerobic power and capacity had an important role for being an elite athlete. In a study by Zagatto et al (35), on elite table tennis players whose average age was 18±3, it was found that the anaerobic peak power was (W/kg) 11.6±0.8 and the average anaerobic power was (W/kg) 9.1±0.8. In another study conducted by Meckel et al (25), on adolescent football players (16-18 years old), it was seen that the anaerobic peak power was (W/kg) 10.6±0.9 and the average anaerobic power was (W/kg) 8.7±0.4. Bradley et al (5), also found that the average anaerobic power of adolescent athletes was (W/kg) 5.3±0.7. When this result was compared to our study, it was said that the badminton players had higher values in anaerobic power variable.

When the agility values of elite and amateur badminton players were compared, it was seen that elite players were more agiler than amateur players (p<0.01), (Table 2). So this has been because agility has been an important determinant for elite and amateur players in badminton. In the study by Hazar & Taşmektepligil (16), on badminton players, whose average age was 12±0.96 years, the average of Illinois agility test was 22.38±1.58 sn. In another study by Okudur (27), on tennis players, the T-drill agility test values were 11.06±0.79 sn. In the study conducted by Atacan (3), on tennis players (14-15 years), it was determined that Illinois agility test values of tennis group were pre test; 17.13±0.48, post test; 15.95±0.50 and the values of control group were pre test; 17.43±0.50, post test; 17.08±0.47. Therefore the regular trainings have affected the agility ability of athletes positively.

As a conclusion, it was determined that the elite players had lower body fat percentage, were taller, stronger and more agiler than the amateur players. As is seen in the studies about elite and amateur level differences, the training programs and frequency developed for badminton as well as physical and physiological fitness to level up the athletes elite level have been a very important role in developing both

morphological and functional features of athletes.

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