COMPARISON OF AEROBİC, ANAEROBİC POWER FEATURES BASKETBALL AND HANDBALL TEAM PLAYERS'

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ABSTRACT

The aim of this study was to compare whether there were differences or not in aerobic and anaerobic power features of Süleyman Demirel University men's basketball and handball team players. 24 athletes joined to the study who are players of Süleyman Demirel University basketball (n=12) and handball (n=12) team. All measurements of ahtletes who joined to the research were applied at Süleyman Demirel University Atatürk Sport Hall and Performance Testing Laboratory. Measurements of 20 m Shuttle Run and Wingate Anaerobic Power tests were taken from ahtletes. Handled datas were compared by using "Independent Samples t-Test" at SPSS 18.0 Statistic Programme. As a result of comparing lenght, weight, 20 m shuttle run test, wingate anaerobic power test absolute and relative values of basketball and handball players, differences were found to be statistically significant (p<0.05). To conclude, differences were defined between the two branches as evaluating in terms of the results of basketball and handball players of aerobic and anaerobic power parameters. As a result of this, we are thinking that this is due to differences in playing time, different training methods and the physical differences that the branch needs

Key Words: Basketball, Handball, Aerobic, Anaerobic

BASKETBOL VE HENTBOL TAKIM OYUNCULARININ AEROBİK, ANAEROBİK GÜÇ ÖZELLİKLERİNİN KARŞILAŞTIRILMASI

ÖZ

Bu çalışmanın amacı, Süleyman Demirel Üniversitesi erkek basketbol ve hentbol takım oyuncularının aerobik ve anaerobik güç özelliklerinde farklılığın olup olmadığını karşılaştırmaktır. Bu çalışmaya Süleyman Demirel Üniversitesi basketbol (n=12) ve hentbol (n=12) olmak üzere toplam 24 sporcu katıldı. Araştırmaya katılan sporcuların tüm ölçümleri Süleyman Demirel Üniversitesi Atatürk Spor Salonunda ve performans test laboratuvarında yapıldı. Sporculardan 20 m Mekik Koşusu Testi ve Wingate Anaerobik Güç Testi ölçümleri alındı. Elde edilen veriler SPSS 18.0 istatistik programında "İndependent Samples t-Testi" kullanılarak karşılaştırıldı. Basketbolcu ve hentbolcuların boy, vücut ağırlıkları, 20 m mekik koşusu testi, wingate anaerobik güç testi mutlak ve relatif değerlerinin karşılaştırılması sonucunda istatistiksel olarak anlamlı fark olduğu bulundu (p<0.05). Sonuç olarak, basketbol ve hentbol oyuncuları, aerobik ve anaerobik güç parametre sonuçları açısından değerlendirildiğinde iki branş arasında farklılıklar tespit edildi. Bunun sebebi olarak, oyun süresindeki farklılıklar, farklı antrenman yöntemleri ve branşın gereksinimi olan fiziksel farklılıklardan kaynaklandığını düşünmekteyiz.

Anahtar Kelimeler: Basketbol, Hentbol, Aerobik, Anaerobik

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INTRODUCTION

Basketball and handball are two sport branches which attract great attention and have millions of fans and players all over the world. Basketball and handball are favorite games among young people on account of the fact that they are games relatively easier and pleasurable to play and which help to improve group dynamics (Koç and Büyükipekçi, 2010). Basketball and handball are named as discontinuous games owing to the fact that they are games which involve extensive usage of both aerobic and anaerobic systems and which have alternating faster and slower episodes (Can, 2009).

In order for players to be able to have physiological resistance in long lasting sport activities, they need to improve their strength and aerobic strength qualities. In improving the strength of basketball and handball players, assessment of aerobic capacity, planning and guiding training and efficiency of training programs are higly important (Gürses, 2011).

Various field and laboratory tests are used in order to measure physiological qualities of players in team games such as basketball and handball. These tests help trainers and sport scientists alike to determine the players' talents, improve strength and power, provide information for individualized training program and determine the changes in physical properties at the end of a training program (Lemmick et al., 2004; Boraczysnki and Urniaz, 2008).

While anaerobic power is of importance for every sort of sport activty, it is especially more important in certain sport branches in which anaerobic power is intensively used. As it is known, instantaneous high power is required in many games such as basketball, handball etc. and this need is met by anaerobic energy system (Bencke et al., 2002). When all these are taken into consideration, players' anaerobic power and capacities are of great importance because they play a great role on performance (Özkan, 2011).

This study was done for the purpose of contribute to athletes' specific performance development and define the differences between branches in terms of aerobic and anaerobic capacity values in basketball and handball branches showing similar features in physical, physiological, motoric and game characteristics.

METHODS

12 basketball and 12 handball players from Suleyman Demirel University participated to the study. The subjects were informed about the content of the study in order to obtain the best measurement values. All the measurements were conducted in the performance test laboratory in Ataturk Gym on the campus. To standarzing the study, all the measurements were conducted between 14:00 and 16.00 hours.

Weight Measurement: The measurements were conducted with the players barefoot wearing t-shirts and tights using an electronic weighting scale with 0.5 kg precision.

Height Measurement: Height measurements were done with a height scale with 0.1 mm precision.

Shuttle Run Test: The test was conducted on a 20 meter straight track with marks at the start and end of it. The players were given signals from a buzzer. The players were asked to be ready in the 2 square meter area before the start and finish lines. The players had a 20 minute warmup before the test. The speed was 8.5 km/h at the start and was raised 0.5 km/h per minute in accordance with the test protocole. The players were told to step on the start and finish line at

the end of each shuttle run. Each signal that a player caught counted as a shuttle while those he failed to catch counted as a failure. When a player had three failures in a row, the test was terminated. The estimated MaxVO2 was calculated by using the following formula:

MaxVO2= 31.025 ± 3.238X- 3.248A ± 0.1536AX (Leger et al., 1988).

Wingate Anaerobic Power Test: A Monark trade mark 894 E cycle ergometer with connected computer was used for the test. The players performed 15 minute warm up before the test. In order to obtain the highest possible efficiency from the test, the players were given a 3 minute recovery time after the warm up. Height, weight and age of each player were recorded prior to the test. After that, the given loads were placed

and the player started to pedal with his utmost power. When he reached the maximum speed, the loads were taken off in order to start measurements. After the test, which lasted only 30 seconds, the players' data were recorded.

Heart Rate Measurement: Heart rates were measured with a polar watch (Polar RS-400). The maximal heart rate was measured just after the 20 meter shuttle run.

Data Analysis: SPSS Windows 18.00 package was used for the data analysis. Independent Samples t-test was used in order to determine whether there was a statistically significant difference between the measurements. The results were evaluated based on "p<0.05" significance level.

RESULTS

Table 1. Comparison of Demographic Information of the Basketball and Handball Players

Variables	Groups	X	Ss	t	p
Age (year)	Basketball	22.25	1.81	-.38	.708
	Handball	22.50	1,38		
Length (cm)	Basketball	190.66	8.75	3.45	.002*
	Handball	181	4.17		
Body Weight (kg)	Basketball	86.33	11.61	2.35	.028*
	Handball	77	7.29		

*p<0.05

Upon analyzing the Table 1, significant difference was found statistically in comparison of height and body weight values of basketball and handball players.

Table 2.Comparison of Shuttle Run Test of the Basketball and Handball Players

Variables	Gruplar	X	Ss	t	p
Shuttle Run Test Completion Time (min)	Basketball	10.92	1.43	2.57	.017*
	Handball	9.71	.76		
Shuttle Run Test Running Speed (km/speed)	Basketball	14.04	.98	2.57	.017*
	Handball	13.25	.39		
Shuttle Run Test Running Number (piece)	Basketball	99.91	16.14	2.69	.013*
	Handball	85.83	8.21		
Shuttle Run Test Running Distance (m)	Basketball	1994	319.08	2.67	.014*
	Handball	1716.66	164.22		
Maximum Heart Rate (beats/min)	Basketball	190.66	7.16	3.88	.001*
	Handball	180.08	6.15		
MaxVO2 (ml/kg/min)	Basketball	52.15	7.28	2.42	.024*
	Handball	46.65	2.94		

*p<0.05

Looking the Shuttle Run Test parameters at the Table 2, difference was found to be statistically significant between branchs.

Table 3. Comparison of Absolute and Relative Values Anaerobic Power Test of the Basketball and Handball Players

Variables	Groups	X	Ss	t	p
Peak Power					
Watt	Basketball	998.59	73.66	3.931	**.001***
	Handball	830.47	128.54		
Kg/Watt	Basketball	11.46	1.31	2.273	**.033***
	Handball	10.14	1.50		
Average Power					
Watt	Basketball	661.98	89.53	3.673	**.001***
	Handball	537.05	76.58		
Kg/Watt	Basketball	7.69	.85	2.701	**.013***
	Handball	6.6	.95		
Minimum Power					
Watt	Basketball	375.67	103.12	2.629	**.015***
	Handball	286.44	56.48		
Kg/Watt	Basketball	4.40	.79	2.524	**.019***
	Handball	3.69	.54		
Dropp Power					
Watt	Basketball	646.81	60.12	2.414	**.025***
	Handball	554.27	118.40		
Kg/Watt	Basketball	7.50	1.25	2.223	**.037***
	Handball	6.32	1.35		

*p<0.05

Upon analyzing the Table 3, significant difference was found statistically in comparison of absolute and relative values of the wingate anaerobic power test of basketball and handball players.

DISCUSSION

This study seeks to compare some physiological qualities and aerobic and anaerobic powers of handball and basketball players. Handball (n=12) and basketball (n=12) players from Suleyman Demirel University took part in the study. The players, who were all Suleyman Demirel Univesity students, voluntarily participated in the study.

The age average of the basketball players who participated in the study was 22.25±1.81 years, height average was 190.66±8.75 cm and weight average was 86.33±11.61 kg; the age average of the handball players was 22.5±1.38 height average 181±4.17 cm and weight average was 77±7.29 kg. Significant differences were determined between the basketballers and handballers in terms of height and weight (p<0.05). This may be due to the fact that the two branches require different physical qualities.

Aerobic power is the most effective factor on performance in endurance sports such as basketball and handball. There is a strong relation between maximal aerobic capacity and the ability to continue an intensive effort. Maximal aerobic capacity is considered the best criterion of the cardiorespiratory strength capacity (Akgün, 1994). When we compared the respective shuttle run test results of the basketballers' and handballers', a significant difference was determined (p<0.05). In the light of these results, it is

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possible to conclude that aerobic strength of the basketball players is higher compared to that of the handball players. We can say that this is because of the characteristic feature of basketball game and the better physiological capacities of the basketball players.

In a study investigated the effect of fatigue on shooting tecnique among young basketball players. He found the following results: shuttle run test finish time 9.08±1.26 mins, test running distance 1621.54±188.58 m, MaxVO2 36.79±5.21 ml/kg/mins (Mülazımoğlu, 2012). The values found in the above study are lower than those in ours, which may be attributed to the players' being younger.

Savucu et al. (2006) found average shuttle run number 80.83±19.89 for the basketball players and 70.67±7.43 for the handball players in a study in which they compared the physical fitness parameters of elite female basketball and handball players. It is seen that the basketball players both in the study by Savucu et al and in ours, though they are from opposite sexes, have better strength than the handball players.

In another study in which compared field and laboratory tests, which were employed to determine aerobic capacity found shuttle run test distance as 1940±244.32 meters, MaxVO2 52.31±3.04 ml/kg/mins and maximum heart rate 194.64±10.09 beat/min (Alemdaroğlu, 2008). The values found in that study bear resemblance to those in our study.

In a study on tennis players investigated the effects of aerobic-anaerobic combined tecnique training programs on performance. In the study, for the shuttle run test prior to the training the values determined were as follows, maximum heart rate 180.4±10.3 beat/min., MaxVO2 41.8±3.8 ml/kg/min., After the training, maximum heart rate 172.5±8.9 beat/min.,

MaxVO2 44.0±4.0 ml/kg/min (Suna, 2013). While some values bear resemblance to those in our study, others do not. From our point of view, this difference may stem from individual differences, training experiences of the athletes.

MaxVO2 is known to be the most important criterion for determining the performance capacity of athletes in aerobic strength exercises. Pamuk et al. in a study they conducted in 2008 on players from second division and regional division found MaxVO2 average 50.80±11.57 ml/kg/min., for second division players and 46.65±3.97 ml/kg/min for the regional division players. Büyükyazı and Sevim determined MaxVO2 average for basketball players as 46.53±0.34 ml/kg/min in a study they conducted in 2000. Erdağlı in a study conducted on 36 basketball players in 2003 found MaxVO2 average 45.28±0.38 ml/kg/min. In still another study, MaxVO2 average of basketball players were determined 47.11±0.92 ml/kg/min (Cicioğlu, 1995). The values found in the studies above and those we determined are similar.

In the study, when the absolute and relative wingate anaerobic power values were investigated, significant differences were observed between the groups (p<0.05). Because of the structural nature of basketball players, we can say that it has the ability to use the absolute and relative strength at its optimal level because of its long paint, long arms and legs.

Orhan et al. (2008) investigated the effects of rope and weight rope exercises on physiological parameters of basketballers'. relative anaerobic power values determined for the rope group: peak power before the test 13.66±1.87 watt/kg, peak power after test 16.7±3.45 watt/kg; for the weight rope group anaerobic peak power before the test 14.36±2.67 watt/kg, after the test

16.46±3.28 watt/kg, the average anaerobic power for the rope group before the test 6.96±0.66 watt/kg, after the test 7.53±0.72 watt/kg, the average anaerobic power for the weight rope group 6.86±0.76 watt/kg, before the test 7.73±0.82 watt/kg after the test. The reason why WANT relative anaerobic power values of the basketballers' in the above study are higher than those in ours may be attributed to the different training programs applied.

Arabacı et al. (2007) in a study they conducted on male handballers' from Turkish Super Division, found maximum power 1074±195.5 watt, minimum power 403±98.2 watt, average power 577.53±114.5. In this study, the handball players' WANT values are higher than those in our study. This may stem from the fact that different training programs were applied because of the categorical difference between the sample groups.

Kılıç and Özen (2015) compared the anaerobic power values of a group of elite Greco-Roman and free style wrestlers in

a study conducted and determined the following values, absolute WANT values of the free style wrestlers, maximum anaerobic power 897.3±206.3 watt, absolute WANT values of the Greco Roman style wrestlers, maximum anaerobic power 939.4±221.9 watt. Relative WANT values of the free style wrestlers, maximum anaerobic power 11.9±2.1 w/kg and relative WANT power values of the greco roman style wrestlers, maximum anaerobic power, 12.3±1.8 watt. The findings in the above paragraph bear resemblance to ours.

Koşar and İşler (2004) investigated wingate anaerobic performance profiles of a group of university students and sexual differences in a study. They determined maximal power as 638.37±141.86 watt, average power 487.97±101.49 watt, and minimum power 372.61±63.34 watt. These values are lower compared to those in our study, which may be attributed to the fact the research group consisted of sedentary students.

CONCLUSION

When evaluated, the aerobic and anaerobic power parameters of the basketball and handball players have shown that there are certain differences between the two games. It was found that the basketball players had higher aerobic and anaerobic values than the handball players did. We can say that this is due to differences in playing time, different training methods and physical differences between the branches. While the values

found in our study bear resemblance to those in some studies, they differ from others. When the findings in our study and in the literature are investigated, it is possible to conclude that aerobic and anaerobic power parameters are determining criteria for performance in basketball and handball. Besides, the data obtained in our study will be taken as a reference by future studies and illuminate sport scientists and trainers alike.

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