

The Effects of Power, Speed, Skill and Anaerobic Capacity of Different Training Models in Young Male Basketball Players

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ABSTRACT The purpose of the present study is to examine the power, speed, skill and anaerobic capacity on men's basketball for 16 weeks endurance training along with the general basketball training. The study involved 36 male basketball players such as, Control Group (CG), Endurance Group (PE) and the General Endurance Group (GE). The shot test, 20 m running test, squat jump, countermovement jump, running-based anaerobic sprint tests were applied to the groups during the Pre-Exercise and Post-Exercise. Mann-Whitney U test was used to determine the differences between evaluations of the groups. While considering the Running Based Anaerobic Speed Test of the Difference among groups in the evaluation of 2nd, 3rd, 4th, 5th, and 6th in run evaluation Pre-Exercise was between CG and PE and between CG and GG, Post-Exercise was in favor between CG and PE in all running values. When considering the Power Index Between Difference Groups, In evaluation of The Pre-Exercise, values were 2nd, 3rd, 4th, and 5th runs, and there was significant difference between the groups CG and GD and CG and PE. As a result, it is considered to be appropriate for practicing the method in the development of young basketball players of the cardiovascular and metabolic stability in addition to specific agent's interval training.

INTRODUCTION

Nowadays, basketball has the ability to show the improvements by having a great potential in our country and in the world; moreover, it can also increase the performance which can strengthen the social dialogue amongst people as well as showing developed sport with different training methods.

Day by day, the increasing number of athletes brings high-level achievements in team sports such as basketball. Therefore, fitness parameters have come to the fore, such as cardio-respiratory fitness is required for basketball, muscular strength, muscular endurance, and flexibility along with body composition parameters. The athletes maintain high level of physical capacity during long periods, which is of great importance in this respect. These physical attributes determine the degree of motor sports items of an individual's body and power capabilities due to the complex power of nature. That's why, players should have particular physical skills to fulfill defense and offense skills in game (Tusurawake 2003; Brittenham 1997; Savucu 2001; Sevim 1991).

Since basketball games are to be based on height due to air dominance, the height is an important physical feature to determine the performance. It is stated that in today's basketball game, it is completely carried out the high per-

formance and as a result of the success achieved with tall and athletic player types (Miller 1996; Smith 1991). Such features are also a factor in changing several motor characteristics. Although it has a negative effect on the mobility and the related motor properties (Açıkada 1990), it is suggested that tall basketball players shooting the rise of the curve can provide less use of force by means of the expenditure shot (Stone 1993).

The required energy for short time and narrow space technical skills applications are produced by anaerobic way; thus it is known that basketball is a game that requires a high level of anaerobic fitness (Karakas 1985; Fox 1988; Günay 1999).

It has been concluded that approximately 20% of basketball consists of aerobic, whereas 80% anaerobic; however, 80% of the total energy contribution of anaerobic energy systems, including anaerobic-aerobic-anaerobic are continuously variable (Dündar 2004).

It is known that high energy formation is needed for the implementation of the movement in a short time span in several sports. The basketball game removes the human organism and its expenditure to the foreground such as; leap, jump and sprint, especially through the applications of anaerobic energy (Fox 1988; Dündar 2004).

From 15-17 years of age star men's basketball players were included in the current research

in order to determine the effects in terms of power, speed, skill and anaerobic capacity for 3 months through different training models across the training mode with the exception of the game's internal structure which is more suited to the developed training models.

MATERIAL AND METHODS

The volunteered male athletes between the ages 15-17 and 36 playing basketball participated in this research. Three groups were formed randomly which consist of 12-athletes. They were called General endurance (GE), Power Endurance Group (PE) and Control Group (CG).

Regular and Known General Basketball Training Exercises (Control Group Exercises)

In this part, sportsmen used routine training plans. In such plans, these sections were practiced; warming-up (20 min.), drills to improve self-movement techniques (40min= 10 min dribbling, 20 min shot drills, 10 min pass Works), tactic trainings (30 min), and 5x5 full court match.

Power Endurance Group Exercises

Training program consists of 4x15 min period technique and tactical movements, 3 passive stops (2x2 min and 1x15 min). The group used double, triple and quad pass drills. Double pass drills, triple pass drills and quad pass drills were practiced. The third part for throwing shot; in this part self and pair drills throwing shot studies done. In self- shot and pair-shot exercises, 4 different points were determined and 5 lap shots throwing were practiced by the players.

General Endurance Group Exercises

This training model examines consistently planned basketball competitions and is used continuously in order to enforce basketball competitions in general. For example, athletes do not do high intensity work more than 10-15 seconds and they are not to run over 20 m. without changing their directions nor are they to perform more than 50-60 high density jumps. The main objective for this training model was an active defense and thus the studies were selected from the most common case of a basketball competition. The drills were 1-1, 2-2, 3-3, 2-3 and 3-2 which provide offense and defense drills. Each drill consists of 15 min as well as five exercise

periods, whose approximate time was 10-15 sec. and they took between 15 seconds and drills. The rest period had to be applied; moreover, each period was planned to last for 10 min.

This main aim of this exercise was to develop applications such as giving pass, dribbling and shots. Between the studies, active rest was provided by performing 10 free throws. During the remaining 20 minutes of training, a 5x5 full-court game tactics exercises were performed.

Measuring of Weight and Height

All the players' weights and heights were measured by SIMBO SBS-4414 labeled digital weight and height machine (sensitivity= 0.01gram)

Corporate Shuttle Running and 2 Min. Shot Test; (Corporate Shuttle Test)

Subject's thrower shots from 2 points lasted for 2 minutes. They dribbled during 212, 4 m by circling the funnels which were placed at 6 different points.

20 m. Speed Running Test (20 m sprint test) and 35 m. Running Based Anaerobic Speed

Test (Rast) (Tiredness index Measurement)

To implement this test by the players, passing through the PROSPORT TMR ESC-2200 Photocell appliance that was placed exactly measured on the start and finish lines and the result by measuring with Telemetry Timing System labeled digital chronometer were taken as a second type. After that the test power index and tiredness index were counted through the formulas given below.

Power index=weight X distance²/time³

Tiredness index=max. Power – min. Power/total time for 6 running.

Collective Shuttle Run (Corporate Shuttle Test)

The players drove the ball around the funnels placed at six different points on the court with a total distance of 212.4 m. The 3 rounds test results of subjects were recorded on a personal data card.

2 min. Shooting Test (Thrown Shot Score)

Two-point shot threw for 2 minutes. Subjects who ran backwards after each shot in the midst of the field turned around the funnel and took

pass from the player standing under the basket for the next firing. During the process, every shot and current numbers was saved.

Power Measurement was Evaluated with Two Protocols

a) Squat Jump (Squat Jumping Test): The subjects performed a maximal vertical jump with their hands on the waist, starting from an angle of 90° at the knee.

b) Countermovement Jump (Countermovement Jumping Test): Subjects performed a maximal vertical jump starting from a standing position with arm swing. All jumps were performed on the Ergo jump (Globus Inc., Italy) that recorded the flight time of all jumps. The flight time was used to calculate the change in the height of the body’s center of gravity.

RESULTS

The groups participated in the study were 16 years old, athlete biographies were 5 years, length; CG = 182.08 ± 2.35 cm, PE = 181.08 ± 2.60 cm, GE = 182.67 ± 2.34 cm, and body weights, CG = 68.10 ± 5.91 CG, PE = 69.76 ± 5.68 CG of GE = 70.57 ± 3.60 36 men’s basketball players who participated in the exercise were detected. When Players in the study were examined according to anthropometric measurements it was found that there was homogeneous distribution.

The pre and post evaluations of the groups that participated in study was; in CG 20 m sprint test, the current shooting test, in PE group 20 m sprint test, the shooting numbers, the current shooting test, in batch shuttle tests, in GE group, the shooting numbers, current shooting test after the exercise it was found that there were statistically significant differences, while there were no differences in the other tests. When evaluating the initial measurement of the inter-group differences in the first participating group in the study; in 20 m sprint test CG and GE difference in favor of GE, the difference between PE and GE was in favor of GE, the difference between PE and GE in the shooting number was in favor of GE and in collective shuttle test the difference between CG and PE was determined statistically in favor of PE. The differences of shooting number of evaluation after the exercise were CG and PE, which was in favor of PE, the difference between CG and GE was in favor of GE, the difference of the current smash test the difference between CG and PE was in favor of PE, the difference between CG and GE was in favor of GE, the difference between PE and CG was found favor of GE. In collective shuttle test the difference between CG and PE was determined statistically in favor PE.

DISCUSSION

The main age of groups who participated in the study was 16 years, athlete biographies was

Table 1: Twenty-meter sprint, scored number of shots, shots number of current, collective shuttle, squat jump, countermovement jumping test

Factors	Times of measuring	N	CG		PE		GE	
			Mean ± SD	P	Mean ± SD	P	Mean ± SD	p
20 M Sprint Test	B.E	12	3.63± 0.16	0.000*	3.49± 0.30	0.035*	3.26± 0.13	0.450
	A.E	12	3.25± 0.11		3.26± 0.18		3.16± 0.09	
Thrown Shot Score	B.E	12	14.08± 1.62	0.329	14.91± 1.08	0.000*	13.25± 1.28	0.000*
	A.E	12	14.83± 2.03		17.91± 1.08		19.00± 0.85	
Valid Shot Score	B.E	12	6.16± 1.40	0.000*	7.00± 1.34	0.000*	6.91± 1.72	0.000*
	A.E	12	8.41± 1.16		10.08± 1.92		12.08± 1.56	
Corporate Shuttle Test	B.E	12	1.13± 0.06	0.350	1.04± 0.02	0.000*	1.08± 0.06	0.119
	A.E	12	1.10± 0.05		0.87± 0.21		0.98± 0.19	
Squat Jumping Test	B.E	12	44.28± 7.32	0.827	42.66± 5.49	0.592	44.68± 3.33	0.369
	A.E	12	44.95± 7.45		43.86± 5.30		45.94± 3.38	
Counter-Movement Jumping Test	B.E	12	51.97± 8.24	0.834	48.85± 7.25	0.640	52.57± 7.53	0.528
	A.E	12	52.68± 8.10		50.25± 7.11		54.47± 6.96	

*p<0.05. B.E = Before Exercise A.E = After Exercise.

Table 2: Running based anaerobic speed test differences between groups

Variables	Groups		Pre-test		Post-test	
			D.M.	P	D.M.	P
35 m running measurement 1. running	CG	PE	0.237	0.405	0.441	0.020*
35 m running measurement 2. running	CG	PE	0.415	0.023*	0.462	0.013*
		GE	0.456	0.012*	0.390	0.040*
35 m running measurement 3. running	CG	PE	0.432	0.019*	0.483	0.010*
		GE	0.418	0.024*	0.393	0.040*
35 m running measurement 4. running	CG	PE	0.365	0.053	0.510	0.008*
		GE	0.375	0.045*	0.399	0.044*
35 m running measurement 6. running	CG	PE	0.275	0.318	0.525	0.007*
		GE	0.320	0.216	0.400	0.044*

*p<0,05 and only difference between the groups are located in the table. Differences do not include. D.M.; Difference in means

Table 3: Power indices differences between groups

Variables	Groups		Front		End	
			D.M.	P	D.M.	P
Power index 1	CG	PE	-72.000	0.362	-254.500	0.038*
		GE	-165.000	0.009*	-284.916	0.019*
Power index 2	CG	PE	-103.750	0.072	-244.250	0.037*
		GE	-171.416	0.002*	-292.916	0.010*
Power index 3	CG	PE	-91.166	0.090	-258.083	0.025*
		GE	-151.666	0.003*	-288.416	0.011*
Power index 4	CG	PE	-76.583	0.118	-259.000	0.026*
		GE	-137.833	0.002*	-289.666	0.012*
Power index 5	CG	PE	-79.666	0.119	-264.750	0.018*
		GE	-117.000	0.014*	-267.416	0.017*
Power index 6	CG	GE	-115.750	0.017*	-254.833	0.017*

5 years. Their length, CG = 182.08 ± 2.35 cm, PE = 181.08 ± 2.60 cm, GE = 182.67 ± 2.34 cm, and body weights, CG = 68.10 ± 5.91, PE = 69.76 ± 5.68, GE = 70.57 ± 3.60 detected 36 men's basketball players participated in the study.

Height could be an important feature in determining the performance in most sports. In sports such as basketball, volleyball and handball, the taller players are preferred in terms of the performance. Height has an important place in the sport of basketball.

A technical and physical ability of tall players has been implicated as a significant effect on the performance of the team (Miller 1996). This property is also a factor in the change on several motor features. While tall players have positive effects on the mobility, motor features have adverse effects (Açıkada 1990), as it contributes in a positive way on basketball player in pot shot at goal and realizing the efficiency and the power consumption (Stone 1993).

Body weight in the sports science also called "relative force" is a force which means the con-

cept of positive and negative effect as driver of the positive and negative expectations, which may cause the maximum oxygen utilization capacity and anaerobic power levels above can also be effective (Günay1999; Sampaio 2009). Changes in body weight exercise are important factors which have an effect on energy consumption. In certain exercises which are heavier than an individual who would spend on the energy of the light is to be more than one person. Therefore, of all individuals with the same height consume oxygen; lighter ones are far more advantageous in terms of the use of oxygen (Eric 2007).

After the exercise, statistically significant differences were observed between the groups participated in 20m sprint test in the evaluation of the start and after the exercise as result of appropriate exercises with a proper training program made in the CG and PE groups. Although certain amount of time was diminished in GE group, there were no significant differences.

Balciunas (2006) detected from the such certain studies as; in the first measurements CG

group 3.10 sec. in the last measurement 3.06, PE group in the first measurement 2.96, and in the last measurement 3.02, GE group in the first measurement 3.10 and last measurement 3:02 Similar results were obtained in the studies that were performed. (Aktan 2006 ; Turhan 2007; Yörükoğlu 2007; Eric 2008, Frane 2010; Yilmaz 2010; João 2012) The results we obtained were parallel with those which were in certain studies.

During the evaluation of the number of shots, after the pre and post exercises, the results were in accordance with the training program in PE and GE groups and thus after the study, statistically significant differences, favoring our program, were observed. There was no significant difference at a certain rate in CG group despite an increase in the number of level in the shooting.

Moreover, statistically significant differences were observed after performing the current number of shots in all groups, especially, there wastwice change as rate in the GE group. Balcinuas (2006) carried out a study on 15-16 year-old male basketball players, the pretest group participated in the study performed shooting test, the shooting attempt measured values respectively lasting for 2 minutes, similar results were found.

The evaluations of the Collective Shuttle Test in the beginning of study and after the study PE as a result of the work in accordance with the training program after the study statistically significant differences were observed in favor of. Although certain amount was diminished of a time in CG and GE group, there were no significant differences in favor.

Although there was certain proportions of developments in all group in the evaluation of Squat jump jumper test and counter movement jump leap test at the beginning and the end of the study, there were not statistically significant differences.

Kalkavan (2005) determined the mean values of subject's athletes' squat jump test participating in the studies as 24.31 ± 4.7 cm. Erol (1995) 13-14 years old male basketball players administered at the 10-week common interval method of training of the vertical jump values 2 cm increments detect statistical significance was found ($P < 0.01$) in the control group find 0.7 cm ratio increase but did not find a statistically significant difference.

Balcinuas (2006) a study conducted on 15-16 years old male basketball players, the work of

the athletes who participated in the pretest measurement values Squat jump, PE = 43.68 ± 4.14 cm, GE = 41.65 ± 5.74 cm, CG = 40.39 cm, post-test, PE = 44.76 ± 4.46 cm, GE = 43.34 ± 5.80 cm, CG = 40.60 cm, Countermovement jumper pretest measurement values; PE = 50.10 ± 3.73 cm, GE = 51.18 ± 3.89 cm, CG = 50.21 ± 4.40 cm, the final test; PE = 54.67 ± 3.39 cm, GE = 51.14 ± 1.60 cm, CG = 49.08 ± 4.38 cm were found to be.

Ostojic (2006) performed the study of athletes jump Vertical jump test, the test was applied to three different basketball regional player and achieved the results were between 57.4 and 59.7 Mandy T. et al, in the initial measurement of Vertical jump test was 33.3 ± 3.8 and in the second measurement of control group was 32.8 ± 3.3 ; in first measurement of the experimental group was 49.5 ± 4.8 and in the second measurement found to be 49.0 ± 4.8 . Manuel (2008) in the work done Counter movement jump 33.5 cm and squat jump 28.9 (cm) found. The results are also in line with some studies such as; (Sampaio 2009; Nuno 2007; Mcmillan 2005 ;Chittibabu 2013; Zagatto 2009; Edson 2012; Alessandro 2009).

The groups who participated in the study anaerobic based sprint running tests during the evaluation study after study start and after the study in all groups were found statistically significant differences. Running speed tests, depending on the power-based indexes similar results were observed in the test. CG in the evaluation of group differences were detected between the other two groups, there were no difference between the PE and GE groups in the running value.

While Balcinuas (2006) established significant difference on 5th and 6th running index in PE group in the study that he made, Yilmaz (2010) established significant difference in 2nd, 4th, 5th and PE of power index values. In this study, significant results were found on the running index values of 2nd, 3rd, 4th and 5th. These results show similarity with other studies.

CONCLUSION

As a result, in many sports high energy is required in a small quantum of time during the formation of the movement demonstration. In such types of branches, the anaerobic process is to remove the foreground for the maximal intensity and place in a short time. The anaero-

bic power energy that can be produced in an anaerobic athlete's, basketball games constitutes the main source of movement together. Anaerobic power is closely related to body weight, which can affect anaerobic power changes of the teams.

RECOMMENDATIONS

Thus, the implementation of the interval training method was concluded to be appropriate together with the cardiovascular and the metabolic specific factors in order to develop the endurance of Basketball players. Power Strength Training Cardiovascular and Metabolic Markers by certain young athletes may lead to more favorable results.

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