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Full Length Research Paper

Effects of 4-month basketball training on speed, agility and jumping in youth basketball players

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ABSTRACT

The aim of this study is to investigate the effect of 4-month basketball training on speed, agility and jump in youth male basketball players. A total of 14 male basketball players from the youth category participated in the study voluntarily. Before the research, parents' consent documents were obtained from the parents of the players. The study included players who continued basketball training for 4 months. Subjects performed basketball training 3 days a week (90 min every day). 20 m sprint, Illinois agility test, vertical and horizontal jump tests were applied in the research. Pre-, mid-, and post-test designs are used in measurements (First test, 2. month and 4. month), and they were carried out in three different test periods. One-way repeated measures analysis of variance was used to determine differences between measurements. The Holm-Sidak test was used to determine the differences between the groups ($p < 0.05$). There was a significant difference between the measurements in the body height, body weights and horizontal jump of the subjects. In addition, an improvement in vertical jump, 20 m speed and agility performances were observed at the end of the 4th month. It was found that 4-month basketball training caused a significant increase in physical and motoric features seen in youth male basketball players. It is thought that the significant increase in speed, agility and vertical jump performance will occur after longer training sessions. It should also be remembered that growing up can affect the positive increase in performance.

Keywords: Basketball, speed, agility, jump, training.

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INTRODUCTION

As in all sports, the development of basic motor skills in basketball constitutes an indispensable part of the training practices. Developing basic motor skills is a prerequisite for sports success (Canlı, 2017). Additionally, the development of basic motor skills is known to facilitate the application of technical and tactical facts (Mülazımoğlu, 2012).

Basketball is a sports discipline that includes different physical features and physiological capacities, and where players complete 4500 to 5000 m of distance in a competition with versatile movements such as running, dribbling, jumping. (Jon Torres-Unda et al., 2016). Perhaps basketball players don't need to have an extraordinary physiological capacity. However, especially senior players have a faster, more agile and better jump performance (Carvalho et al., 2011). The lower limb strength has a positive effect on the vertical jump height and the time to reach this point, and hence the shooting performance (Struzik et al., 2014). Previous research reported a strong relationship between vertical jump with maximum strength (Dawes et al., 2016; Hoffman et al., 1996) horizontal jump (Hoffman et al., 1996), sprint (Chaouachi et al., 2009) and change of direction (Spiteri et al., 2015)

Although it is accepted that motor skills are at the forefront of basketball, it is difficult to judge regarding success only with a single criterion (Savas et al., 2018). Basketball, which is a one-to-one contact sport, involves

skills that require maximum muscle strength such as sprinting, jumping and changing direction (Suchomel et al., 2016; Vamvakoudis et al., 2007). Although it is known that the physical attributes in basketball will differ according to the game positions of the players (Dawes et al., 2016), it has been reported that changing direction, speed and vertical jump during a basketball game is a critical sport-specific movement performed by all players (Bishop and Wright, 2006).

It is acknowledged that the correct technical models that children have acquired in the age categories during the development process will be the basis for future sports life. If the strengths and weaknesses of the player are not evaluated during training in technical development period, then it may cause many shortcomings while determining which path to follow in the development period (Kılınç et al., 2011). It is very useful for youth players to know whether these skills are contributed to them only with basketball training, without special training. Hence, the aim of this study is to investigate the effect of 4-month basketball training on speed, agility and jump in youth male basketball players.

MATERIALS AND METHODS

Research group

A total of 14 male basketball players from the youth category participated in the study voluntarily. Before the research, parents' consent documents were obtained from the parents of the players. The study included players who continued basketball training for 4 months. Players who do not regularly participate in training are excluded from the research. Subjects performed basketball training 3 days a week (90 min every day).

Study design

The subjects were informed about the purpose and application of the study before the research. 20 m sprint, Illinois agility test, vertical and horizontal jump tests were applied in the research. Measurements were applied on two different days. On the first day, physical features of the subjects: age and years of experience, vertical jump and 20 m sprint test; and on the 2nd measurement day, horizontal jump and agility test were applied.

Vertical jump test

Before the start of the test, participants performed warm-up and stretching activities. To perform the test, a 200 cm long, 60 cm wide white plate was mounted on the wall with a height of 155 cm from the floor. The participant was first asked to touch the highest point he could reach out by extending his arm while standing and then touch the highest point he could reach by jumping. The distance between the height that the participant could reach while standing and the point he could touch by jumping was measured in cm. This score was determined as the vertical jump value of the subjects. This test was repeated three times with rest intervals and the best one was recorded as score (Kamar, 2008).

Horizontal jump test

Before the start of the test, participants performed warm-up and stretching activities. The participant's toes were behind the starting line and the subject was allowed to bend his knees, arms, waist. With the command heard, the subject, pulling the arms backwards, tries to jump as far as possible from the starting line. The distance between the start line and the participant's closest heel to this line was recorded as the score of the participant. The participant had two trials and the one with the best score was recorded as the subject's horizontal jump score (Kamar, 2008).

20 m sprint test

20 m sprint distance was determined in the basketball court. Speed performance was taken by Newtest Powertimer 2000 photocell. Subjects had performed warm-up and stretching exercises before the test started. The test was repeated twice, and the best value was recorded in the form of measurement in seconds. Full rest was given between repetitions.

Illinois agility test

Illinois agility test parkour (5 m wide, 10 m long and consisting of three cones lined up on a straight line at 3.3 m intervals in the middle section) was set up in the basketball court. Subjects left the starting line of the test parkour, lying face down and hands on the floor at shoulder level. Agility performance was determined by Newtest Powertimer 2000 photocell. The test was run once. When there were faulty applications, the test was terminated, and the subject was asked to re-perform after a full rest. Time to finish the parkour was recorded in seconds.

A rest day is given between the measurement days and a full rest between the tests. The subjects performed 15 min general and special warm-up, 25 min technical and corrective drills, 25 min tactical drills, 15 min competition-oriented drills and 10 minutes cool-down and stretching exercises in basketball training. Pre-, mid- and post-test designs are used in measurements (First test, 2nd month and 4th month), and they were carried out in three

different test periods.

Statistical analyses

Statistical analysis was made with Sigma Plot 11.0 (Systat Software, Inc) software. All data are presented in median with ± standard deviation. One-way repeated measures analysis of variance was used to determine differences between measurements. In order to determine the differences between the groups, the Holm-Sidak test was applied. The significance level was determined as $p < 0.05$.

RESULTS

After four months of basketball training, a significant difference was determined in the body height and body weights of basketball players $p<0.05$. The height of the subjects increased 2 cm and their body weight by 2.2 kg (Table 1).

In the measurements made after four months of basketball training, it was determined that there was an improvement in the performance of the subjects in all motoric tests. This improvement in performance shows a linear trend in the mid-test (2nd month) and then in the final test (4th month). However, this improvement was found statistically significant only in horizontal jump performance (Table 2, $p < 0.05$). After 4 months of basketball training, the vertical jump of the subjects increased by 2.2 cm and the horizontal jump by 12.8 cm. However, 20 m sprint performance decreased by 0.06 s and agility performance by 0.11 s.

DISCUSSION AND CONCLUSION

In our study, we investigated the effect of four-month basketball training on physical and motoric features. After four months of follow-up, we determined whether there was a difference in height, body weight, speed, jump and agility and in what direction this difference was.

The development of motoric features - especially in age categories - is an indispensable part of training. During adolescent development, there is a rapid increase in physical performance and, in parallel, sudden increases in size and weight, mainly due to hormones and maturational changes (Roemmich and Rogol, 1995; Jon Torres-Unda et al., 2016). In addition to this increase in size and weight in this process, there are also studies indicating that there is an increase in running speed, strength and agility (Coelho-e-Silva et al., 2010; Torres-Unda et al., 2013).

Physical activity affects the development of motor skills positively (Akin, 2015). Sports and physical activities are an important tool for the development of motor skills (Kambas et al., 2012). De Milander (2011) compared the basic motor skills of girls who are 12-14 years old and doing sports and girls who do not do sports in his study. In the data obtained, it was stated that there is a significant difference in bilateral coordination, balance, strength and running skills in favour of athlete girls.

Gencer and Asma (2017) have studied on male basketball players of 10-12 age group, after six months of basketball training, they examined the physical (height and body weight) and motoric properties of the players (flexibility, vertical jump, sprint and skill); and they identified a significant difference (increase in physical attributes and performance) in almost all parameters. Ocak et al. (2014) reported that 8-week basketball training had improved some of the physical and physiological features of basketball players. Torres-Unda et al. (2013) conducted with male basketball players aged 13-14 in their research, they divided the subjects into two groups as elite and non-elite. The elite group consisted of players taking the 2nd position in the Spanish League, and non-elite athletes consisted of athletes in the same age group during the regular basketball season. The height of the elite and non-elite basketball players, respectively, are 180.55 ± 6.86 cm vs. 168.79 ± 9.89 cm, their body weights, 70.33 ± 13.69 kg vs. 57.34 ± 8.71 kg, their 20 m sprint performance 3.02 ± 0.27 sec vs. 3.28 ± 0.35 sec, their vertical jump height 46.8 cm vs. 33.4 cm. The physical and motoric features of the subjects in our research on male basketball players of similar age group are parallel to the elite group in this research. We think that this makes the research strong in terms of the quality of the subject group. In addition to these findings, Torres-Unda et al. (2013) calculated point average based on the shots by the subjects and the number of matches they played during the season in their research. They determined that taller elite players with much weight and better motor features had significantly higher point average (12.71 ± 3.10 vs. 4.31vs. 2.95, respectively). From this point of view, it would not be wrong to state that a better physical attribute and a better motor performance are reflected as an advantage to score and efficiency (thus success) in basketball. This is also desirable.

Players often perform sudden change of direction in basketball. Change of direction speed is defined as agility. According to the study of Chaouachi et al. (2009), agility in basketball should be considered an important physiological and motoric element on its own. In our research, the agility performance of the subjects increased after four months of basketball training, however this increase was not significantly different.

It was found that 4-month basketball training caused a significant increase in physical features and motor skills seen in youth male basketball players. However, this increase was determined as a significant difference only in horizontal jump performance. It should not be overlooked that adolescent players, especially in the age of growth and development, will improve their

Table 1. Characteristics of the subjects.

	Pre-test [(a)]	Mid-test [(b)]	Post-test [(c)]	Difference
Age (year)	14.6 ± 0.5			
Years of experience (year)	7.8 ± 1.5			
Body height (cm)	180.4 ± 6.3[b,c]	182.0 ± 6.2[a]	182.4 ± 6.2[a]	+2
Body weight (kg)	73.2 ± 7.1[b,c]	74.2 ± 7.1[a,c]	75.4 ± 6.5[a,b]	+2.2

[a]: Significant difference with pre-test, [b]: Significant difference with mid-test, [c]: Significant difference with post-test, $p<0.05$.

Table 2. Jumping, speed and agility performance of the subjects for four months.

	Pre-test [(a)]	Mid-test [(b)]	Post-test [(c)]	Difference
Vertical jump (cm)	47.2±5.7	48.6±5.5	49.4±4.6	+2.2
Horizontal jump (cm)	204.6±20.5 [b,c]	216.6±18.8 [a]	217.4±16.4 [a]	+12.8
20 m sprint (sn)	3.32±0.17	3.27±0.17	3.26±0.13	-0.06
Agility (sn)	16.66±0.62	16.63±0.54	16.55±0.67	-0.11

a: Significant difference with pre-test, b: Significant difference with mid-test, c: Significant difference with post-test, $p < 0.05$.

development and performance through regular training sessions. In addition, regular physical and motoric follow-up of players by trainers during this period is very important and critical. It is thought that the significant increase in speed, agility and vertical jump performance will occur after longer training sessions. It should also be remembered that growing up can affect the positive increase in performance.

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