Investigation of Strength, Flexibility and Balance Parameters with Performance Dimension in Basketball Players

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Abstract

The aim of this study is to investigate the relationship between strength, flexibility and balance parameters of male basketball players with performance dimension. Sixteen elite basketball players participated in the study voluntarily. Leg and back strength, flexibility and static and dynamic balance parameters of the participants were examined. Pearson Product Moment Correlation Coefficient method was used to determine the relationship between performance values obtained from strength, flexibility and balance parameters. As a result of the analysis of the data obtained; between LS and BS ($r = 0.676$ $p < 0.01$), SBRL and SBB ($r = 0.787$ $p < 0.01$), SBLL and SBB and SBRL ($r = 0.688$ $p < 0.01$, $r = 0.791$ $p < 0.01$), DBB and SBB and SBRL ($r = 0.775$ $p < 0.01$, $r = 0.752$ $p < 0.01$), DBRL and SBB, SBRL, SBLL and DBB ($r = 0.800$ $p < 0.01$, $r = 0.694$ $p < 0.01$, $r = 0.707$ $p < 0.01$, $r = 0.874$ $p < 0.01$), DBLL and SBB and SBRL ($r = 0.765$ $p < 0.01$, $r = 0.652$ $p < 0.01$) are high related. Whiler there was a moderate relationship between DBB and SBLL($r = 0.610$ $p < 0.05$), DBRL and SBRL, DBB and DBRL ($r = 0.588$ $p < 0.05$, $r = 0.589$ $p < 0.05$, $r = 0.566$ $p < 0.05$), there were no relationship between FLX and LS and BS($r = 0.430$ $p > 0.05$, $r = 0.155$ $p > 0.05$), SDİ SBB and LS, BS and FLX ($r = 0.341$ $p > 0.05$, $r = 0.388$ $p > 0.05$, $r = 0.274$ $p > Z0.05$), SDSA SBRL and LS, BS and FLX ($r = 0.103$ $p > 0.05$, $r = 0.347$ $p > 0.05$, $r = 0.167$ $p > 0.05$), SBLL and LS, BS ve FLX ($r = -0.027$ $p > 0.05$, $r = 0.237$ $p > 0.05$, $r = 0.022$ $p > 0.05$), DBB and LS, BS ve FLX ($r = 0.211$ $p > 0.05$, $r = 0.306$ $p > 0.05$, $r = 0.268$ $p > 0.05$), DBRL and LS, BS and FLX ($r = 0.268$ $p > 0.05$, $r = 0.433$ $p > 0.05$, $r = 0.281$ $p > 0.05$), DBLL and LS, BS and FLX ($r = 0.136$ $p > 0.05$, $r = 0.137$ $p > 0.05$, $r = 0.164$ $p > 0.05$). As a result, it is thought that the basketball players' performance will be increased by paying attention to the content of training programs due to the sudden direction change actions of basketball, which are related to strength, flexibility and balance parameters of male basketball players.

Keywords: basketball, balance, flexibility, strength

1. Introduction

In sport, "how to achieve success, how to reach the top, how to stay at the top" these questions and concerns are important in the selection of players specific to the branch and determine the training models to be applied. Therefore, researchers' interest in the performance of targets and their ability to demonstrate physical competence with scientific data is increasing each day (Albay et al., 2008). Achieving a high level of performance in sports results from a combination of many factors (Pepe & Bozkurt 2018). The most important of these is physical fitness and training needed to be have great perfomance (Bozkurt et al., 2011; Bozkurt et al., 2011). Physical fitness is the most important criterion in determining the physiological capacity (Çakmakçi et al., 2018; Tatlici & Cakmakci, 2019). In most sport branches, Skill-related components include speed, agility, strength, balance, coordination, and response time (Çakmakçı et al., 2019). In sport, this is well known that small times make teams or players winner (Tatlıcı ve ark 2018). In addition to these physiological features, the athlete has to perfect these features through exercises (Tatlıcı et al., 2018). Basketball is a team sport that requires high level technical skills and tactical ability (Yılmaz et al., 2012), in which compound motoric features such as necessity of application in sudden and changing positions, coordination, reactionary properties (Akçayaka, 2009), quick strength and endurance in strength are important (Menevşe, 2013). Therefore, athletes with excellent technique and tactics can achieve success if they develop their basic motoric features systematically (Ünlü & Tatlıcı, 2018; Polat & Çetin, 2018). It is hard to say that success in basketball is difficult to attribute to a single criterion (Gocentas et al., 2004). In the competition characteristics of basketball, physical structure,

physiological capacity (Kılınç, 2008; Drinkwater et al., 2008), and being tall in the physical structure are considered as an advantage (Carter et al., 2005). In addition, muscle mass and physical functions of players should be improved and individualized (Magill, 1989; Pamuk et al., 2008). Physical structure, technical, tactical and mental abilities are prominent in branches with doing ball and it is important for technical performance as well as a technical tactic for optimal performance (Tsunawake et al., 2003; Kılınç et al., 2011). In the literature, anthropometric and physiological profiles of elite basketball players were evaluated in many respects and in the evaluation results of elite basketball players, it was observed that motoric features such as experience, body composition, strength, flexibility, and balance were prioritized among other factors (Hoffmn et al., 2003; Scheller et al., 2003; Raks, 1993; Pamuk et al., 2008). When the literature is examined, it is noteworthy that anthropometric measurements, body compositions and physiological parameters of elite basketball players are noteworthy (Pazarözyurt & Gonca, 2009; Jelicic et al., 2005; Sallet et al., 2005; Carter et al., 2005; Bale, 1990; Hoare, 2000) however there are few studies that are associated with each other. Based on this, it is aimed to examine the strength, flexibility and balance parameters of basketball players with performance dimension.

2. Method

2.1 Design and Participant (Subject) Characteristics

16 elite male basketball players from Bartın University basketball team participated in the study voluntarily. The age, height and bodyweight of the athletes are given in

Table 1. The age, height and bodyweight of the athletes

Mean Age	21.50 ± 2.00
Mean Height	187.50 ± 8.72
Mean Weight	82.04 ± 12.27

2.2 Measures and Covariates

Back Strenght Measurement

The measurement was made with Takei (Japanese) brand digital back-leg dynamometer. While subjects placed their feet on the dynamometer stand with their knees bent, with the arms stretched, the back straight and the body slightly bent forward, the grasped dynamometer bar with hands was vertically pull up with maximum using the back muscles (Aslan et al., 2011).

Sit and Reach test

Flexibility measurements of the subjects were performed by a sit-reach test using the flexibility table. Subjects were asked to perform two trials and their best grades were recorded in cm (Mackenzie, 2005).

Balance Performance Test

Biodex Balance System (Biodex, Inc., Shirley, New York) was used for balance measurement. Biodex balance device; as well as a platform that allows the participant to move forward and backward and sideways as well as to remain stationary. Static balance and dynamic balance test were used. Balance tests were carried out in double feet and standing straight position. Double foot balance tests were performed 3 times with a duration of 30 seconds and a rest interval of 10 seconds. Before the tests, a 10-second retry was performed for the athletes to adapt and recognize the static and dynamic balance tests. Participants were asked not to move or speak during the test period. The test of the participants who lost their balance was restarted (Adam et al. 2008).

3.2 Statistics Analysis

Pearson Product Moment Correlation Coefficient method was analyzed in spss 23 program in order to determine the relationship between the obtained data and the values of force, flexibility and balance parameters.

3. Results

Table 2. Strenght, Flexibility and Balance correlation values of the basketball players

Variables		LS	BS	FLX	SBB	SBRL	SBLL	DBB	DBRL	DBLL
LS	r	1								
BS	r	.676**	1							
FLX	r	.430	.155	1						

SBB	**r**	.341	.388	.274	**1**					
SBRL	**r**	.103	.347	.167	.787**	**1**				
SBLL	**r**	-.027	.237	.022	.688**	.791**	.610*			
DBB	**r**	.211	.306	.268	.775**	.752**	.610*	**1**		
DBRL	**r**	.268	.433	.281	.800**	.694**	.707**	.874**	**1**	
DBLL	**r**	.136	.137	.164	.765**	.588*	.652**	.589*	.566*	**1**

Note. *. p< 0.05 level (2-tailed). **. p< 0.01 level (2-tailed). LS: Leg Strenght, BS: Back Strenght, FLX: Flexibility, SBB: Static Balance Two Legs, SBRL: Static Balance Right Leg, SBLL: Static Balance Left Leg, DBB: Dynamic Balance Two Legs, DBRL: Dynamic Balance Right Leg, DBLL: Dynamic Balance Right Leg.

There were correlation beetwen physical parametres of the basketball players. As it in seen in the table: LS and BS (r = 0.676 p < 0.01), SBRL and SBB (r = 0.787 p < 0.01), SBLL and SBB and SBRL (r = 0.688 p < 0.01, r = 0.791 p < 0.01), DBB and SBB and SBRL (r = 0.775 p < 0.01. r = 0.752 p < 0.01), DBRL and SBB, SBRL, SBLL and DBB (r = 0.800 p < 0.01, r = 0.694 p < 0.01, r = 0.707 p < 0.01, r = 0.874 p < 0.01), DBLL and SBB and SBRL (r = 0.765 p < 0.01, r = 0.652 p < 0.01) are high related.

While there was a moderate relationship between DBB and SBLL(r = 0.610 p < 0.05), DBRL and SBRL, DBB and DBRL (r = 0.588 p < 0.05, r = 0.589 p < 0.05, r = 0.566 p < 0.05), there were no relationship between FLX and LS and BS(r = 0.430 p > 0.05, r = 0.155 p > 0.05), SDİ SBB and LS, BS and FLX (r = 0.341 p > 0.05, r = 0.388 p > 0.05, r = 0.274 p > Z0.05), SDSA SBRL and LS, BS and FLX (r = 0.103 p > 0.05, r = 0.347 p > 0.05, r = 0.167 p > 0.05), SBLL and LS, BS ve FLX (r = -0.027 p > 0.05, r = 0.237 p > 0.05, r = 0.022 p > 0.05), DBB and LS, BS ve FLX (r = 0.211 p > 0.05, r = 0.306 p > 0.05, r = 0.268 p > 0.05), DBRL and LS, BS and FLX (r = 0.268 p > 0.05, r = 0.433 p > 0.05, r = 0.281 p > 0.05), DBLL and LS, BS and FLX (r = 0.136 p > 0.05, r = 0.137 p > 0.05, r = 0.164 p > 0.05). It seen performance of basketball players related to strength, flexibility and balance parameters.

4. Discussion

Nowadays, it is seen that especially the successes and championships achieved in recent international sports activities are not easily achieved. Therefore, the necessary criteria should be determined on the way to success (Yıldırım & Özdemir, 2010). One of the most important of these criteria is choosing the athlete who has a suitable physical and conditional structure for the related sports branch (Zorba, 1999). In many activities in basketball, the strength in many basketball activities is applied at angular velocities higher than the maximal velocities provided by isokinetic and isometric measuring tools. When the analysis of the basketball competition is analyzed, it is seen that a very important part of the movements is related to the strength and components of the whole. It is also known that the rate of fat in the body has a significant effect on the factors affecting strength. A good fat proportion of a person affects a person's strength (Akyüz et al., 2013). Soslu et al. (2016), as a result of their study with 16 male basketball players' right-left leg fat, fat mass, muscle, lean mass values, lower peak power, relative peak power, lower average power, relative average power, leg strength, determination of right-left arm fat , fat mass, muscle, lean mass values of the upper peak power, relative upper peak power, upper average power, upper relative average power, hand-arm and body strength are important factors in determining. Taş et al. (2013) found a statistically significant relationship between back and leg strength and thigh and calf circumference in their study with elite basketball players. In Akyüz et al. (2013) study with basketball national team athletes, showed that there was a statistically significant relationship between right grip force and left grip force values and back force and leg force values. Ulusu et al. (2018) in their study, 20 meters speed and horizontal jump performances of basketball players with arm, foot, stroke length, leg length, knee height, foot width, arm, thigh, calf circumference have found a positive relationship. Gencer et al. (2019) examined the relationship between basketball players' dominant and non-dominant grip strength and free throw hit rates. They also found that there was a significant relationship between the basketball player's shooting hand grasping strength and the free throw hit rate, but there was no statistically significant relationship between the shooting hand and the shooting rate. Gür et al. (2017) reported that there was a statistically positive relationship between upper extremity ekstantör strength and grip strength, vertical jump, reaction time, hand reaction time and free throw success of basketball players. Pizzigalli et al. (2016) examined the relationship between basketball players' anthropometric properties and force parameters and performance dimension and stated that there was a statistically significant relationship between hand grip strength and arm length. Temur (2017) stated that right and left hands grip strength of basketball players were significant in terms of height, body weight and arm circumference values, whereas horizontal and vertical jump distances were not statistically significant compared to thigh and calf circumference measurements. Pamuk et al. (2008) found that there was a statistically positive difference in favor of 2nd league basketball players in terms of left-hand grip and anaerobic variables. Tetik et al.

(2013) found that there was a positive relationship between game performance scores and static balance scores of basketball players. Yörükoğlu and Koz (2007) in their study did not find a significant difference in flexibility parameters of basketball players. Abdullah and Gencer (2013) found a significant relationship between the basketball players' dynamic balance scores and vertical jump scores. Korkmaz (2013) compared the physiological parameters of 2nd league and regional league basketball teams and showed that body fluid and fat percentage and lactic acid levels after competition were statistically significant compared to regional league basketball players of 2nd league basketball players. These studies were not only related to basketball but also tried to relate the performance with motoric features for many individual and team athletes (Albay et al., 2008; Özer & Kılınç, 2011; Çakmakcı et al., 2018). While the present studies related to basketball players show parallelism with some studies in the literatüre, do not show parallelism with the other studies. As a result, it is thought that basketball players' strength, balance and flexibility characteristics will be determined and their performance will be improved positively through planning and programming of the training.

5. Conclusion

As a result, it is thought that the coaches of the basketball teams should apply training which contains flexibility, strength, balance to basketball players. Based on the study, performance can be improved by increasing strength, flexibility and balance parameters of male basketball players.

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