Relationship among Anthropometric, Body Composition and Physical Fitness of Basketball Skill Performance: A Study of Ethiopian University Players

Tariku Assefa and Ashok Kumar

Abstract

Aim: the present study was to identify the relationships among anthropometric, body composition and physical fitness with basketball skill performance of Ethiopian inter University male basketball players. **Method:** two hundred (N=200) men basketball players selected by simple random sampling technique from Ethiopian inter University basketball Tournament. To achieve the objectives of the study six Anthropometric variables, eight Body composition variables and six physical fitness variables were included as independent variables and one dependent variable basketball skill performance which was assessed by AAHPERD basketball skill test (Accuracy speed passing, control dribbling, defensive movement and speed spot shooting).It was aggregation made by using principal component analysis to reduce correlated variable in to one. **Results:** Person's product moment correlation was used as a statistical tool. The result showed that Anthropometric variables i.e. weight, height, body mass index, arm length, Palme length and leg length were found to possess positive and significant (p< 0.05) correlation with the basketball skill performance at 0.01, body composition variables i.e. Biceps skin fold, triceps skin fold, subscapular skin fold, suprailiac skin fold, percent of body fat andfat weight were found to possess negative and significant (p< 0.01)correlation with the basketball skill performance at 0.01, body density and lean body mass measurements were found to possess positive and significant (p< 0.01) correlation with the basketball skill performance at 0.01 and physical fitness variables i.e.Sit and reach ,sergeant jump, Harvard step test and hand grip dynamometer for strength were found to possess positive and significant (p< 0.01) correlation with the basketball skill performance at 0.01 and 50 meter dash and SEMO agility were found to possess negative and significant (p< 0.01) correlation with the basketball skill performance at 0.01. **Conclusion:** Hence, it can be concluded from the findings of the present study that Anthropometric, Body composition and physical fitness variables contribute significant in basketball skill performance.

Tariku Assefa
Ph.D. Student
Department of Sports Science
Punjabi University, Patiala, India
E mail: tarikuass@gmail.com
Ashok Kumar
Associate Professor
Department of Sports Science
Punjabi University, Patiala, India

INTRODUCTION

Basketball is a type of ball game, it can be performed in high-intensity with the demand of physical contact, high speed and constant jumps (both to offense and to defend) and changes (Paiva and Cesar, 2005). Basketball needs a person to be physically fit in nature as well as technical and tactical abilities for optimal performance (Hoffman *et al*., 1999). In a very broad sense physical fitness is, determined by the individual's capacity for optional work and motor and sport performance (Astrand and Rodahl, 1986). However, during competition the physical fitness of a player can be a decisive determinant of success (Smekal *et al*., 2001). A high level of speed, power, explosiveness and agility are needed for Basketball players (Boone &Bourgois, 2013). Because of those movements are frequently performed by players during different positions (blocking, shooting and rebounding) maneuvers vertical jump and sprint exercise are the essential for motor components of basketball game (McInnes *et al.,* 1995; Adelkerim*et al.,* 2007). One of a factor affecting performance in basketball has been described by jump power (Greene *et al.*, 1998). Basketball is one of the complex technical team games and differences in performance between players of different region and varying ability standard needs the implementation of variety of different abilities (Angyan, *et al.,* 2003).Team games were sports where size, shape, body composition and fitness all play animportant part in providing distinct advantage for specific playing positions particularly at thehigher level, where there is a high degree of player specialization (Dey, Kar & Debray, 2010).The objective of the present study was to identify the relationships among anthropometric, body composition and physical fitness with basketball skill performance of Ethiopian inter University male basketball players

MATERIAL AND METHODS

The research design was characterized by a cross sectional quantitative survey, and the research data was collected from the study participants through different techniques to achieve the stated specific objectives. Cross-sectional data was employed in which data was collected at one time to describe the selected anthropometric, body composition, physical fitness and basketball skills performance of male basketball players of selected public universities in Ethiopia.

The subjects for this study were selected from the Ethiopian public university basketball competitors of the year 2016-2017 by using a multistage sampling technique. There are a total of 34 public universities in Ethiopia, where each have basketball teams. In the first stage, public universities are categorized in to three strata based on the generation (year of establishment): First generation universities, second generation universities and third generation universities to make homogenous population. In the second stage, from each strata, sample universities were selected using simple random sampling technique so as to give equal chance to be selected; hence, the two stage sampling is called stratified random sampling techniques. In the meantime, by employing proportionate to size sampling technique to each strata. Based on aforementioned sampling techniques, 12 representative ultimate Ethiopian public university basketball teams (2 from first generation, 5 from second generation and 5 from third generation) were selected for the study so that the anthropometric, body composition, physical fitness and basketball skill performance variables measurements were taken from 200 basketball players**.**

The subject tested for the Anthropometric variables: weight, height, body mass index, arm length, palm length and leg length. Body composition variables: Biceps skinfold, Triceps skinfold, subscapular skinfold, supriliac, body density, percent of fat, fat weight and lean body mass. Physical fitness variables: speed (50m dash), agility (SEMO agility test), power (sergeant jump), endurance (Harvard step test), strength (hand grip dynamometer). The dependent variables (basketball skill performance) werenot directly measured but aggregation was made using principal component analysis while it is used to reduce correlated variables in to one or two variables (Jolliffe 2002). Person's product moments correlation was used to find out the relationship of selected

anthropometric, body composition and physical fitness variables with basketball skill performance. All the obtained data from tests and measurement wear recorded, standard descriptive statistics (mean ± standarddeviation) and person's correlation coefficient were applied, the data were analyzed by using SPSS (statistical package for social science)version 20.0 at 0.01 level statistical significant.

RESULTS

In the present study, the anthropometric variables of Ethiopian inter university basketball players with basketball performance are described in table .The mean values and standard deviation of anthropometric variables was observed that mean age of basketball player male students in selected Ethiopian universities basketball players was 22.22 years with standard deviation of 1.88 years. Their mean, weight was 68.34 kg and standard deviation 10.99 kg, and their average height was 1.80m with standard deviation of 0.92m. In addition their average value of body mass index was 20.74 kg/m^2 with standard deviation of 1.27 kg/m^2 mean of their arm length was 84.92cm with standard deviation of 6.83 cm, Their Palme length was on average 19.67cm with standard deviation of1.55 cm lastly average mean leg length of male basketball players was 101.13cm With standard deviation of 9.71cm.

It revealed that basketball skill performance was significantly and positively related to weight, height, body mass index, arm length, Palme length and leg length. (r = 0.93, 0.92, 0.88, 0.68, 0.82, 0.33 respectively). This justifies that weight, height, body mass index and Palme length were strongly related to basketball skill performance. Whereas arm length was moderately and leg length weakly related to basketball skill performance as described by Cohen (1989).

Table 1. Mean, standard deviation, correlations value between dependent and independent Variables

Anthropometric variables	Mean	SD	Correlation (r)
Basketball performance	80.56	10.44	
weight	68.34	10.996	0.93**
Height	1.80	0.95	0.92**
Body mass Index	20.74	1.279	0.88**
Arm Length	84.92	6.83	0.68**
Palme Length	19.67	1.55	0.82**
Leg length	101.13	9.71	0.33*

N= 200;   **Significant at.0.01,*Significant at.0.05 Level of significance

The Body composition variables in relation with basketball performance are described in table -2 and it showed that body density of Ethiopian university basketball players was mean 1.07, standard deviation 0.006, minimum and maximum values were 1.05 and 1.08 respectively. The mean value of percent of body fat was 12.32, standard deviation was 2.75, minimum and maximum values were 6.8 and 19.97 respectively. Besides average value of their fat weight was 8.13, standard deviation was 0.62 minimum and maximum values were 5.85 and 9.55 respectively. Average value of lean body mass was 60.21, standard deviation was 11.53. Minimum and maximum values were 36.01 and 97.39 respectively.

The evident that biceps skin fold (r = - 0.83), triceps skin fold (r = - 0.81), subscapular skin fold (r = - 0.80), suprailiac skin fold (r =- 0.79) Percent of body fat (r = - 0.98), and fat weight (r = - 0.88) were negatively and strongly correlated with basketball skill performance at 0.01 significance level. Body density (r = 0.98) and lean body mass (r = 0.94) were positively and strongly correlated with basketball skill performance at 0.01 significance level as described by Cohen (1989).

Table 2. Mean, standard deviation, correlations value between dependent and independent Variables

Body composition variables	Mean	SD	Correlation (r)
Basketball performance	80.56	10.44	
Biceps skin fold	4.27	1.63	- 0.83**
Triceps skin fold	6.35	2.15	- 0.81**
Subscapular skin fold	8.52	2.17	- 0.80**
Suprailiac skin fold	10.59	2.67	- 0.79**
Body density	1.07	.006	0.98**
Percent of body fat	12.32	2.75	- 0.98**
Fat weight	8.13	.62	- 0.88**
Lean body mass	60.21	11.53	0.94**

N= 200; **Significant at.0.01 Level

The descriptive data of the various physical fitness variables of university basketball players is shown in table -3. The average time in 50m dash (speed) of the players was 7.47 seconds with standard deviation of 0.78. The mean SEMO agility test of the players was 10.98 seconds, whereas, the standard deviation was 1.04. The average distance in sit and reach test (flexibility) of the players was 37.24 cm with 2.85 of standard deviation. The basketball players had 60.24 cm mean value in sergeant jump (power) and standard deviation 2.5. The mean time in Harvard step test (Cardo respiratory endurance) of the players, was 84.77 minutes with 2.31 of standard deviation. The mean value of Hand grip dynamometer (strength) of the players was 109.81 kg whereas, thestandard deviation.

The 50 meter dash speed run test ($r = - 0.57$) was moderately and significantly correlated to basketball skill performance and SEMO agility test ($r = - 0.76$) was strongly and negatively correlated with basketball skill performance at 0.01 significance level .Sit and reach test for flexibility ($r = 0.43$) significantly but weakly correlated with basketball skill performance. Sergeant jump for explosive power($r = 0.78$) was positively and significantly correlated with basketball skill performance., Harvard step test for endurance (0.67) and hand grip dynamometer for strength (0.65) were positively and moderately correlated at 0.01 level with basketball skill performance According to Cohen (1989).

Table 3. Mean, standard deviation, correlations value between dependent and independent Variables

Physical fitness variables	Mean	SD	Correlation (r)
Basketball performance	80.56	10.44	
50 Meter Dash speed test	7.47	.782	- 0.57**
SEMO Agility test	10.98	1.04	- 0.76**
Sit and reach test for Flexibility	37.24	2.95	0.43**
Sergeant jump for Explosive Power	60.24	2.50	0.78**
Harvard step test for Endurance	84.77	2.31	0.67**
Hand Grip dynamometer for strength	109.81	2.43	0.65**

N= 200; **Significant at.0.01 Level

DISCUSSION

The finding of the present study shows that the Anthropometric variables i.e. weight, height, Arm length, Palme length and leg length have been found to possess positive and significant ($p < 0.01$) correlation with basketball performance but leg length positive significant ($p<0.05$)and week correlation with basketball performance. The result of the study was supported by Lakshya Nagar, Dharam Singh meena and Balwindar Singh (2012) he found that Anthropometric variables weight, height, Arm length, Palme length and leg lengthpositive and significant with basketball performance. Jay Kumar Pandey, Tilak Rajmeena, Inder Kerkatta and Sunita Bisht (2016)reported in their results that the significantly positive correlation with weight, height, Arm length, Palme length and leg length with basketball performance. It can be concluded from the findings of the present study that anthropometric variables contribute to selection criteria and significant in basketball performance. Body composition variables i.e. biceps skin fold, triceps skin fold, subscapular skin fold, suprailiac skin fold, body density, percent of body fat, fat weight and lean body mass are positively but significant correlated with basketball performance. This indicated that with the development of the amount of subcutaneous tissues of these muscles increase the contractile power of the muscles and hence contribute positively of basketball performance. The findings of the study are in complete agreement with the results of the earlier study reported by Sukhwinder sing (2016).The physical fitness variables was significant correlation with basketball performance. Sit reach test (flexibility), sergeant jump (power), Harvard step test (endurance), and hand grip dynamometer (strength) were having significant but positive correlation. Among these 50m dash(speed) and SOME (agility test)were negative but significance correlation with basketball performance. The speed and agility are time factor, decrease the time higher the performance.Arvind Bahadur Singh (2012), Lakshya Nagar, Dharam Singh Meena and Balwindar Singh (2012) reported that physical fitness variables i.e. speed, agility, flexibility, power, endurance and strength significant relationship with basketball performance.

CONCLUSION

From the result and desiccation the following consolation have been drawn.

- There was positive and a significant relationship between the basketball performance and selected anthropometric variables such as weight, height, body mass index, arm length, palm length and leg length.
- There waspositive and a significant relationship between the basketball performance and body composition variables such as Biceps skinfold, Triceps skinfold, subscapular skinfold, suprailc skinfold, body density, percent of body fat, fat weight and lean body mass.
- Basketball performance waspositive and significantly related to speed, agility, flexibility, power, endurance and strength.

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