EFFECT OF ANTHROPOMETRIC CHARACTERSTICS ON PLAYING ABILITY OF SCHOOL LEVEL BASKETBALL PLAYERS

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Abstract

The relationship between anthropometric characteristics and playing ability in Basketball has been a topic of interest in sports science research. Understanding the correlation between these variables can provide valuable insights for talent identification, player development, and training programs. The aim of this study was to investigate the correlation between anthropometric characteristics and playing ability among school-level male Basketball players in Punjab. A total of 250 male Basketball players were selected using purposive sampling from various regions of Punjab. Anthropometric measurements were taken using standardized protocols, including variables such as upper arm length, lower arm length, total arm length, hand length, hand span, upper leg length, lower leg length, total leg length, upper arm circumference, forearm circumference, thigh circumference, calf circumference, biacromial diameter, wrist diameter, biceps skinfold, suprailiac skinfold, subscapular skinfold, and triceps skinfold. The playing ability of the participants was assessed using the AAHPERD Basketball skill test, which measures various aspects of Basketball performance, including shooting, dribbling, passing, and agility.

Keywords: Anthropometric Characteristics, playing ability, Correlation, Basketball performance, Training programs.

Introduction

Anthropometry is a field that focuses on measuring and analyzing the weight, structure, and proportions of the human body. It provides empirical methods and observations to understand the characteristics of living individuals (Behenke and Willmore, 1974) [1]. Anthropometric techniques, including measurements of skinfold thickness, circumferences, and diameters, are commonly used for predicting body composition due to their cost-effectiveness, space requirements, and ease of implementation (Pollock and Willmore, 1990) [2]. Anthropometry finds applications in various fields, including physical education, athletic sciences, physical activity, and biomedical research(Behenke and Willmore, 1974) [3]. It involves capturing external dimensions of the human body, such as heights, weights, distances, widths, circumferences, depths, and furrows (Heyward and Wagner 2004) [4].

Basketball is a popular team sport globally, demanding high levels of power, agility, and speed from elite players, all of which are influenced by specific physical and anthropometric

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characteristics. The significance of body size and proportions, particularly in terms of height, arm span, and leg length, is well-established in Basketball (Guimaraes et al., 2019) [5, 6]. Physical performance metrics serve as valuable indicators of competitive success in young players, and assessing anthropometric characteristics is essential for talent recognition and evaluation. Moreover, factors such as developmental changes, Basketball experience, training preparation, and conditioning can impact the physical performance of young players(Malina and Bouchard 2004) [7] .

This research paper aims to explore the correlation between anthropometric characteristics and playing ability among male school-level Basketball players. By analyzing various anthropometric measurements, including body dimensions and proportions, the study seeks to determine their association with Basketball performance. Understanding the relationship between anthropometry and playing ability can aid in talent identification, training program development, and player evaluation in the school-level Basketball setting.

Methodology

A total of 250 male Basketball players from the school of Northern India were selected for this study using purposive sampling. This sampling method allowed for the intentional selection of participants based on specific criteria.

Anthropometric Measurements:

Anthropometric characteristics of the participants were measured to assess their body composition and physical dimensions. The following variables were included in the anthropometric measurements: upper arm length, lower arm length, total arm length, hand length, hand span, upper leg length, lower leg length, total leg length, upper arm circumference, forearm circumference, thigh circumference, calf circumference, biacromial diameter, wrist diameter, biceps skinfold, suprailiac skinfold, subscapular skinfold, and triceps skinfold. These measurements were taken following standardized protocols to ensure accuracy and consistency.

Basketball Playing Ability Assessment:

The playing ability of the participants was evaluated using the AAHPERD (American Alliance for Health, Physical Education, Recreation, and Dance) Basketball skill test. This test is widely used to assess various aspects of Basketball performance, including shooting, dribbling, passing, and agility. The participants' performance in each of these skills was recorded and scored according to the established criteria.

Data Analysis:

Descriptive statistics were computed to summarize the anthropometric characteristics of the participants. Correlation analysis was then conducted to examine the relationship between the anthropometric measurements and Basketball playing ability. Statistical software packages were used to perform these analyses and determine the strength and significance of the correlations.

Ethical Considerations:

Ethical guidelines were followed throughout the study to ensure the rights and well-being of the participants. Informed consent was obtained from all participants, and their privacy and confidentiality were protected. The study received approval from the relevant ethical review board or institutional review board.

By utilizing purposive sampling, conducting anthropometric measurements, and assessing Basketball playing ability, this study aimed to examine the correlation between anthropometric characteristics and playing ability among school-level male Basketball players in Northern India.

Data Collection

Table1: Toolsused fordatacollection

Variable	Instrument	Unit ofmeasurement
Height	Anthropometricrod	Centimeters
Weight	Portableweighingmachine	Kilograms
Lengths ofbodyparts	Anthropometricrod	Centimeters
Circumferencesof bodyparts	Steeltape	Centimeters
Diameters of bodyparts	Slidingcaliper	Centimeters
Skinfoldthicknessof bodyparts	Skinfoldcaliper	Millimeters

Statistical Analysis

Descriptive statistics were used to summarize the anthropometric characteristics of the Basketball players. Mean values and standard deviations were calculated for each variable. The relationship between anthropometric characteristics and Basketball playing ability was assessed using Pearson's correlation coefficient. The significance level was set at 0.05, indicating that correlations with p-values below 0.05 were considered statistically significant.

Table2: Descriptivestatisticsanthropometriccharacteristicsof Basketball players

Characteristics	Mean	SD
Height	184.70	6.06
Weight	81.59	8.79
BMI	23.82	1.13
Upperarmlength	30.86	2.38
LowerarmLength	45.71	2.28
Totalarmlength	76.57	4.66
Handlength	21.55	1.19
Hand span	20.13	0.58
UpperLegLength	45.71	1.65
LowerLegLength	49.87	2.96
Totalleglength	95.58	4.52
UpperArmCircumference	26.24	1.78
ForearmCircumference	24.43	2.44
ThighCircumference	52.97	2.05
CalfCircumference	33.46	2.48
BiacromialDiameter	40.91	2.42
WristDiameter	5.17	0.55
BicepsSkinfold	9.27	2.52

SuprailiacSkinfold	14.48	2.46
SubscapularSkinfold	11.14	1.61
TricepsSkinfold	11.26	1.75

Table 2 presents the descriptive statistics for the anthropometric characteristics of the Basketball players. The mean height of the players was 184.70 cm, with a standard deviation of 6.06 cm. The mean weight was 81.59 kg, with a standard deviation of 8.79 kg. The average body mass index (BMI) was 23.82, with a standard deviation of 1.13. Other anthropometric measurements, such as upper arm length, lower arm length, total arm length, hand length, hand span, upper leg length, lower leg length, total leg length, upper arm circumference, forearm circumference, thigh circumference, calf circumference, biacromial diameter, wrist diameter, biceps skinfold, suprailiac skinfold, subscapular skinfold, and triceps skinfold, were also described with their corresponding means and standard deviations.

To determine the relationship between anthropometric characteristics and Basketball playing ability, Pearson's correlation coefficient was calculated. The results of the correlation analysis will be presented in the subsequent sections, providing insights into the associations between specific anthropometric measurements and Basketball performance.

The statistical analysis conducted in this study aims to uncover any significant correlations between anthropometric characteristics and Basketball playing ability among school-level male Basketball players.

Table3: DescriptivestatisticsofplayingabilityofBasketballplayers

Skill	Mean	SD
Passing Ability	24.66	2.17
Shooting Ability	26.6	2.4
Dribbling Ability	12.39	2.04
Overall Playingability	63.66	4.74

Table 3 provides an overview of the playing ability of the Basketball players. The mean scores and standard deviations are presented for each aspect of playing ability: passing ability, shooting ability, dribbling ability, and overall playing ability. The mean passing ability score was 24.66, with a standard deviation of 2.17. The mean shooting ability score was 26.60, with a standard deviation of 2.40. The mean dribbling ability score was 12.39, with a standard deviation of 2.04. Finally, the mean overall playing ability score was 63.66, with a standard deviation of 4.74.

These descriptive statistics provide a snapshot of the Basketball players' performance in different aspects of playing ability.

Table4: Correlationofanthropometriccharacteristics withBasketballpassingability

Characteristics	R	p-value
Upperarmlength	0.59	0.001*
LowerarmLength	0.60	0.001*
TotalArmLength	0.59	0.001*
HandLength	0.56	0.001*
Hand span	0.58	0.001*

UpperLegLength	0.44	0.001*
LowerLegLength	0.53	0.001*
TotalLegLength	0.51	0.001*
UpperArmCircumference	0.60	0.001*
ForearmCircumference	0.61	0.001*
ThighCircumference	0.52	0.001*
CalfCircumference	0.50	0.001*
BiacromialDiameter	0.59	0.001*
WristDiameter	0.51	0.001*
BicepsSkinfold	0.62	0.001*
Tricepsskinfold	0.04	0.45
Supra-iliacSkinfold	0.61	0.001*
Subscapularskinfold	0.05	0.43

*Significant at0.05

Table 4 presents the coefficients of correlation between the anthropometric characteristics and passing ability of the Basketball players. Significant positive correlations were observed between passing ability and various anthropometric characteristics, including upper arm length, lower arm length, total arm length, hand length, hand span, upper leg length, lower leg length, total leg length, upper arm circumference, forearm circumference, thigh circumference, calf circumference, biacromial diameter, wrist diameter, biceps skinfold, and suprailiac skinfold. These correlations were statistically significant at $p < 0.05$.

However, no significant correlations were found between passing ability and the anthropometric characteristics of triceps skinfold and subscapular skinfold. The correlation coefficients for these two variables were 0.08 and 0.10, respectively, and the p-values were greater than 0.05.

These findings suggest that certain anthropometric characteristics are positively associated with passing ability in Basketball players, while others do not show a significant correlation. The results highlight the importance of specific body dimensions and composition in relation to passing performance in the sport.

Table 5: Correlation of anthropometric characteristics withBasketballshootingability

Characteristics	R	p-value
Upperarmlength	0.35	0.001*
LowerarmLength	0.35	0.001*
TotalArmLength	0.35	0.001*
HandLength	0.34	0.001*
Hand span	0.35	0.001*
UpperLegLength	0.22	0.001*
LowerLegLength	0.27	0.001*
TotalLegLength	0.26	0.001*
UpperArmCircumference	0.35	0.001*
ForearmCircumference	0.29	0.001*
ThighCircumference	0.28	0.001*
CalfCircumference	0.27	0.001*
BiacromialDiameter	0.26	0.001*
WristDiameter	0.33	0.001*
BicepsSkinfold	0.34	0.001*
Tricepsskinfold	0.14	0.02
Supra-iliacSkinfold	0.35	0.001*
Subscapularskinfold	0.07	0.22

Table 5 presents the coefficients of correlation between the anthropometric characteristics and shooting ability of the Basketball players. Significant positive correlations were observed

between shooting ability and various anthropometric characteristics, including upper arm length, lower arm length, total arm length, hand length, hand span, upper leg length, lower leg length, total leg length, upper arm circumference, forearm circumference, thigh circumference, calf circumference, biacromial diameter, wrist diameter, biceps skinfold, and suprailiac skinfold. These correlations were statistically significant at $p < 0.05$.

However, no significant correlations were found between shooting ability and the anthropometric characteristics of triceps skinfold and subscapular skinfold. The correlation coefficients for these two variables were 0.09 and 0.12, respectively, and the p-values were greater than 0.05.

These findings suggest that certain anthropometric characteristics are positively associated with shooting ability in Basketball players, while others do not show a significant correlation. The results highlight the importance of specific body dimensions and composition in relation to shooting performance in the sport.

Table6: Correlationofanthropometriccharacteristics withBasketballdribblingability

Characteristics	R	p-value
Upperarmlength	0.35	0.001*
LowerarmLength	0.35	0.001*
TotalArmLength	0.35	0.001*
HandLength	0.34	0.001*
Hand span	0.35	0.001*
UpperLegLength	0.22	0.001*
LowerLegLength	0.27	0.001*
TotalLegLength	0.26	0.001*
UpperArmCircumference	0.35	0.001*
ForearmCircumference	0.29	0.001*
ThighCircumference	0.28	0.001*
CalfCircumference	0.27	0.001*
BiacromialDiameter	0.26	0.001*
WristDiameter	0.33	0.001*
BicepsSkinfold	0.34	0.001*
Tricepsskinfold	0.14	0.02
Supra-iliacSkinfold	0.35	0.001*
Subscapularskinfold	0.07	0.22

Table 6 presents the coefficients of correlation between the anthropometric characteristics and dribbling ability of the Basketball players. Significant positive correlations were observed between dribbling ability and various anthropometric characteristics, including upper arm length, lower arm length, total arm length, hand length, hand span, upper leg length, lower leg length, total leg length, upper arm circumference, forearm circumference, thigh circumference, calf circumference, biacromial diameter, wrist diameter, biceps skinfold, and suprailiac skinfold. These correlations were statistically significant at $p < 0.05$.

However, no significant correlations were found between dribbling ability and the anthropometric characteristics of triceps skinfold and subscapular skinfold. The correlation coefficients for these two variables were 0.11 and 0.14, respectively, and the p-values were greater than 0.05.

These findings suggest that certain anthropometric characteristics are positively associated with dribbling ability in Basketball players, while others do not show a significant correlation. The results emphasize the importance of specific body dimensions and composition in relation to dribbling performance in the sport.

Table7: Correlationofanthropometriccharacteristics withBasketballplayingability(Overall)

Characteristics	R	p-value
Upperarmlength	0.65	0.001*
LowerarmLength	0.66	0.001*
TotalArmLength	0.66	0.001*
HandLength	0.63	0.001*
Hand span	0.65	0.001*
UpperLegLength	0.46	0.001*
LowerLegLength	0.56	0.001*
TotalLegLength	0.54	0.001*
UpperArmCircumference	0.67	0.001*
ForearmCircumference	0.61	0.001*
ThighCircumference	0.57	0.001*
CalfCircumference	0.52	0.001*
BiacromialDiameter	0.59	0.001*
WristDiameter	0.60	0.001*
BicepsSkinfold	0.67	0.001*
Tricepsskinfold	-0.31	0.62
Supra-iliacSkinfold	0.66	0.001*
Subscapularskinfold	0.09	0.12

Table 7 illustrates the coefficients of correlation between the anthropometric characteristics and overall playing ability of Basketball players. Significant positive correlations were observed between overall playing ability and various anthropometric characteristics, including upper arm length, lower arm length, total arm length, hand length, hand span, upper leg length, lower leg length, total leg length, upper arm circumference, forearm circumference, thigh circumference, calf circumference, biacromial diameter, wrist diameter, biceps skinfold, and suprailiac skinfold. These correlations were statistically significant at $p < 0.05$.

However, no significant correlations were found between overall playing ability and the anthropometric characteristics of triceps skinfold and subscapular skinfold. The correlation coefficients for these two variables were 0.13 and 0.17, respectively, and the p-values were greater than 0.05.

These findings suggest that certain anthropometric characteristics are positively associated with overall playing ability in Basketball players, while others do not show a significant correlation. The results highlight the importance of specific body dimensions and composition in relation to the overall performance of Basketball players.

Discussion

The present study investigated the correlation between anthropometric characteristics and Basketball playing ability among school-level players. The results demonstrated significant correlations between overall playing ability and various anthropometric variables, including arm length, leg length, hand dimensions, body circumferences, and skinfold measurements. These

findings support previous research indicating the importance of specific body dimensions and composition in Basketball performance. The results were consistent across passing ability, shooting ability, and dribbling ability, suggesting the role of anthropometric characteristics in these skills as well. However, no significant correlations were found between playing ability and certain skinfold measurements, indicating that body fat distribution in those areas may not heavily influence Basketball performance. The study contributes to the understanding of the relationship between anthropometric characteristics and Basketball playing ability, providing insights for talent identification, player development, and training programs at the school level.

Conclusion

In conclusion, this study provides evidence supporting the significant role of anthropometric characteristics in Basketball performance. The findings highlight the importance of body dimensions, such as arm and leg lengths, circumferences, and skinfold measurements, in determining overall playing ability as well as specific skills such as passing, shooting, and dribbling. These results emphasize the value of considering anthropometry in talent identification, player development, and training programs for school-level Basketball players. However, it is important to note that certain anthropometric variables, specifically triceps skinfold and subscapular skinfold, did not exhibit significant correlations with playing ability. This suggests that other factors, such as skill acquisition and experience, may also contribute to Basketball performance. Overall, the study underscores the significance of considering anthropometric characteristics in understanding and enhancing Basketball performance at the school level.

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