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Jasbir Singh
Research Scholar, Department of
Physical Education, Sant Baba
Bhag Singh University,
Jalandhar, Punjab, India

Dr. Pritam Singh
Head and Professor, Department
of Physical Education, Sant
Baba Bhag Singh University,
Jalandhar, Punjab, India

Correlation between anthropometric characteristics and playing ability of university level male basketball players

Jasbir Singh and Dr. Pritam Singh

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Abstract
The purpose of the study was to determine the correlation between anthropometric characteristics and playing ability of university level male Basketball players. For this purpose, a total of 250 male Basketball players were chosen from the Universities of Northern India. The purposive sampling method was used to select the sample. The subjects were tested for their anthropometric characteristics and Basketball playing ability. For anthropometry, the 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. For playing ability, AAHPERD Basketball skill test was used. Results revealed that all the anthropometric characteristics were related to the Basketball playing ability except Triceps skinfolds and Subscapular skinfolds. It can be concluded from the study that anthropometric characteristics play important role in Basketball performance.

Keywords: Basketball, anthropometric, relationship, correlation

Introduction
Anthropometry is a discipline that deals with the calculation of the weight, structure, and proportions of the human body. It provides empirical methods and observations of living human beings. Anthropometric techniques (skin fat, circumference and diameter measurements) are common for predicting body composition because they are not costly, require little space and can be easily performed (Behenke and Willmore, 1974 and Pollock and Willmore, 1990) [1]. Anthropometry is also used in Physical Education, athletic sciences, physical activity, and biomedical sciences. Anthropometric dimensions may be classified into heights, weights and distances, widths or widths, circumferences or girths, depths and furrows. The measurements of the person are of the external dimensions of the body.
Basketball is one of the most common team sports in the world and elite players need high standards of power, agility and speed both of which need particular physical and anthropometric characteristics. The value of body size and body proportions, particularly in terms of height, arm span and leg length, is well known in Basketball (Guimarães *et al*., 2019) [6, 18]. Physical performance metrics can be valuable indicators of competitive success in young players, and anthropometric characteristics are necessary for the recognition and evaluation of talent. In addition, there are other factors, such as changes in development, basketball experience, preparation and weighting that can influence the physical performance of young players.

Methods
For this study, a total of 250 male Basketball players were chosen from the Universities of Northern India. The purposive sampling method was used to select the sample. The subjects were tested for their anthropometric characteristics and Basketball playing ability. For anthropometry, the 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,

Corresponding Author:
Jasbir Singh
Research Scholar, Department of
Physical Education, Sant Baba
Bhag Singh University,
Jalandhar, Punjab, India

Biacromial Diameter, Wrist Diameter, Biceps Skinfold, Suprailiac Skinfold, Subscapular Skinfold and Triceps Skinfold. For playing ability, AAHPERD Basketball skill test was applied.

Data collection

Table 1: Tools used for data collection

Variable	Instrument	Unit of measurement
Height	Anthropometric rod	Centimeters
Weight	Portable weighing machine	Kilograms
Lengths of body parts	Anthropometric rod	Centimeters
Circumferences of body parts	Steel tape	Centimeters
Diameters of body parts	Sliding caliper	Centimeters
Skinfold thickness of body parts	Skinfold caliper	Millimeters

Statistical analysis

The variables were described as means and standard deviations. The relationship between the anthropometric characteristics and Basketball playing ability was tested using the Pearson's coefficient of correlation. The significance level was 0.05.

Table 2: Descriptive statistics anthropometric characteristics of basketball players

Characteristics	Mean	SD
Height	184.70	6.06
Weight	81.59	8.79
BMI	23.82	1.13
Upper arm length	30.86	2.38
Lower arm Length	45.71	2.28
Total arm length	76.57	4.66
Hand length	21.55	1.19
Hand span	20.13	0.58
Upper Leg Length	45.71	1.65
Lower Leg Length	49.87	2.96
Total leg length	95.58	4.52
Upper Arm Circumference	26.24	1.78
Forearm Circumference	24.43	2.44
Thigh Circumference	52.97	2.05
Calf Circumference	33.46	2.48
Biacromial Diameter	40.91	2.42
Wrist Diameter	5.17	0.55
Biceps Skinfold	9.27	2.52
Suprailiac Skinfold	14.48	2.46
Subscapular Skinfold	11.14	1.61
Triceps Skinfold	11.26	1.75

Table 2 shows the description of anthropometric characteristics of Basketball players. The mean and standard deviation of height was 184.70 and 6.06 respectively. The mean and standard deviation of weight was 81.59 and 8.79 respectively. The mean and standard deviation of BMI was 23.82 and 1.13 respectively. The mean and standard deviation of Upper arm length was 30.86 and 2.38 respectively. The mean and standard deviation of Lower arm Length was 45.71 and 2.28 respectively. The mean and standard deviation of Total arm length was 76.57 and 4.66 respectively. The mean and standard deviation of Hand length was 21.55 and 1.19 respectively. The mean and standard deviation of Hand span was 20.13 and 0.58 respectively. The mean and standard deviation of Upper Leg Length was 45.71 and 1.65 respectively. The mean and standard deviation of Lower Leg

Length was 49.87 and 2.96 respectively. The mean and standard deviation of Total leg length was 95.58 and 4.52 respectively. The mean and standard deviation of Upper Arm Circumference was 26.24 and 1.78 respectively. The mean and standard deviation of Forearm Circumference was 24.43 and 2.44 respectively. The mean and standard deviation of Thigh Circumference was 52.97 and 2.05 respectively. The mean and standard deviation of Calf Circumference was 33.46 and 2.48 respectively. The mean and standard deviation of Biacromial Diameter was 40.91 and 2.42 respectively. The mean and standard deviation of Wrist Diameter was 5.17 and 0.55 respectively. The mean and standard deviation of Biceps skinfold was 9.27 and 2.52 respectively. The mean and standard deviation of Suprailiac skinfold was 14.48 and 2.46 respectively. The mean and standard deviation of Subscapular skinfold was 11.14 and 1.75 respectively. The mean and standard deviation of Triceps skinfold was 11.26 and 2.38 respectively.

Table 3: Descriptive statistics of playing ability of basketball players

Skill	Mean	SD
Passing	24.66	2.17
Shooting	26.6	2.4
Dribbling	12.39	2.04
Playing ability	63.66	4.74

Table 3 presents the description of playing ability of Basketball players. The mean and standard deviation of passing ability was 24.66 and 2.17 respectively. The mean and standard deviation of shooting ability was 26.6 and 2.4 respectively. The mean and standard deviation of Dribbling ability was 12.39 and 2.04 respectively. The mean and standard deviation of overall Playing ability was 63.66 and 4.74 respectively.

Table 4: Correlation of anthropometric characteristics with basketball passing ability

Characteristics	R	p-value
Upper arm length	0.59	0.001*
Lower arm Length	0.60	0.001*
Total Arm Length	0.59	0.001*
Hand Length	0.56	0.001*
Hand span	0.58	0.001*
Upper Leg Length	0.44	0.001*
Lower Leg Length	0.53	0.001*
Total Leg Length	0.51	0.001*
Upper Arm Circumference	0.60	0.001*
Forearm Circumference	0.61	0.001*
Thigh Circumference	0.52	0.001*
Calf Circumference	0.50	0.001*
Biacromial Diameter	0.59	0.001*
Wrist Diameter	0.51	0.001*
Biceps Skinfold	0.62	0.001*
Triceps skinfold	0.04	0.45
Supra-iliac Skinfold	0.61	0.001*
Subscapular skinfold	0.05	0.43

* Significant at 0.05

Table 4 depicts the coefficient of correlation between anthropometric characteristics and passing ability of Basketball players. It was found that a significant positive correlation existed between the Basketball passing ability and the anthropometric characteristics viz. 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 Supra-iliac Skinfold. However, no significant correlation was found between the Basketball passing ability and the two anthropometric characteristics viz. Triceps skinfold and Subscapular skinfold.

Table 5: Correlation of anthropometric characteristics with basketball shooting ability

Characteristics	R	p-value
Upper arm length	0.35	0.001*
Lower arm Length	0.35	0.001*
Total Arm Length	0.35	0.001*
Hand Length	0.34	0.001*
Hand span	0.35	0.001*
Upper Leg Length	0.22	0.001*
Lower Leg Length	0.27	0.001*
Total Leg Length	0.26	0.001*
Upper Arm Circumference	0.35	0.001*
Forearm Circumference	0.29	0.001*
Thigh Circumference	0.28	0.001*
Calf Circumference	0.27	0.001*
Biacromial Diameter	0.26	0.001*
Wrist Diameter	0.33	0.001*
Biceps Skinfold	0.34	0.001*
Triceps skinfold	0.14	0.02
Supra-iliac Skinfold	0.35	0.001*
Subscapular skinfold	0.07	0.22

* Significant at 0.05

Table 5 depicts the coefficient of correlation between anthropometric characteristics and shooting ability of Basketball players. It was found that a significant positive correlation existed between the Basketball shooting ability and the anthropometric characteristics viz. 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 Supra-iliac Skinfold. However, no significant correlation was found between the Basketball shooting ability and the two anthropometric characteristics viz. Triceps skinfold and Subscapular skinfold.

Table 6: Correlation of anthropometric characteristics with basketball dribbling ability

Characteristics	R	p-value
Upper arm length	0.35	0.001*
Lower arm Length	0.35	0.001*
Total Arm Length	0.35	0.001*
Hand Length	0.34	0.001*
Hand span	0.35	0.001*
Upper Leg Length	0.22	0.001*
Lower Leg Length	0.27	0.001*
Total Leg Length	0.26	0.001*
Upper Arm Circumference	0.35	0.001*
Forearm Circumference	0.29	0.001*
Thigh Circumference	0.28	0.001*
Calf Circumference	0.27	0.001*
Biacromial Diameter	0.26	0.001*
Wrist Diameter	0.33	0.001*
Biceps Skinfold	0.34	0.001*
Triceps skinfold	0.14	0.02
Supra-iliac Skinfold	0.35	0.001*
Subscapular skinfold	0.07	0.22

* Significant at 0.05

Table 6 depicts the coefficient of correlation between anthropometric characteristics and dribbling ability of Basketball players. It was found that a significant positive correlation existed between the Basketball dribbling ability and the anthropometric characteristics viz. 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 Supra-iliac Skinfold. However, no significant correlation was found between the Basketball dribbling ability and the two anthropometric characteristics viz. Triceps skinfold and Subscapular skinfold.

Table 7: Correlation of anthropometric characteristics with basketball playing ability (Overall)

Characteristics	R	p-value
Upper arm length	0.65	0.001*
Lower arm Length	0.66	0.001*
Total Arm Length	0.66	0.001*
Hand Length	0.63	0.001*
Hand span	0.65	0.001*
Upper Leg Length	0.46	0.001*
Lower Leg Length	0.56	0.001*
Total Leg Length	0.54	0.001*
Upper Arm Circumference	0.67	0.001*
Forearm Circumference	0.61	0.001*
Thigh Circumference	0.57	0.001*
Calf Circumference	0.52	0.001*
Biacromial Diameter	0.59	0.001*
Wrist Diameter	0.60	0.001*
Biceps Skinfold	0.67	0.001*
Triceps skinfold	-0.31	0.62
Supra-iliac Skinfold	0.66	0.001*
Subscapular skinfold	0.09	0.12

* Significant at 0.05

Table 7 portrays the coefficient of correlation between anthropometric characteristics and overall playing ability of Basketball players. It was found that a significant positive correlation existed between the Basketball playing ability and the anthropometric characteristics viz. 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 Supra-iliac Skinfold. However, no significant correlation was found between the Basketball playing ability and the two anthropometric characteristics viz. Triceps skinfold and Subscapular skinfold.

Discussion
The aim of the study was to find out the relationship between anthropometric characteristics and Basketball playing ability of University level. It was found that significant relationship existed between the overall playing ability and the variables 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 Supra-iliac Skinfold. However, the two variables: Triceps skinfold and Subscapular skinfold were not significantly related to the Basketball playing ability. Similar

results were found for the passing ability, shooting ability and dribbling ability. The findings of the study are in agreement with the study of found that skill appears to be independent of the pubertal status and the highest group of Basketball players did not play. Achieve better scores in basketball-specific skills testing. The results of the study were supported by Hoare. The ability to play from anthropometric and its physiological attributes. They concluded that it was anthropometric and physiological profile that contribute to selection procedures in Basketball.

Conclusion
This study concluded that anthropometric characteristics play important role in Basketball performance.

References

1. Behnke AR, Willmore JH. Evaluation and regulation of body build and composition. Englewood Cliffs NJ: Prentice Hall 1974.
2. Pollock ML, Willmore JH. Exercise in health and disease: Evaluation and presentation for prevention and rehabilitation. Philadelphia: W.B. Saunders 1990.
3. Prabhu A, Sathuluri R. Study On Relationship between Shooting Ability on Selected Physical Anthropometric Variables among Men Basketball Players in Andhra Pradesh, 2016.
4. Gangopadhyay SR. Physical Education Today and Tomorrow. Delhi: Friends Publications, 1993, 15.
5. Aahper. Aahperd Youth Fitness Test manual. Washington: DC. AS citied by Bosco, James S and Gustafson William F. Measurement and Evaluation in Physical Education in Physical Education, Fitness and Sports. Prentice Hall Inc. Englewood Cliffs, 1976.
6. Guimarães E, Baxter-Jones A, Maia J, Fonseca P, Santos A, Santos E *et al.* The Roles of Growth, Maturation, Physical Fitness, and Technical Skills on Selection for a Portuguese Under-14 Years Basketball Team Sports 2019;7:61.
   DOI: 10.3390/sports7030061
7. Apostolidis N, Nassis GP, Bolatoglou T, Geladas ND. Physiological and technical characteristics of elite young basketball players, J Sports Med Phys Fit. 2004;44:157–163.
8. Singh H, Singh S. Prevalence, patterns and associated factors of Physical Activity in Indian University students, European Journal of physical education and sport science. 2017;3(10):76-87.
9. Keshav K, Harmandeep S. Comparative Study of Physical Fitness Variables of male Volleyball Players and Football Players, Research Journal of Physical Education Sciences. 2014;2(1):5-7.
10. Singh G, Singh S, Singh H. Physical fitness differentials between boys of government and private schools, International Journal of Physical Education, Sports and Health. 2017;4(3):468-471.
11. Singh H. Exploring the relationship between trait emotional intelligence and physical activity levels in male university students, European Journal of Physical Education and Sport Science. 2018;4(3):141-148.
12. Harmandeep S, Satinder K, Amita R, Anupriya S. Effects of six-week Plyometrics on vertical jumping ability of volleyball players, Research Journal of Physical Education Sciences. 2015;2320:9011.
13. Singh H. Relationship between levels of physical activity and health-related quality of life in male university students, International Journal of Physiology, Nutrition and Physical Education. 2018;3(1):1391-1394.
14. Singh H. Relationship between leisure-time physical activity and emotional intelligence in female university students: A correlational study, European Journal of Physical Education and Sport Science. 2017;3(10):209-216.
15. Singh A, Singh T, Singh H. Autogenic training and progressive muscle relaxation interventions: Effects on mental skills of females, European Journal of Physical Education and Sport Science. 2018;5(1):134-141.
16. Ziv G, Lidor R. Physical attributes, physiological characteristics, on-court performances and nutritional strategies of female and male basketball players Sport Med. 2009;39:547-568.
    DOI: 10.2165/00007256-200939070-00003
17. Gualdi-Russo E, Rinaldo N, Pasini A, Zaccagni L. Hand preference and performance in basketball tasks, Int J Environ Res Public Health. 2019;16:4336.
    DOI: 10.3390/ijerph16224336
18. Guimarães E, Ramos A, Janeira MA, Baxter-Jones ADG, Maia J. How Does Biological Maturation and Training Experience Impact the Physical and Technical Performance of 11–14-Year-Old male basketball players? Sports 2019;7:243.
    DOI: 10.3390/sports7120243.
19. Singh H. Relationship between leisure-time physical activity and emotional intelligence in female university students: A correlational study, European Journal of physical education and sport science. 2017;3(10):209-216.
20. Singh A, Singh T, Singh H. Autogenic training and progressive muscle relaxation interventions: Effects on mental skills of females, European Journal of physical education and sport science. 2018;5(1):134-141.