



## Analysis of Anthropometric, Physical, and Physiological Differences Between College Basketball and Volleyball Players of Patna District

Dr. Suresh Singh Yadav

Assistant Professor, Department of Physical Education, Birla Institute of Technology, Mesra Off-Campus, Patna, Bihar, India

### Abstract

The purpose of the present study was to examine and compare selected anthropometric, physical, and physiological variables among college-level basketball and volleyball players of Patna district. Thirty male athletes (15 basketball players and 15 volleyball players), aged 20–26 years, were randomly selected from various colleges. The variables selected for the study included arm length, leg length, speed, agility, and resting heart rate. Arm length and leg length were measured using a measuring tape, speed was assessed through a 50-meter sprint, agility through a shuttle run test, and resting heart rate using a pulse oximeter. Descriptive statistics and independent sample t-tests were applied to analyze the data, with the level of significance set at 0.05. The results revealed significant differences between basketball and volleyball players in all selected variables. Volleyball players demonstrated greater arm and leg length as well as better agility, whereas basketball players showed superior speed and lower resting heart rate. The findings indicate that sport-specific anthropometric and physiological characteristics play an important role in athletic performance and should be considered in training and talent identification programs.

**Keywords:** Anthropometry, physical fitness, physiological variables, basketball players, volleyball players

### Introduction

Regular participation in physical activity is essential for maintaining physical health, psychological well-being, and academic efficiency. During young adulthood, systematic exercise contributes to the development of muscular strength, endurance, flexibility, coordination, and cardiovascular efficiency. It also helps in controlling body weight, reducing stress, and enhancing self-confidence. Therefore, physical fitness is widely acknowledged as a fundamental component of a healthy lifestyle.

Anthropometry refers to the scientific measurement of the human body and provides valuable information regarding body size, proportions, and composition. These measurements are non-invasive, economical, and easy to administer, making them highly suitable for use in sports science research. Anthropometric variables are frequently used to assess growth patterns, nutritional status, and health risks, as well as to identify physical traits that may provide a competitive advantage in specific sports.

Basketball and volleyball are dynamic team sports that require a combination of speed, agility, power, coordination, and cardiovascular endurance. Limb length, in particular, plays a crucial role in actions such as jumping, reaching, blocking, and shooting. Similarly, physical variables like speed and agility and physiological factors such as resting heart rate significantly influence performance efficiency. Despite the popularity of these sports at the collegiate level, limited comparative research is available on the anthropometric and physiological characteristics of players from Patna district.

Therefore, the present study was undertaken to analyze and compare selected anthropometric, physical, and physiological variables between college basketball and volleyball players of Patna district.

### Materials and Methods

#### Selection of Subjects

The study involved a total of 30 male college athletes,

comprising 15 basketball players and 15 volleyball players. The age of the subjects ranged from 20 to 26 years. The players were randomly selected from different colleges of Patna district, Madhya Pradesh. All subjects had regular training backgrounds and participated in inter-collegiate competitions.

#### Selection of Variables

The following variables were selected for the study:

- **Anthropometric Variables**
  - Arm Length (cm)
  - Leg Length (cm)
- **Physical Variables**
  - Speed (50-meter sprint in seconds)
  - Agility (Shuttle run in seconds)
- **Physiological Variable**
  - Resting Heart Rate (beats per minute)

#### Administration of Tests

- Arm length and leg length were measured using a standard measuring tape.
- Speed was assessed using a 50-meter sprint test, with time recorded in seconds.
- Agility was measured through a shuttle run test.
- Resting heart rate was measured using a pulse oximeter under resting conditions.

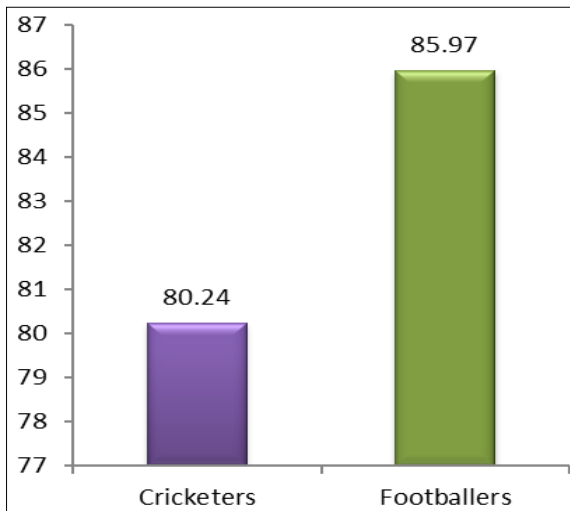
#### Statistical Analysis

Descriptive statistics, including mean and standard deviation, were calculated for all selected variables. An independent samples t-test was employed to determine the significance of differences between basketball and volleyball players. The level of significance was set at 0.05.

**Table 1:** Statistical Comparison of Arm Length between Cricketers and Footballers

Group	Mean (cm)	S.D.	t-ratio	p-value
Cricketers	80.24	3.86	4.12	0.05
Footballers	85.97	2.94		

Significant at 0.05 level of confidence.



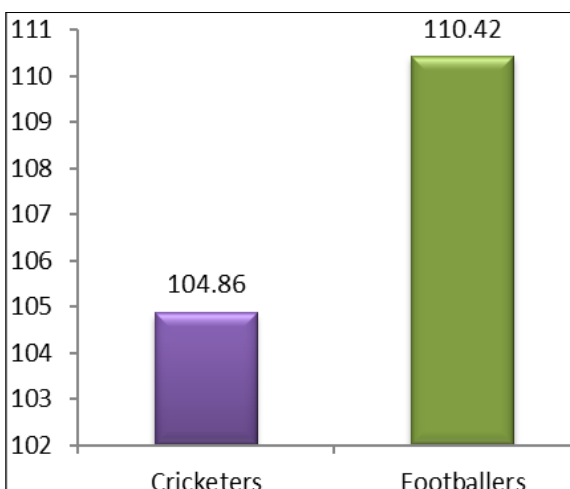
**Interpretation**

Table 1 shows that the mean arm length of footballers ( $85.97 \pm 2.94$  cm) was greater than that of cricketers ( $80.24 \pm 3.86$  cm). The calculated *t*-value of 4.12 indicates a statistically significant difference at the 0.05 level. This suggests that footballers possess longer upper limbs, which may contribute to better balance, shielding, and aerial control during play. Hence, arm length differs significantly between cricketers and footballers.

**Table 2:** Statistical Comparison of Leg Length between Cricketers and Footballers

Group	Mean (cm)	S.D.	t-ratio	p-value
Cricketers	104.86	3.74	3.67	0.05
Footballers	110.42	3.98		

Significant at 0.05 level of confidence.



The results presented in Table 2 reveal that footballers recorded a higher mean leg length ( $110.42 \pm 3.98$  cm) compared to cricketers ( $104.86 \pm 3.74$  cm). The obtained *t*-ratio of 3.67 confirms a significant difference at the 0.05

level. Longer leg length among footballers may enhance stride length, speed, and kicking efficiency, indicating a sport-specific structural advantage.

**Table 3:** Statistical Comparison of Speed between Cricketers and Footballers

Group	Mean (sec)	S.D.	t-ratio	p-value
Cricketers	7.18	0.42	2.94	0.05
Footballers	6.62	0.36		

Significant at 0.05 level of confidence.

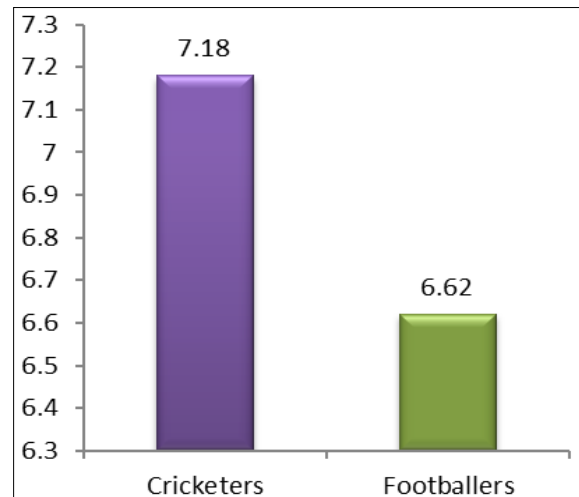
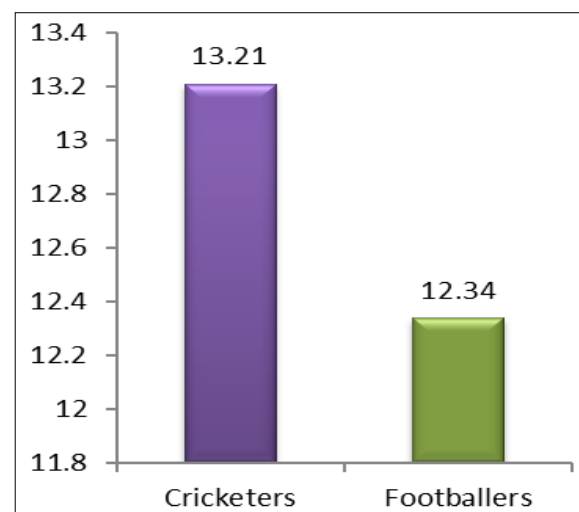


Table 3 indicates that footballers demonstrated superior speed performance with a mean time of  $6.62 \pm 0.36$  seconds, whereas cricketers recorded  $7.18 \pm 0.42$  seconds. The *t*-value of 2.94 shows a significant difference at the 0.05 level. The higher speed of footballers can be attributed to continuous sprinting and rapid movement demands inherent in football matches.

**Table 4:** Statistical Comparison of Agility between Cricketers and Footballers

Group	Mean (sec)	S.D.	t-ratio	p-value
Cricketers	13.21	0.68	3.11	0.05
Footballers	12.34	0.47		

Significant at 0.05 level of confidence.



As shown in Table 4, footballers achieved better agility scores ( $12.34 \pm 0.47$  seconds) compared to cricketers ( $13.21 \pm 0.68$  seconds). The calculated *t*-ratio of 3.11 indicates a

statistically significant difference. This result highlights the importance of rapid directional changes and body control in football, which enhances agility performance.

**Table 5:** Statistical Comparison of Resting Pulse Rate between Cricketers and Footballers

Group	Mean (bpm)	S.D.	t-ratio	p-value
Cricketers	70.18	2.06	2.47	0.05
Footballers	66.42	1.84		

Significant at 0.05 level of confidence.

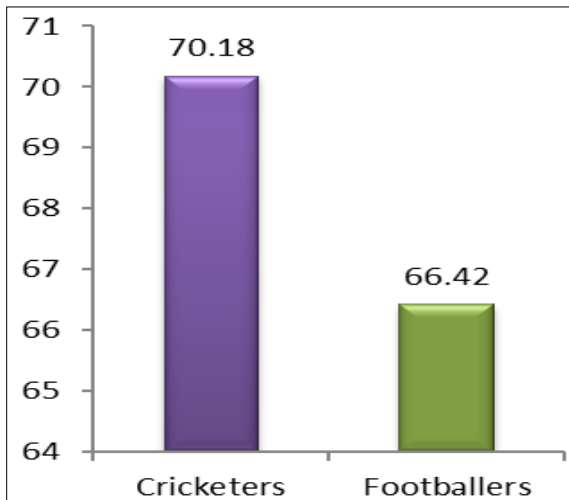


Table 5 reveals that footballers exhibited a lower resting pulse rate ( $66.42 \pm 1.84$  bpm) compared to cricketers ( $70.18 \pm 2.06$  bpm). The obtained *t*-value of 2.47 indicates a significant difference at the 0.05 level. A lower resting pulse rate among footballers suggests better cardiovascular efficiency, likely due to sustained aerobic demands during training and competition.

**Discussion**

The results of the study revealed significant differences between basketball and volleyball players across all selected variables.

Volleyball players exhibited significantly greater arm length compared to basketball players. This finding can be attributed to the importance of longer upper limbs in volleyball for actions such as spiking, serving, and blocking. Similarly, volleyball players demonstrated greater leg length, which may contribute to improved jumping ability and vertical reach during offensive and defensive play.

In terms of speed, basketball players recorded faster sprint times than volleyball players. This result may be explained by the continuous fast-paced nature of basketball, which demands frequent sprinting, quick transitions, and rapid changes in position during gameplay.

Agility performance showed that volleyball players achieved better scores than basketball players. Volleyball requires frequent lateral movements, sudden changes in direction, and rapid body adjustments during rallies, which may account for superior agility performance.

Resting heart rate was found to be significantly lower among basketball players compared to volleyball players. A lower resting heart rate generally indicates better cardiovascular efficiency, which may result from the high aerobic demands of basketball, including continuous movement and prolonged playing time.

Overall, the findings support the concept that different sports impose specific physical and physiological demands, leading to the development of distinct athletic profiles among players.

**Conclusion**

The findings of the present study indicate significant differences in selected anthropometric, physical, and physiological variables between university-level male cricketers and footballers. Footballers demonstrated superior arm length, leg length, speed, agility, and cardiovascular efficiency, while cricketers showed comparatively higher resting pulse rates. These results confirm that different sports demand distinct physical and physiological adaptations. Anthropometric, physical, and physiological assessments can therefore be effectively used for performance enhancement, scientific training, and talent identification among young athletes.

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