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An Analysis of Selected Anthropometric and Motor Fitness Components among University-Level Cricket Players of the University of Lucknow

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Abstract

This study evaluated selected anthropometric and motor fitness variables among university-level cricket players to identify physiological and morphological differences between batsmen and bowlers. Twenty male players aged 19 to 25 from University of Lucknow, Lucknow, all with Inter-University experience or higher, were randomly assigned to two groups: batsmen (n=10) and bowlers (n=10). Measurements included arm length, shoulder breadth, leg length, foot length, waist and hip circumferences, waist-to-hip ratio (WHR), and body mass index (BMI). Upper body strength (push-up test) and speed (50-meter dash) were also assessed using standardized procedures. Descriptive statistics were calculated. Independent t-tests compared group means at a significance level of $p < 0.05$. Significant differences were found in shoulder breadth ($t = 2.32$), foot length ($t = 2.24$), and BMI ($t = 3.06$), all exceeding the critical t-value (2.101). No significant differences appeared for other variables, with t-values ranging from 0.00 to 1.95. These results suggest bowlers and batsmen differ in shoulder breadth, foot length, and BMI, likely reflecting the positional and biomechanical demands of their roles. Similarities in other measures indicate comparable general fitness and body proportions. The findings underscore the value of role-specific anthropometric and fitness profiling to optimize cricket training and performance at the university level.

Introduction

Cricket, the iconic bat-and-ball contest, pits two teams of eleven against each other in a thrilling test of

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skill and strategy. Revered across the globe, especially in cricket-loving nations like India, Sri Lanka, New-Zealand, England, Australia, Pakistan, and South Africa, the sport dazzles with its rich history and tactical complexity. From the lightning-fast excitement of T20S to the endurance of Test matches, cricket's many formats are governed by the International Cricket Council. The game's roots stretch back to 16th-century southern England, where it first captured the imagination of both aristocrats and villagers. Batting, the art of striking the ball to rack up runs and protect the wicket, demands not just physical prowess but also razor-sharp reflexes and quick thinking. Today, every player at the crease is called a batter; a nod to the sport's evolving inclusivity. Bowlers, masters of precision, deliver each ball with a unique blend of skill and biomechanics, while all-rounder's shine in both batting and bowling. Deliveries come in sets of six, known as over's, with teammates taking turns from opposite ends of the pitch. If a bowler sends the ball too far for the batter to reach, the umpire calls it wide. Fielding, often underestimated, is a true test of endurance and courage. Fielders must stay alert for hours, ready to dive, leap, or sprint at a moment's notice, turning defense into a display of athletic daring.

Anthropometric characteristics are significant determinants of athletic success (Rico-Sanz, 1998; Wilmore and Costill, 1999; Keogh, 1999). Bowlers and batsmen may exhibit distinct anthropometric profiles, leading to differences in research findings. Anthropometry, a subfield of anthropology, focuses on measuring the human body, including diameters, circumferences, and other external dimensions. Motor fitness refers to the ability to perform physical activities efficiently, encompassing agility, balance, coordination, power, speed, muscle strength, and response time. This attribute is essential for overall physical well-being and has a substantial impact on performance in both daily activities and athletic contexts. Maintaining motor fitness is important for the general population and athletes alike to support an active and healthy lifestyle. Physical activities such as jumping, bending, stretching, throwing velocity, and motor skills are considered essential for participation in team sports like cricket (Boby & Badhan, 2023).

Objectives of the Study

This study has the following objectives:

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- To compare anthropometric traits of bowlers and batsmen in cricket.
- To assess differences in motor fitness between bowlers and batsmen in cricket.

Methodology

This study aimed to assess the anthropometric and motor fitness parameters of male university-level cricket players, focusing on arm length, shoulder breadth, leg length, foot length, hip and waist circumference, BMI, WHR, speed, and strength. Twenty players (10 batsmen and 10 bowlers) aged 19 to 25, who participated in the Inter-University competition at University of Lucknow, Lucknow, were randomly selected. All participants were deemed fit to participate in the test trial. A random-group research design was used.

Collection of Data

Male cricket players from University of Lucknow, Lucknow participated in the study. Batsmen and bowlers were included. They completed selected anthropometric and motor fitness tests. These tests included measurements of arm length, shoulder width, leg length, and foot length. Hip and waist circumference, BMI, WHR, speed, and strength were also measured.

Statistical Analysis

Descriptive statistics, including mean and standard deviation, were calculated for both measured and derived variables. To explore differences in anthropometric traits and motor fitness between bowlers and batsmen, an independent t-test was performed. Statistical significance was set at the 5% level, and all analyses were conducted using IBM SPSS Version 21.

Data Analysis

Comparison of Mean Weight and Height between Batsmen and Bowlers in Cricket

Batsman

The weight of the batsmen ranged from 55 kg to 95 kg, with a mean of 70.70 kg and a standard deviation of 14.37 kg.

The height of the batsmen ranged from 165 cm to 190 cm, with a mean of 171.30 cm and a

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standard deviation of 7.26 cm.

Bowler

The weight of the batsmen ranged from 55 kg to 85 kg, with a mean of 70.70 kg and a standard deviation of 14.37 kg.

The height of the batsmen ranged from 165 cm to 195 cm, with a mean of 171.30 cm and a standard deviation of 7.26 cm.

Table 1: Descriptive Statistics and Mean Comparison of Arm Length, Shoulder Breadth, Leg Length, Foot Length, Waist Circumference, Hip Circumference, Speed, Strength, B.M.I., and WHR between Batsmen and Bowlers in Cricket

			players						
Test	**Group**	**N**	**M**	**SD**	**MD**	**SED**	**df**	**t-value**	**Sig. p-value**
Arm Length	Batsman Bowler	20	58.60 58.60	5.83 3.95	0.00	2.23	18	0.00	1.00
Shoulder Breadth	Batsman Bowler	20	42.70 40.50	2.26 1.96	2.20	0.95	18	2.32*	0.03
Leg Length	Batsman Bowler	20	87.30 86.90	5.83 3.78	0.40	2.20	18	0.18	0.86
Foot Length	Batsman Bowler	20	25.60 24.30	1.58 0.95	1.30	0.58	18	2.24*	0.04
Waist Circumference	Batsman Bowler	20	86.40 77.30	14.17 4.19	9.10	4.67	18	1.95	0.07
Speed	Batsman Bowler	20 20	7.31 7.38	0.50 0.64	0.07	0.26	18	0.27	0.80
Hip Circumference	Batsman Bowler	20	110.40 89.30	37.02 3.02	21.10	11.74	18	1.80	0.09
Strength	Batsman Bowler	20	25.40 26.60	9.56 7.26	1.20	3.80	18	0.32	0.76
BMI	Batsman	20	23.92	3.63	3.86	1.26	18	3.06*	0.01
	Bowler		20.07	1.68					
WHR	Batsman	20	0.81	0.12	0.05	0.04	18	1.25	0.19
	Bowler		0.87	0.02					

We determined statistical significance at the 0.05 level (tabulated value: 2.101, df = 18). Abbreviations: M = mean, SD = standard deviation, MD = mean deviation, SED = standard error of the difference, df = degrees of freedom.

Table I presents the mean arm lengths for both batsmen and bowlers, each measuring 58.60. At the 0.05 level of confidence, the t-value for arm length was 0.00, which is less than the critical value of

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2.101, indicating no significant difference between the groups. The mean shoulder breadths for bowlers and batsmen were 40.50 and 42.70, respectively. The t-value for shoulder breadth was 2.32, exceeding the critical value, which demonstrates a significant difference between bowlers and batsmen. Mean leg lengths for bowlers and batsmen were 86.90 and 87.30, respectively, with a t-value of 0.18, below the critical value, indicating no significant difference. The mean foot lengths for batsmen and bowlers were 25.60 and 24.30, respectively. The t-value for foot length was 2.24, which is greater than the critical value, indicating a significant difference. Mean waist circumferences for bowlers and batsmen were 77.30 and 86.40, respectively, with a t-value of 1.95, which is below the critical value, indicating no significant difference. The mean speeds for batsmen and bowlers were 7.31 and 7.38, respectively, with a t-value of 0.27, also below the critical value, indicating no significant difference. The mean hip circumferences for bowlers and batsmen were 89.30 and 110.40, respectively, with a t-value of 1.80, which is below the critical value, indicating no significant difference. The mean strength values for bowlers and batsmen were 26.60 and 25.40, respectively, with a t-value of 0.32, indicating no significant difference. The mean BMI scores for bowlers and batsmen were 20.07 and 23.92, respectively. The t-value for BMI was 3.06, which exceeds the critical value, indicating a significant difference. The mean waist-to-hip ratio (WHR) scores for bowlers and batsmen were 0.87 and 0.81, respectively, with a t-value of 1.25, which is below the critical value, indicating no significant difference. A graphical representation compares the mean values of arm length, shoulder breadth, leg length, foot length, hip circumference, waist circumference, BMI, WHR, speed, and strength between batsmen and bowlers among male cricket players.

Discussion on the Findings

The results of the present study indicate that, based on descriptive statistics and t-test analyses, there were no significant differences between batsmen and bowlers in arm length, leg length, hip circumference, waist circumference, speed, strength, or waist-to-hip ratio (WHR). The calculated t-values for these variables (0.00, 0.18, 1.80, 1.95, 0.27, 0.32, and 1.25, respectively) were all less than the tabulated value of 2.101 at the 0.05 confidence level. In contrast, significant differences were observed between batsmen and bowlers in shoulder breadth, foot length, and body mass index (BMI), with t-values of 2.32, 2.24, and 3.06, respectively, all exceeding the critical value of 2.101 at

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the 0.05 confidence level. These findings suggest that, among competitive cricket players, anthropometric and motor fitness factors such as arm length, leg length, hip circumference, waist circumference, speed, strength, and WHR may not be specific to playing roles. This lack of difference may be attributed to similar physical training regimens for both bowlers and batsmen, which emphasize general athletic development rather than specialization in these areas. Furthermore, modern cricket requires a baseline level of physical fitness and symmetry across all roles to minimize morphological disparities (Patel & Desai, 2019; Khan et al., 2021; Reddy & Thomas, 2020). However, significant differences in foot length, shoulder breadth, and body composition were identified between batsmen and bowlers. Wider shoulders may contribute to a more stable batting stance and increased swing power, as shoulder breadth provides a larger area for muscular attachment, thereby facilitating greater force generation. Lamani G C. (2016) also reported significant variations in body composition, arm length, and shoulder width among bowlers and batters in the Goa State senior cricket team. Foot length is essential for footwork and balance, enabling batsmen to move quickly toward the ball and maintain stability during strokes. In contrast, bowlers may rely less on foot length. Sharma, R., & Singh, J. (2021) found a statistically significant difference in foot length between bowlers and batters, with batsmen exhibiting a longer average foot length ($p < 0.05$).

These findings suggest a potential biomechanical advantage related to stability and balance in batting stances. A balanced BMI contributes to both power and agility. Although batsmen may possess less muscular mass than bowlers, they still require sufficient muscle to maintain balance and generate power during shots. The study found a statistically significant difference in Body Mass Index (BMI) between batters and bowlers, with batsmen exhibiting a higher mean BMI. This indicates that playing roles may influence body composition, reflecting physical adaptations specific to each role. This difference was significant at $p < 0.05$ (Sharma & Singh, 2021).

Conclusion

The study finds no significant difference in performance outcomes between batsmen and bowlers, despite their distinct physical activities. This similarity may be due to both groups following training

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regimens that emphasize overall athletic development rather than specialized skills. (Till et al., 2022) However, the study identifies a potential biomechanical advantage in foot stance stability for batting and shoulder strength during stroke play, underscoring the importance of specific body adaptations in cricket athletes. (Stretch et al., 1998, pp. 711-720)

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