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Study On Selected Anthropometric and Motor Fitness of University Level Cricket Players

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Abstract: The study aimed to evaluate selected anthropometric characteristics and motor fitness variables among university-level cricket players. Understanding these physiological and morphological differences between batsmen and bowlers provides insights into performance-specific adaptations required in cricket. A total of twenty (N=20) male cricket players aged between 19 and 25 years, who had participated at the Inter-University level and above, were randomly selected from ICFAI University, Tripura. The participants were equally divided into two groups batsmen (n=10) and bowlers (n=10). Anthropometric variables such as arm length, shoulder breadth, leg length, foot length, waist circumference, hip circumference, waist-to-hip ratio (WHR), and body mass index (BMI) were measured. Motor fitness components including upper body strength (push-up test) and speed (50-meter dash) were assessed using standardized procedures. Descriptive statistics (mean and standard deviation) were computed for all variables, and independent t-tests were applied to compare the means between batsmen and bowlers. The level of statistical significance was set at $p < 0.05$. The results revealed significant differences in shoulder breadth ($t = 2.32$), foot length ($t = 2.24$), and BMI ($t = 3.06$) between the two groups, exceeding the critical t-value (2.101). However, no significant differences were observed for arm length, leg length, waist and hip circumferences, WHR, strength, and speed, as their computed t-values (ranging from 0.00 to 1.95) were below the critical value. The findings indicate that bowlers and batsmen differ significantly in shoulder breadth, foot length, and BMI, which may reflect positional demands and biomechanical requirements in cricket. Conversely, similarities in limb lengths, circumferential measures, WHR, strength, and speed suggest comparable general fitness and body proportions among players. These results highlight the importance of role-specific anthropometric and fitness profiling for optimizing cricket training and performance at the university level.

Keywords: Anthropometric variables, Motor fitness, Cricket, Bowlers, Batsmen, University athletes.

INTRODUCTION

A famous bat-and-ball game, cricket pitches two teams of eleven players against one another. A renowned sport worldwide, especially in nations like India, England, Australia, Pakistan, and South Africa, cricket is renowned for its strategic depth and historical heritage. It is played in a variety of formats, such as Twenty 20 (T20) matches, One Day Internationals (ODIs), and Test matches, and is overseen globally by the International Cricket Council (ICC). Cricket is thought to have started in southern England in the 16th century, and the first recorded mention of it is around 1550. The sport gained popularity among English aristocrats and rural people by the 17th century. The act or skill of striking the ball with a bat in order to score runs and keep one's wicket is known as batting in cricket. Regardless of whether batting is their specific specialty, every player who is now batting is referred to as a batter as of September 2021 (historically, the titles "batsman" and "batswoman" were used). In addition to possessing exceptional physical batting abilities, top-level hitters will also have fast reflexes, superb decision-making abilities, and sound strategic thinking because they must adjust to a variety of conditions when playing on different cricket pitches, particularly in different nations.

A bowler is a player who is good at bowling; an all-rounder is a bowler who is also a good batter. A rigorously defined biomechanical concept that limits the elbow's angle of extension sets bowling apart from throwing the ball. A ball or delivery is a single act of bowling the ball in the direction of the batsman. Bowlers make deliveries in overs, which are sets of six. A teammate will bowl an over from the opposite end of the ground after the bowler has finished. The bowler's end umpire will declare a ball wide if it is bowled too far from the striker for the batsman to shoot at it with a conventional cricket shot. Fielding is far more difficult than it appears. Fielders need to be able to concentrate for five days during a test match and seven hours during a one-day match. They can risk their lives by rushing for the ball, springing for a grab, or making that audacious dive instead of just getting by during the day.

Anthropometric characteristics play a major role in the success of athletes (Rico-Sanz, 1998; Wilmore and Costill, 1999; Keogh, 1999). Because bowlers and

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batsmen may have different anthropometric measurements, their studies may also differ. The measurement of the human body is the main focus of the field of anthropology known as anthropometry. Anthropometry measures the diameters, circumferences, and other external body parts.The capacity to do physical activities efficiently, with agility, balance, coordination, power, speed, muscle strength, and response time is known as motor fitness. It is crucial for general physical well-being and significantly affects how well people function in daily activities and athletics. Motor fitness is just as vital for the general public as it is for athletes in order to sustain an active and healthy lifestyle. Physical activities such as jumping, bending, stretching, throwing velocity, and motor skills are believed to be necessary for team sports like cricket (Boby&Badhan, 2023).

OBJECTIVES OF THE STUDY

The objectives of the study were as follows:

- To explore the differences in anthropometric traits between bowler and batsman of cricket players.
- To investigate the differences in motor fitness between bowler and batsman of cricket players.

METHODOLOGY

The purpose was to investigate the anthropometric and motor fitness parameters of male university-level cricket players, specifically examining variables such as arm length, shoulder breadth, leg length, foot length, hip circumference, waist circumference, BMI, WHR, speed, and strength. For the study, the investigator randomly selected 20 cricket players (10 batsmen and 10 bowlers) who had participated in the Inter University competition from ICFAI University Tripura. The age group ranged between 19 - 25 years. The selected individuals proved fit to undergo the test trial for the study. The research design of the study was random group design.

Collection of Data

The male cricket players of ICFAI University Tripura provided the required data. The subjects are given selected anthropometric and motor fitness tests, and the necessary data was obtained from male cricket players' batsmen and bowlers in addition to the criterion variables, namely cricket players' arm length, shoulder width, leg length, foot length, hip circumference, waist circumference, BMI, WHR, speed, and strength.

Statistical Analysis

Standard descriptive statistics (mean ± standard deviation) were determine for directly measured and derived variables. An independent t-test were used for the comparison of anthropometric variables and motor fitness between bowlers and batsman of cricket players. A 5% level of probability will be used to indicate statistical significance. The data were analyzed by using the IBM SPSS-Version 21.

Data Analysis

Mean Comparison of weight and height Between Batsman and Bowler of cricket players

Batsman

Weight of batsman ranged between 50kg to 95kg (70.70±14.37)

Height of batsman ranged between 160cm to 185cm (171.30±7.26)

Bowler

Weight of batsman ranged between 50kg to 95kg (70.70±14.37)

Height of batsman ranged between 160cm to 185cm (171.30±7.26) m

Table 1: The descriptive and Mean Comparison of Arm length, Shoulder Breath, Leg Length, Foot Length, Waist Circumference, Hip Circumference, Speed, Strength, BMI and WHR Between Batsman and Bowler of cricket players

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

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WHR	Bowler	20	20.07	1.68	0.05	0.04	18	1.25	0.19
	Batsman		0.81	0.12					
	Bowler		0.87	0.02					

Significant at 0.05, where tabulated $_{(0.05)}$ (18) =2.101

(M-mean, SD-standard deviation, MD-mean deviation, SED - standard error of the difference, df - degrees of freedom,)

The mean values for batsmen's and bowlers' arm lengths were 58.60 and 58.60, respectively, as shown in Table I. At the 0.05 level of confidence, the arm length "t" value is 0.00, which is less than the table value of 2.101. The arm length test results showed no significant difference between the bowlers and batsmen.

The average values for bowler and batsman shoulder breadth were 40.50 and 42.70, respectively. At the 0.05 level of significance, the "t" value for shoulder breadth is 2.32, meaning that it is higher than the necessary table value of 2.101. The shoulder breadth test results showed a significant difference between bowlers and batsmen.

The mean leg length values for the bowlers and batsmen were 86.90 and 87.30, respectively. Leg length's "t" value at the 0.05 level of confidence was 0.18, below the table value of 2.101. Therefore, based on leg length test data, there is no significant difference between bowlers and batsmen.

The average batsman and bowler foot lengths were 25.60 and 24.30, respectively. At the 0.05 level of confidence, the "t" value for foot length was 2.24, which was higher than the value found in the table (2.101). The foot length test results showed significant differences between the bowlers and batsmen.

For bowlers and batsmen, the mean waist circumferences were 77.30 and 86.40, respectively. Compared to the table value of 2.101, the obtained "t" value for waist circumference is 1.95 with a 0.05 level of confidence. Based on waist circumference test results, there was no significant difference between bowlers and batsmen.

The average batsman and bowling speed was 7.31 and 7.38, respectively. The speed "t" value was less than the necessary table value of 2.101, at a 0.05 level of confidence, at 00.27. Consequently, there was no significant difference in the speed test results between the bowlers and batsmen.

The mean hip circumference for bowlers was 89.30, whereas the mean for batsmen was 110.40. At the 0.05 level of significance, the "t" value (factor name: hip circumference) was 1.80, which was below the crucial table value of 2.101. According to demographic test results on hip circumference, there was no significant difference between the bowlers and batsmen.

The strength test data sets for bowlers and batters had respective average strength values of 26.60 and 25.40. At the 0.05 level of confidence, the strength "t" value was 0.32, and the corresponding table value was 2.101. This suggested that there was no significant difference in the strength test results between the bowlers and batsmen.

The typical BMI scores for bowlers and batters were 20.07 and 23.92, respectively. At the 0.05 level of confidence, the "t" value for BMI is 3.06, which is higher than the necessary table value of 2.101. The BMI test results showed a significant difference between the bowlers and batsmen.

The average WHR scores for bowlers and batsmen were 0.87 and 0.81, respectively. At the 0.05 level of confidence, the obtained "t" value for WHR was 1.25, which was less than the necessary table value of 2.101. Based on results from the WHR test, there was no significant difference between bowlers and batters.

The graphical representation of mean comparison of arm length, shoulder breadth, leg length, foot length, hip circumference, waist circumference, BMI, WHR, speed and strength of batsmen and bowler of male cricket players are shown in Figures 1.

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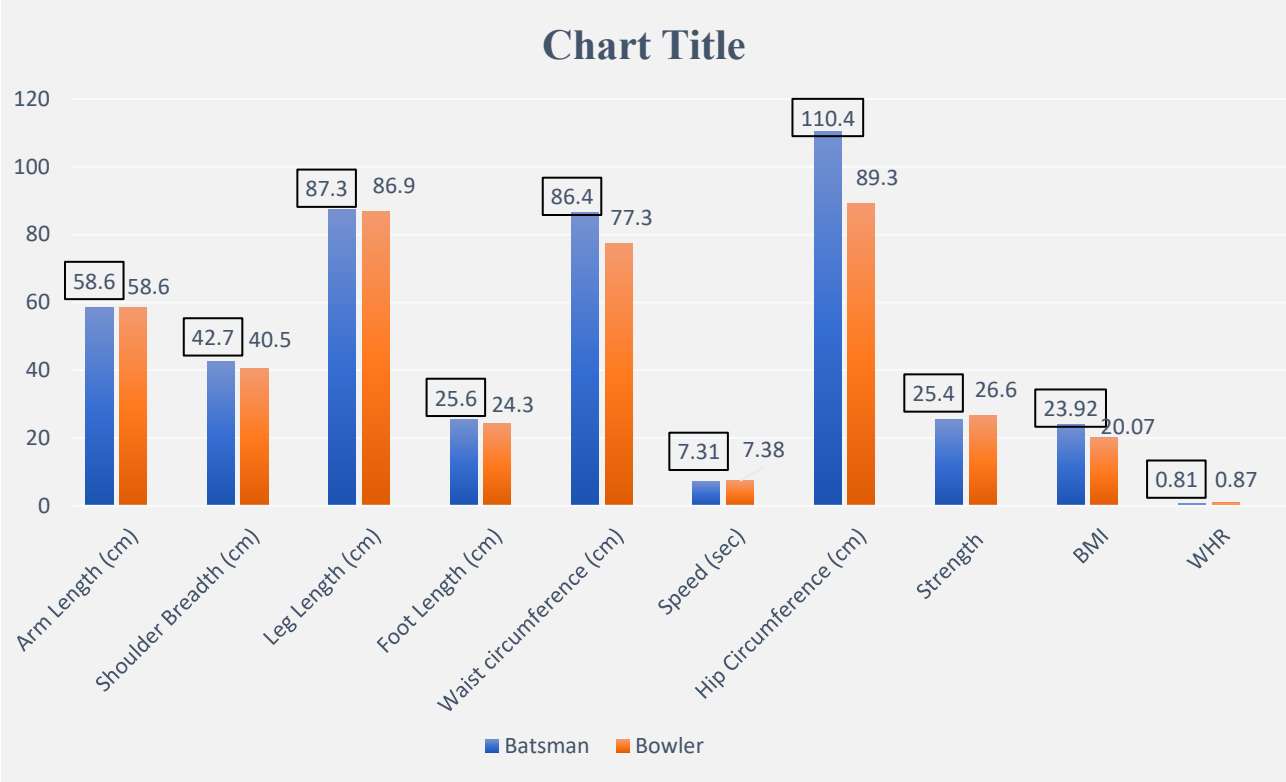

Figure 1: Graphical Illustration of of Arm length, Shoulder Breath, Leg Length, Foot Length, Waist Circumference, Hip Circumference, Speed, Strength, BMI and WHR Between Batsman and Bowler players

DISCUSSION ON THE FINDINGS

The findings of the present study show that on the results of the descriptive and t-test there was no significant found in the batsmen and bowler of arm length, leg length, leg length, hip circumference, waist circumference, speed, strength and WHR of cricket players, as for calculated t-values were 0.00, 0.18, 1.80, 1.95, 0.27, 0.32, 1.25 respectively were less than of the tabulate value 2.101 at 0.05 confidence level. Though, significant found in the batsmen and bowler of cricket players on shoulder breadth, foot length and BMI, as calculated t-values were 2.32, 2.24 and 3.06 respectively was greater than of the tabulate value 2.101 at 0.05 confidence level.

According to the study's findings batsmen and bowlers did not differ statistically significantly in arm length, leg length, hip circumference, waist circumference, speed, strength, or waist-to-hip ratio (WHR) ($p > 0.05$). This implies that among competitive cricket players, these anthropometric and motor fitness factors might not be role-specific. Because both bowlers and batsmen follow similar physical training schedules that prioritize general athletic development over specialization in these particular areas, there may not be a significant difference. Additionally, in order to minimize morphological inequalities, modern cricket demands a baseline level of physical fitness and symmetry across all roles (Patel & Desai, 2019; Khan et al., 2021; Reddy & Thomas, 2020).

However, the foot length, shoulder width, and body composition of cricket players' bowlers and batsmen, varies significantly. The wider shoulder may be the cause of the outcomes, as shoulder breadth is still crucial for a stable batting stance, followed by swing power. Although it isn't as crucial as the bowlers', the shoulder breadth helps to create a greater region for muscular attachment, which will aid to generate more force. According to a study on anthropometrical characteristics of the Goa State senior cricket team's bowlers and batters, Lamani G C. (2016), there was a significant variation between the players' body composition, arm length, and shoulder width.

Foot length is vital for footwork and balance because it enables the batsman to move swiftly towards the ball when he gets it, which helps him maintain balance when completing a stroke. However, bowlers in cricket don't need it as much. A statistically significant variation in foot length between cricket players' bowlers and batters was found by Sharma, R., & Singh, J. (2021). The average foot length of batsmen was longer than that of bowlers, and the difference was significant ($p < 0.05$). This points to a potential biomechanical benefit associated with stability and balance in batting stances.

A balanced BMI will assist with both power and agility. Even while they might not have as much muscular mass as bowlers, cricket players nonetheless require it to maintain their balance and provide power during shots. According to the investigation, cricket players' Body Mass Indexes (BMIs) for batters and

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bowlers differed statistically significantly. The mean BMI of batsmen was greater than that of bowlers, indicating that playing roles may have an impact on body composition. Cricket players have physical adaptations particular to their roles, as evidenced by this difference, which was significant at $p < 0.05$ (Sharma & Singh, 2021).

CONCLUSION

The findings of this study, it was highlights that although the batsmen and bowlers of cricket players are involved physically in different execution. The lack of significant difference could be attributed to the overlapping physical training regimens of both batsmen and bowlers, which emphasize overall athletic development rather than specialization in these specific dimensions. However, this study also suggests a possible biomechanical advantage linked to foot stance stability in batting positions, shoulder strength during stroke play and indicating specific role of body adaptations in cricket athletes.

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