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Impact of Anthropometrical Measurements on Shuttle Run Times of Cricket Players

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Abstract: This study investigated the relationships between selected anthropometric variables (standing height, body weight, arm length, leg length) and shuttle run performance among 20 male intercollegiate cricket players aged 18-25 years. Using Pearson's product-moment correlation, results revealed negligible associations: height ($r = 0.084$), arm length ($r = 0.011$), and leg length ($r = -0.035$) showed trivial positive or negative links, while body weight exhibited a low negative correlation ($r = -0.250$). None reached statistical significance (critical r {0.05,18} = 0.444), indicating no meaningful predictive role for these variables in agility-based shuttle run tasks. Findings underscore shuttle runs' emphasis on neuromuscular coordination over body morphology, aligning with prior agility literature, and suggest training implications beyond anthropometrics for talent identification in cricket.

Key Words: *Anthropometry, Stride, Shuttle run, Agility.*

Introduction: Sport encompasses any organized, competitive physical activity aimed at improving mental and physical health, building social ties, or achieving performance goals (Tomlinson, 2008). It has become integral to modern life, captivating millions of fans worldwide with devotion-like intensity. Popular sports like football, cricket, and hockey draw huge participation for fun, fitness, and competition. Cricket, a staple in Commonwealth nations, has surged in popularity, now played year-round with demanding training schedules (Davies et al., 2008). Cricket demands endurance, strength, speed, agility, and persistent effort under expert coaching (Start et al., 1966). Elite athletes are selected based on physical attributes and body size suited to high performance (Tanner, 1964).

Anthropology studies humans across biological, cultural, linguistic, and historical dimensions (Guest, 2025). Anthropometry, a core physical anthropology method, measures body size, shape, and proportions using tools like callipers and tapes (Lohman, 1988). Common anthropometric measures include height, weight, BMI, circumferences (waist, hip, limbs, head, chest, mid-upper arm), and skinfolds. These non-invasive metrics assess body composition and variation across populations (Lohman, 1988).

A shuttle run involves rapid back-and-forth sprints over short distances to test speed, agility, coordination, and direction changes (Fathoni & Yuliastuti, 2020). It mimics sports demands through repeated acceleration, deceleration, and turns. Shuttle runs build lower-body strength, cardiovascular fitness, and performance, used in education, training, and assessments. In cricket, traits like height, limb lengths, weight, BMI, and body fat link to shuttle performance via turning mechanics and stride efficiency (Singh, 2018).

Cricket studies use shuttle tests for agility in fielding and quick singles. The Yo-Yo Intermittent Recovery Test Level 1 (20m shuttles with 10s recoveries) shows batters covering more distance (1,200–1,600m) than fast bowlers, with heart rates at ~90% max (Rumpf et al., 2021).

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However, most studies aggregate roles, lacking role-specific anthropometric-shuttle correlations (e.g., for wicketkeepers, spinners). Variations in tests (e.g., 20m Yo-Yo vs. 17–20m shuttles) and mechanics (Pote & Draper, 2014) hinder comparisons.

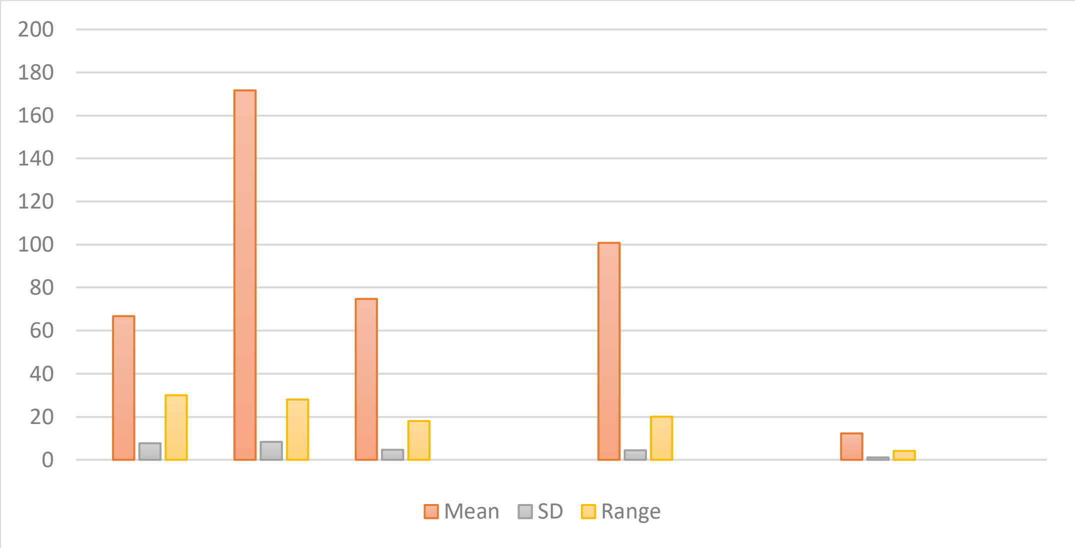
Few integrate full anthropometric batteries with cricket-specific metrics like rapid singles. No multivariate models predict shuttle outcomes accounting for age or training load, overlooking evolutionary body optimization for cricket (Tanner, 1964; Guest, 2025). Addressing these gaps could improve training, injury prevention, and talent ID amid cricket's global growth.

Methodology: Twenty male cricket players, who competed in the intercollegiate tournament were selected as study subjects. The subject's age was 18 ± 3.452 years. Independent variables were Standing Height, Body Weight, Arm length, and Leg length whereas, dependent variable was shuttle run. Random sampling method was used for fair results. The subjects were weighed using a level-type anthropometric weighing equipment in the lab. The centre of the scale was where the subject was placed. The weight was noted to the nearest kilogram. The subject's standing height without shoes was measured using a centimetre-marked stadiometer. The individual was requested to step outdoors by lowering his head after standing upright, and the reading was taken. Arm length was measured using a small sliding calliper. When the subject sits or stands, their arm length is measured. Palm up, the subject's hand and fingers are extended in the direction of the longitudinal axis of the forearm. The measurement was taken between the shoulder and wrist joints. The sliding calliper was also used to measure leg length. The subjects stand on a wooden stool. The measurement was taken from the point where the thigh and ankle meet. Lengths of arms and legs were measured to the closest 0.1 cm. For shuttle run two parallel lines were marked 10 meters apart on a flat, non-slip surface using cones or tape, two small blocks or markers were placed behind line B for pickup.

Result And Discussion: To know the characteristic of the sample descriptive statistics was employed which includes Mean, SD (Standard Deviation), Range, Skewness and Kurtosis. The Pearson's product moment correlation of coefficient statistical technique was used to determine the relationship between anthropometric measurements and shuttle run ability of cricket players.

TABLE 1: Descriptive statistics of anthropometrical variables and shuttle run

Variable/Statistics	Mean	SD	Range	Skewness	Kurtosis
Standing Height (Cm)	66.7500	7.66314	30	.135	.457
Body weight (kg)	171.6500	8.31786	28	1.124	.087
Arm length (Cm)	74.7500	4.63255	18	-.201	.112
Leg length (Cm)	100.8000	4.40813	20	.632	1.280
Shuttle run (Sec)	12.2480	1.09591	4.10	.305	-.638



Graph Figure 1: representing Descriptive statistics (Mean, SD, Range)

TABLE 2: Relationship of selected anthropometric measurements and shuttle run ability of cricket players

S.No.	Independent Variables (X)	Dependent variable (Y)	Correlation coefficient (r)
1	Standing height	Shuttle run	.084
2	Body weight	Shuttle run	-.250
3	Arm length	Shuttle run	.011
4	Leg length	Shuttle run	-.035

N = 20, *Significant at 0.05 level of confidence, $r_{(0.05,18)} = 0.444$

Standing height showed a very low positive correlation with shuttle run performance (r = 0.084), indicating a negligible relationship. Studies on agility tasks like shuttle runs often report weak links between height and performance. For example, Sheppard and Young (2006) analysed anthropometrics in team-sport athletes and found height correlations with change-of-direction speed below r = 0.10, as taller stature offers minimal advantage in quick turns. Shuttle runs emphasize rapid changes in direction, acceleration, and neuromuscular control rather than linear speed benefits from greater height. Taller stature may slightly aid stride length in straight-line phases but hinders quick pivots and lowers centre of gravity advantages, resulting in near-zero net correlations (r < 0.10). With a small sample (n=20) and likely homogeneous group traits, variance is low, keeping r below the significance threshold of 0.444. Body weight exhibited a low negative correlation with shuttle run performance (r = −0.250), suggesting that an increase in body weight may be associated with slightly poorer shuttle run performance, though the relationship is weak. Higher body weight increases inertial resistance during rapid accelerations, decelerations, and direction changes central to shuttle runs, slightly impairing performance (Abe et al., 2023) without reaching statistical significance (r < 0.444 threshold here). This effect is more evident in those with excess fat mass, as it adds non-propulsive load, but weakens in lean or athletic samples where muscle compensates. The modest r = −0.250 likely stems from the small, homogeneous n=20 sample, limiting variance detection (Moran et al., 2017). Arm length also demonstrated a negligible positive correlation with shuttle run performance (r = 0.011), arm length plays a minimal role in shuttle runs, which primarily tax lower-body power, reaction time, and turning mechanics rather than upper-body reach (Sheppard & Young, 2006). While longer arms might marginally aid balance during pivots, any potential benefit is offset by the test's focus on leg drive and core stability (Raj, 2015), yielding near-zero correlations like r = 0.011—well below the 0.444 significance threshold in small samples (n=20). Homogeneous groups further suppress detectable variance. Leg length showed a very low negative correlation (r = −0.035) because shuttle runs demand quick multidirectional changes rather than stride efficiency from longer legs (Sheppard & Young, 2006), which benefits straight-line sprints but hinders sharp pivots by raising the center of mass and moment of inertia (Tomita et al., 2020). Any stride advantage dissipates in turns, yielding trivial negative or null correlations (r ≈ 0 to −0.05); here, r = −0.035 stays far below the 0.444 significance level due to small n=20 and low anthropometric variance in the sample.

Conclusion: In light of the study's result, the following deductions are made based on the findings:

1. Anthropometric variables like height, weight, arm length, and leg length show negligible correlations with shuttle run performance.
2. Shuttle runs prioritize neuromuscular agility over body size, explaining the weak links across studies.

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