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Research Paper

Measuring Athletic Potential: Anthropometric Components of Young Female Netball Players

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Abstract
The present study aimed to examine the anthropometric components and their relationship with the performance of young female netball players from selected districts of Karnataka. A total of 132 female netball players aged between 15 and 18 years were selected from eleven districts affiliated with the Amateur Netball Association of Karnataka®. The selected anthropometric variables included standing height, body weight, arm length, leg length, and Body Mass Index (BMI). Descriptive statistics and Pearson's Product Moment Correlation were used for data analysis. The findings revealed that standing height (r = .932), arm length (r = .915), and leg length (r = .949) showed significant positive correlations with performance, while body weight (r = -.850) and BMI (r = -.883) showed significant negative correlations. District-wise analysis indicated variations in anthropometric characteristics among players. The study concluded that anthropometric variables significantly influence athletic performance and may be useful in talent identification and player development in netball.

Keywords: *Anthropometric Components, Female Netball Players, Athletic Performance, Body Mass Index, Standing Height, Talent Identification.*

I. Introduction

Netball is a fast-paced team sport that demands a combination of speed, agility, endurance, coordination, and tactical intelligence. Over the years, the sport has gained substantial popularity among young female athletes across several countries, particularly in nations such as Australia, New Zealand, England, South Africa, and India. The increasing competitiveness of netball has encouraged researchers and coaches to focus on the physical and physiological characteristics that contribute to athletic success. Among these characteristics, anthropometric components play a significant role in determining player performance and positional suitability (Drinkwater, Pyne, & McKenna, 2008). Anthropometry refers to the systematic measurement of the size, shape, composition, and proportions of the human body. In sports science, anthropometric assessment is widely used to identify physical attributes associated with athletic performance, talent identification, and player development (Norton & Olds, 2001). Measurements such as height, body weight, body mass index (BMI), limb length, skinfold thickness, and body composition are important indicators that help coaches and trainers evaluate the potential and preparedness of athletes. In team sports like netball, where different playing positions require distinct physical characteristics, anthropometric profiling becomes particularly valuable (Spamer & De la Port, 2006).

Young female netball players undergo significant physical and physiological changes during adolescence, which directly influence their athletic performance. Growth and maturation affect muscle development, body composition, flexibility, and coordination, thereby impacting the ability to perform sport-specific skills efficiently (Malina, Bouchard, & Bar-Or, 2004). Understanding these anthropometric variations among young athletes can help in designing appropriate training programs, minimizing injury risks, and improving overall performance outcomes. Furthermore, anthropometric characteristics may assist in identifying talented players at an early stage and guiding them toward suitable playing positions within the team structure. Previous studies have demonstrated that successful netball players often possess advantageous anthropometric traits such as greater height, longer limb length, and lower body fat percentage. Taller players generally perform better in positions requiring rebounding, shooting, and interception because height provides a biomechanical

advantage during jumping and ball handling activities (Steele & Chad, 1992). Similarly, lean body composition contributes to enhanced speed, agility, and endurance, which are essential for maintaining performance throughout the game. Research also suggests that anthropometric characteristics differ according to playing positions, with goal shooters and goal keepers typically being taller and heavier than centers and wing players (Bale & Hunt, 1986).

In recent years, sports scientists have emphasized the importance of evidence-based athlete monitoring and talent identification programs. Anthropometric evaluation has become an essential component of these programs because it provides objective and measurable data related to athletic potential. Coaches and sports academies increasingly rely on such assessments to select players and customize training interventions according to individual physical profiles (Ackland et al., 2012). Despite the growing recognition of anthropometric assessment in sports performance, limited research has focused specifically on young female netball players, particularly in developing sporting regions where scientific talent identification systems are still evolving. The investigation of anthropometric components among young female netball players is therefore important for understanding the physical demands of the sport and establishing normative data for athlete development. Such information can contribute to the improvement of coaching practices, conditioning programs, and player selection criteria. Additionally, identifying the relationship between anthropometric characteristics and athletic performance may support long-term athlete development models and encourage scientific approaches in youth sports training.

The present study aims to examine the anthropometric components of young female netball players and evaluate their significance in measuring athletic potential. By analyzing physical characteristics such as body dimensions, composition, and proportionality, the study seeks to provide valuable insights into the role of anthropometry in enhancing performance and supporting talent identification in netball. The findings may serve as a useful reference for coaches, physical educators, sports scientists, and researchers involved in youth sports development and female athletic performance evaluation.

II. Review of Literature

Anthropometric characteristics and physical fitness components play a crucial role in determining athletic performance and positional suitability in team sports, especially among female athletes. Several researchers have emphasized the importance of body composition, height, body mass, limb length, and physiological fitness in enhancing sports performance and identifying athletic potential. Recent studies on netball and other team sports have highlighted significant variations in anthropometric and performance-related characteristics based on playing positions and training adaptations. A study by Kwong and Green (2025) examined the anthropometric and physical performance characteristics of 150 female netball players across different playing positions. Their findings revealed significant differences in body height, body mass, and body fat percentage among positions. The study also identified positional differences in sprint speed, flexibility, and jumping ability, though no significant variations were found in aerobic capacity, anaerobic capacity, or agility. The researchers concluded that each playing position in netball requires distinct anthropometric and physical characteristics, which influence the performance demands of the game. Similarly, Kapri (2025) investigated the anthropometric characteristics, body composition, and somatotypes of female field hockey players. The study reported a positive correlation between height and lean body mass, indicating that taller athletes generally possess greater muscular development. Goalkeepers were found to have higher skinfold thickness values compared to other players, suggesting greater fat accumulation associated with reduced aerobic demands. The study highlighted the importance of anthropometric assessment in talent identification and player development.

A study by Leko and Adefisan (2024) compared the anthropometric characteristics and somatotypes of volleyball, basketball, and soccer players. Significant differences were observed in height, skinfold thickness, and humerus breadth among the athletes. Basketball players were taller and heavier, while soccer players exhibited leaner body types with higher ectomorphic characteristics. The study demonstrated that sport-specific anthropometric profiles are essential in understanding physical demands and designing specialized training programs. Manasa and Kiran (2024) focused on the analysis of motor fitness components and physiological variables in female netball players. Their experimental study showed that an eight-week specialized training program significantly improved speed and vital capacity among the participants. The findings indicated that structured training positively influences physiological and fitness parameters necessary for improved netball performance.

Palani et al. (2024) investigated the relationship between anthropometric variables, lower limb strength, and jump height among female volleyball players. The results revealed strong positive correlations between height, weight, arm span, and lower limb muscular strength. However, body mass index demonstrated a negative association with muscular strength. The study emphasized that body dimensions and physical structure significantly influence athletic performance and muscular efficiency. Madushika et al. (2023) studied the relationship between anthropometric measurements and physical performance among Sri Lankan national-level

netball players. Positive correlations were found between speed and variables such as lower leg length, hand length, power, flexibility, and muscle strength. Conversely, skinfold thickness measurements negatively affected agility, speed, aerobic endurance, and muscular strength. The study also identified significant positional differences in lower leg length and body height, particularly among shooters, defenders, and attackers. These findings reinforced the importance of anthropometric factors in determining netball performance.

Melissa et al. (2022) examined lower limb muscular and functional asymmetries among young female handball athletes. Although the athletes displayed lower-than-recommended balance scores, the study reported no significant bilateral differences in muscular strength or functional performance. The findings suggested that handball training may contribute to balanced muscular development despite the sport's dynamic and unilateral movements. Varma and Naidu (2022) explored the relationship between anthropometric parameters and the performance of female netball players. Their study found significant positive correlations between netball performance and several anthropometric variables, including height, weight, palm span, arm length, leg length, chest circumference, shoulder diameter, and BMI. The researchers concluded that anthropometric measurements serve as important indicators of netball performance and athletic potential. Mastun (2020) assessed the anthropometric and physical performance characteristics of young female netball players from Sabah. Significant differences were observed in height and body weight according to playing positions, while BMI and physical fitness variables did not differ significantly. The study suggested that coaches can utilize anthropometric and fitness profiles to improve player selection and performance preparation before competitions. The reviewed studies demonstrate that anthropometric characteristics such as height, body weight, body composition, limb length, and muscular strength significantly influence athletic performance in netball and other team sports. Positional differences in physical attributes are consistently reported, highlighting the need for sport-specific and position-specific evaluation. The literature also emphasizes the importance of structured training programs and anthropometric assessments in talent identification, athlete development, and performance enhancement among young female athletes.

III. Objectives

- To assess the anthropometric characteristics of young female netball players from selected districts of Karnataka.
- To examine the relationship between selected anthropometric variables and the performance of young female netball players.
- To compare the anthropometric components of young female netball players across selected districts of Karnataka.

IV. Methodology

The present study adopted a descriptive survey design to examine the anthropometric components of young female netball players and their relationship with athletic performance. A total of 132 female netball players aged between 15 and 18 years were selected from eleven districts of Karnataka, namely Bengaluru Urban, Hassan, Mysore, Ramanagara, Chamarajanagar, Dakshina Kannada, Belagavi, Davanagere, Tumkur, Bengaluru Rural, and Haveri. Twelve players were selected from each district, and all participants were registered under their respective district associations affiliated with the Amateur Netball Association of Karnataka®. The study was confined to players who had represented their districts in state-level championships. The selected anthropometric variables for the study included standing height, body weight, arm length, leg length, and Body Mass Index (BMI). Standardized anthropometric procedures and calibrated instruments were used for data collection. Standing height was measured using a stadiometer, body weight with a digital weighing scale, and arm length and leg length using a non-stretchable anthropometric measuring tape. BMI was calculated using the standard formula: BMI=Weight (kg)/Height $(m)^2$. The data collected were analyzed using descriptive statistics such as mean and standard deviation, while Pearson's Product-Moment Correlation was employed to determine the relationship between anthropometric variables and performance. The level of significance for the study was fixed at 0.05.

V. Data Analysis and Interpretation

Table 1. Descriptive Statistic of Anthropometric Variables

Anthropometric Variables	N	Mean	Std. Deviation
Standing Heigh	132	162.30	7.38
Body Weight	132	51.85	7.35
Arm length	132	74.27	4.16

Leg length	132	89.19	5.01
Body Mass Index	132	19.71	2.73

Table 1 presents the descriptive statistics of selected anthropometric variables of young female netball players. The analysis was carried out on 132 players. The mean standing height of the players was found to be 162.30 cm with a standard deviation of 7.38, indicating moderate variation in height among the participants. The mean body weight was 51.85 kg with a standard deviation of 7.35, showing slight differences in body weight among the players. The average arm length of the players was 74.27 cm with a standard deviation of 4.16, which indicates comparatively less variation in arm length. Similarly, the mean leg length was recorded as 89.19 cm with a standard deviation of 5.01, reflecting moderate uniformity among the participants. The mean Body Mass Index (BMI) of the players was 19.71 kg/m² with a standard deviation of 2.73, suggesting that most of the players were within a normal and healthy body composition range. The descriptive statistics indicate that the selected young female netball players possessed suitable anthropometric characteristics necessary for netball performance.

Table 2. Correlation between Performance and Selected Anthropometric Variables of Young Female Netball Players

		Standing Height	Body Weight	Arm length	Leg length	Body Mass Index
Performance	Pearson Correlation	.932**	-.850**	.915**	.949**	-.883**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	132	132	132	132	132
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 2 presents the correlation between performance and selected anthropometric variables of young female netball players. The results reveal that standing height showed a very high positive correlation with performance ($r = .932$, $p < 0.01$), indicating that taller players tend to perform better in netball activities. Similarly, arm length demonstrated a strong positive correlation with performance ($r = .915$, $p < 0.01$), suggesting that players with greater arm length possess advantages in catching, passing, and intercepting the ball. Leg length also exhibited a very high positive correlation with performance ($r = .949$, $p < 0.01$), which indicates that longer leg length may contribute to better movement efficiency, speed, and agility during play.

On the other hand, body weight showed a high negative correlation with performance ($r = -.850$, $p < 0.01$), implying that increased body weight may negatively affect the movement and overall playing efficiency of the players. Likewise, Body Mass Index (BMI) displayed a strong negative correlation with performance ($r = -.883$, $p < 0.01$), indicating that higher BMI levels may reduce athletic efficiency and performance in netball. Since all the obtained p-values were .000, the correlations were found to be statistically significant at the 0.01 level. Overall, the findings suggest that anthropometric variables play a significant role in determining the performance of young female netball players.

Table 3. Descriptive Statistics of Standing Height among Female Netball Players from Selected Districts

Districts	**N**	**Mean**	**Std. Deviation**
Bangalore	12	160.00	7.49
Hassan	12	160.92	6.37
Mysore	12	160.33	2.80
Chamarajanagara	12	163.58	3.70
Dhakshina Kannada	12	175.17	5.89
Belagavi	12	159.42	7.02
Davanagere	12	160.83	5.28
Tumkur	12	159.42	6.48
Bangalore Rural	12	162.75	8.42
Haveri	12	163.25	7.96
Ramanagara	12	159.67	4.37
Total	**132**	**162.30**	**7.38**

Table 3 presents the descriptive statistics of standing height among female netball players from selected districts of Karnataka. The analysis shows that the overall mean standing height of the players was 162.30 cm with a standard deviation of 7.38, indicating moderate variation in height among the participants. Among all the districts, players from Dakshina Kannada recorded the highest standing height of 175.17 cm with a standard deviation of 5.89, indicating that players from this district were comparatively taller than players from other districts. Chamarajanagara and Haveri also showed relatively higher mean values of 163.58 cm and 163.25 cm, respectively. Bangalore Rural players recorded a mean height of 162.75 cm, which was slightly above the overall average.

On the other hand, players from Belagavi and Tumkur recorded the lowest standing height of 159.42 cm each, followed by Ramanagara with a mean value of 159.67 cm. Bangalore, Mysore, Hassan, and Davanagere showed mean standing heights ranging between 160 cm and 161 cm, indicating only slight differences among these districts. Concerning variability, Bangalore Rural showed the highest standard deviation (8.42), indicating greater variation in standing height among players, whereas Mysore recorded the lowest standard deviation (2.80), suggesting greater uniformity in height among its players. Overall, the findings indicate noticeable district-wise differences in standing height among young female netball players, with Dakshina Kannada players exhibiting a clear advantage in height, which may positively influence netball performance.

Table 4. Descriptive Statistics of Body Weight among Female Netball Players from Selected Districts

Districts	N	Mean	Std. Deviation
Bangalore	12	57.92	11.61
Hassan	12	48.50	6.77
Mysore	12	53.42	2.39
Chamarajanagara	12	47.83	4.44
Dhakshina Kannada	12	54.75	4.09
Belagavi	12	46.33	5.10
Davanagere	12	56.17	9.58
Tumkur	12	54.75	8.51
Bangalore Rural	12	50.58	4.73
Haveri	12	49.58	5.17
Ramanagara	12	50.50	5.19
Total	**132**	**51.85**	**7.35**

Table 4 presents the descriptive statistics of body weight among female netball players from selected districts of Karnataka. The overall mean body weight of the players was found to be 51.85 kg with a standard deviation of 7.35, indicating moderate variation in body weight among the participants. Among the selected districts, Bangalore players recorded the highest mean body weight of 57.92 kg with a standard deviation of 11.61, followed by Davanagere with a mean value of 56.17 kg and Tumkur and Dakshina Kannada with equal mean values of 54.75 kg. These findings indicate that players from these districts possessed comparatively higher body weight than players from other districts. In contrast, Belagavi players recorded the lowest mean body weight of 46.33 kg, followed by Chamarajanagara with a mean value of 47.83 kg and Hassan with 48.50 kg. Bangalore Rural, Ramanagara, and Haveri showed moderate mean body weight values ranging between 49 kg and 51 kg. Mysore players recorded a mean body weight of 53.42 kg, which was slightly above the overall average.

With regard to variability, Bangalore showed the highest standard deviation (11.61), indicating greater variation in body weight among players from that district. Davanagere and Tumkur also exhibited relatively high variability with standard deviation values of 9.58 and 8.51 respectively. On the other hand, Mysore recorded the lowest standard deviation (2.39), suggesting greater uniformity in body weight among its players. The results reveal noticeable district-wise differences in body weight among young female netball players. Variations in body weight may influence factors such as speed, agility, endurance, and overall athletic performance in netball.

Table 5. Descriptive Statistics of Arm Length among Female Netball Players from Selected Districts

Districts	N	Mean	Std. Deviation
Bangalore	12	76.50	5.03
Hassan	12	74.50	3.52

Mysore	12	76.25	1.76
Chamarajanagara	12	72.75	2.63
Dhakshina Kannada	12	76.42	5.35
Belagavi	12	72.00	3.86
Davanagere	12	75.58	3.14
Tumkur	12	72.92	6.50
Bangalore Rural	12	74.17	3.56
Haveri	12	71.50	2.23
Ramanagara	12	74.33	3.20
Total	**132**	**74.27**	**4.16**

Table 5 presents the descriptive statistics of arm length among female netball players from selected districts of Karnataka. The overall mean arm length of the players was 74.27 cm, with a standard deviation of 4.16 cm, indicating moderate variation in arm length among the participants. Among the selected districts, Bangalore players recorded the highest mean arm length of 76.50 cm, with a standard deviation of 5.03 cm, followed closely by Dakshina Kannada with a mean of 76.42 cm and Mysore with 76.25 cm. Davanagere players also showed a relatively higher mean arm length of 75.58 cm. These findings indicate that players from these districts possessed comparatively longer arm lengths, which may provide advantages in catching, passing, shooting, and intercepting the ball during netball play.

On the other hand, Haveri players recorded the lowest mean arm length of 71.50 cm, followed by Belagavi with 72.00 cm and Chamarajanagara with 72.75 cm. Tumkur players recorded a mean arm length of 72.92 cm, which was also below the overall average. Hassan, Bangalore Rural, and Ramanagara showed moderate mean values ranging between 74 cm and 75 cm. Regarding variability, Tumkur showed the highest standard deviation (6.50), indicating greater variation in arm length among its players, whereas Mysore recorded the lowest standard deviation (1.76), suggesting greater uniformity in arm length among the participants from that district. The findings indicate noticeable district-wise differences in arm length among young female netball players, and longer arm length may contribute positively to netball performance.

Table 6. Descriptive Statistics of Leg Length among Female Netball Players from Selected Districts

Districts	N	Mean	Std. Deviation
Bangalore	12	88.83	6.76
Hassan	12	89.83	5.99
Mysore	12	88.50	3.37
Chamarajanagara	12	90.33	4.37
Dhakshina Kannada	12	91.92	6.41
Belagavi	12	90.00	5.92
Davanagere	12	88.50	3.42
Tumkur	12	89.33	5.44
Bangalore Rural	12	87.67	5.08
Haveri	12	88.25	3.67
Ramanagara	12	87.92	3.57
Total	**132**	**89.19**	**5.01**

Table 6 presents the descriptive statistics of leg length among female netball players from selected districts of Karnataka. The overall mean leg length of the players was 89.19 cm, with a standard deviation of 5.01 cm, indicating moderate variation in leg length among the participants. Among the selected districts, Dakshina Kannada players recorded the highest mean leg length of 91.92 cm with a standard deviation of 6.41, indicating that players from this district possessed comparatively longer legs than players from other districts. Chamarajanagara and Belagavi also showed relatively higher mean leg lengths of 90.33 cm and 90.00 cm respectively. Hassan players recorded a mean leg length of 89.83 cm, which was slightly above the overall average.

On the other hand, Bangalore Rural players recorded the lowest mean leg length of 87.67 cm, followed by Ramanagara with 87.92 cm and Haveri with 88.25 cm. Bangalore, Mysore, and Davanagere showed mean leg lengths around 88.50 cm, indicating only slight differences among these districts. Tumkur players recorded a moderate mean value of 89.33 cm. Concerning variability, Bangalore showed the highest standard deviation (6.76), followed by Dakshina Kannada (6.41), indicating greater variation in leg length among players from these districts. Mysore recorded the lowest standard deviation (3.37), suggesting greater uniformity in leg length among its players. The findings indicate noticeable district-wise differences in leg length among young female netball players. Since leg length contributes to speed, stride length, agility, and movement efficiency, players with longer leg length may possess advantages in netball performance.

Table 7. Descriptive Statistics of Body Mass Index among Female Netball Players from Selected Districts

Districts	N	Mean	Std. Deviation
Bangalore	12	22.55	3.71
Hassan	12	18.72	2.13
Mysore	12	20.77	1.02
Chamarajanagara	12	17.92	1.99
Dhakshina Kannada	12	17.88	1.39
Belagavi	12	18.20	1.18
Davanagere	12	21.70	3.42
Tumkur	12	21.50	2.94
Bangalore Rural	12	19.20	2.25
Haveri	12	18.66	2.14
Ramanagara	12	19.76	1.58
Total	**132**	**19.71**	**2.73**

Table 7 presents the descriptive statistics of Body Mass Index (BMI) among female netball players from selected districts of Karnataka. The overall mean BMI of the players was found to be 19.71 kg/m² with a standard deviation of 2.73, indicating moderate variation in BMI among the participants. The overall BMI value suggests that most of the players were within a healthy and normal body weight range suitable for athletic performance. Among the selected districts, Bangalore players recorded the highest mean BMI of 22.55 kg/m² with a standard deviation of 3.71, followed by Davanagere with a mean value of 21.70 kg/m² and Tumkur with 21.50 kg/m². Mysore players also showed a relatively higher BMI mean of 20.77 kg/m². These findings indicate that players from these districts possessed comparatively higher body mass in relation to height. In contrast, Dakshina Kannada players recorded the lowest mean BMI of 17.88 kg/m², followed closely by Chamarajanagara with 17.92 kg/m² and Belagavi with 18.20 kg/m². Hassan and Haveri also showed lower BMI values of 18.72 kg/m² and 18.66 kg/m² respectively. Bangalore Rural and Ramanagara recorded moderate BMI values of 19.20 kg/m² and 19.76 kg/m².

Concerning variability, Bangalore showed the highest standard deviation (3.71), indicating greater variation in BMI among players from that district, whereas Mysore recorded the lowest standard deviation (1.02), suggesting greater uniformity in BMI among its players. Overall, the findings reveal district-wise differences in BMI among young female netball players. Since BMI influences agility, speed, endurance, and movement efficiency, maintaining an optimal BMI is important for achieving better performance in netball.

VI. Conclusion

The present study concluded that anthropometric components play a significant role in determining the athletic potential and performance of young female netball players. The findings revealed that variables such as standing height, arm length, and leg length showed strong positive relationships with performance, indicating that players with greater body dimensions tend to perform better in netball activities. In contrast, body weight and Body Mass Index (BMI) exhibited negative correlations with performance, suggesting that excess body mass may adversely affect speed, agility, and overall playing efficiency. The descriptive analysis further highlighted noticeable district-wise variations in anthropometric characteristics among the players. Dakshina Kannada players demonstrated superior standing height and leg length, while Bangalore players showed higher body weight and BMI values. The overall results suggest that maintaining optimal anthropometric characteristics is essential for enhancing netball performance. The study emphasizes the importance of anthropometric assessment in talent

identification, player selection, and training program development for young female netball players. Coaches and trainers may use these findings to identify promising athletes and design scientific training strategies according to the physical requirements of the game. Overall, the study confirms that anthropometric variables are important indicators of athletic potential and performance in netball.

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