

Association of Anthropometric Profiles with Motor Fitness Performance in Competitive Male Taekwondo Athletes

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Abstract

Taekwondo is a high-intensity Olympic combat sport that demands strength, speed, agility and endurance. Anthropometric characteristics significantly influence motor fitness performance, particularly in weight-category-based sports. The present study aimed to examine the relationship between selected anthropometric variables and motor fitness performance and to compare motor fitness characteristics between Inter-College and Inter-University male Taekwondo players of Uttar Pradesh. A sample of 60 male players (30 Inter-College and 30 Inter-University) aged 18–24 years was assessed. Anthropometric measurements included height, weight, BMI, body fat percentage and circumferences of upper arm, forearm, waist, hip, mid-thigh and mid-calf, following ISAK guidelines. Motor fitness tests included Pull-Ups, 50-Yard Dash and Shuttle Run 10×2, administered per AAHPERD standards. Data were analyzed using descriptive statistics, independent t-tests, and Pearson's correlation coefficient at a significance level of 0.05. Results indicated significant differences between Inter-College and Inter-University players for all motor fitness variables, with Inter-University players demonstrating superior performance. Pearson's correlation revealed significant positive associations of height, upper arm circumference, forearm circumference, mid-thigh circumference and weight with Pull-Ups and significant negative associations with 50-Yard Dash and Shuttle Run times. Body fat percentage showed significant negative correlation with Pull-Ups and positive correlation with speed tests. Findings suggest that favourable anthropometric traits enhance motor fitness in competitive Taekwondo. These insights can inform talent identification, training program design, and performance optimization in Indian Taekwondo athletes.

Keywords: Anthropometry, Motor Fitness, Taekwondo, Inter-College, Inter-University, Performance

1. Introduction

Taekwondo is a high-intensity Olympic combat sport that demands optimal physical fitness, speed, agility, strength and endurance. Anthropometric characteristics play a crucial role in influencing motor fitness performance, especially in weight-category-based sports like Taekwondo. Previous research has emphasized that body composition, limb circumferences, and skinfold thickness significantly affect strength, power, speed and aerobic capacity.

Competitive success in Taekwondo is closely linked with favourable anthropometric traits that support efficient biomechanical execution of techniques. However, limited research is available comparing anthropometric profiles and motor fitness performance of Indian Taekwondo players across different competitive levels. Therefore, the present study aims to analyze the association between anthropometric variables and motor fitness performance and to compare motor fitness characteristics between Inter-College and Inter-University male Taekwondo players of Uttar Pradesh.

2. Objectives of the Study

1. To assess the motor fitness performance of Inter-College and Inter-University male Taekwondo players.
2. To compare selected motor fitness variables between Inter-College and Inter-University Taekwondo players.
3. To examine the relationship between selected anthropometric variables and motor fitness performance among Taekwondo players.

3. Hypotheses

1. There will be no significant difference in selected motor fitness variables between Inter-College and Inter-University male Taekwondo players.
2. There will be no significant relationship between selected anthropometric variables and motor fitness performance among Taekwondo players.

4. Methodology

Research Design:

A descriptive-comparative research design was adopted for the present study.

Sample:

The sample comprised 60 male Taekwondo players (30 Inter-College and 30 Inter-University) from Uttar Pradesh, aged between 18 and 24 years. Players were selected through purposive sampling.

Variables:

- **Anthropometric Variables:** Height, weight, BMI, body fat percentage, upper arm circumference, forearm circumference, waist circumference, hip circumference, mid-thigh circumference, mid-calf circumference.
- **Motor Fitness Variables:** Pull-ups, 50-yard dash, Shuttle Run 10×2.

Tools and Techniques:

Standardized procedures were used for anthropometric measurements following ISAK guidelines. Motor fitness tests were administered using AAHPERD standardized test protocols.

Statistical Analysis:

Mean, standard deviation, independent *t*-test, and Pearson’s correlation coefficient were employed. The level of significance was set at 0.05.

5. Results and Analysis

Table 1: Comparison of Motor Fitness Variables between Inter-College and Inter-University Male Taekwondo Players

Variable	Inter-College (Mean ± SD)	Inter-University (Mean ± SD)	t-value	p-value
Pull-Ups (reps)	13.43 ± 2.27	19.43 ± 2.27	-10.24	0.000*
50-Yard Dash (sec)	7.12 ± 0.13	6.59 ± 0.17	13.53	0.000*
Shuttle Run 10×2 (sec)	11.28 ± 0.24	10.38 ± 0.27	13.41	0.000*

*Significant at 0.05 level

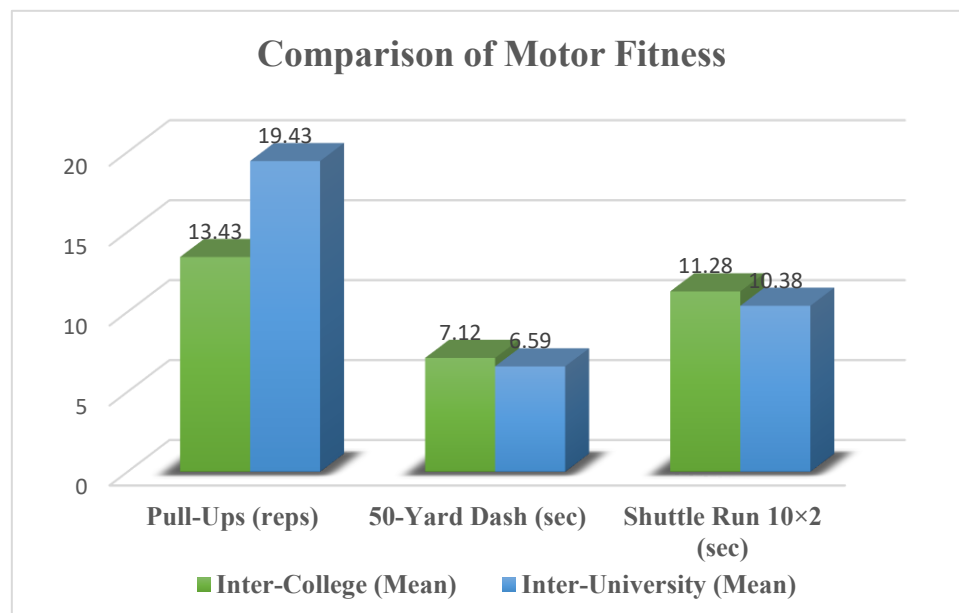


Figure 1: Shows the Comparison of Motor Fitness Variables between Inter-College and Inter-University Male Taekwondo Players

Table 2: Descriptive Statistics of Anthropometric Variables of Inter-College Male Taekwondo Players

Variable	Mean	SD
Height (cm)	172.45	7.12
Weight (kg)	68.42	13.01
BMI (kg/m ²)	23.54	3.41
Body Fat (%)	15.12	2.86
Upper Arm Circumference (cm)	27.14	1.24
Forearm Circumference (cm)	24.82	1.05
Waist Circumference (cm)	78.31	3.59
Hip Circumference (cm)	92.86	2.47
Mid-Thigh Circumference (cm)	49.87	3.15
Mid-Calf Circumference (cm)	35.02	1.59

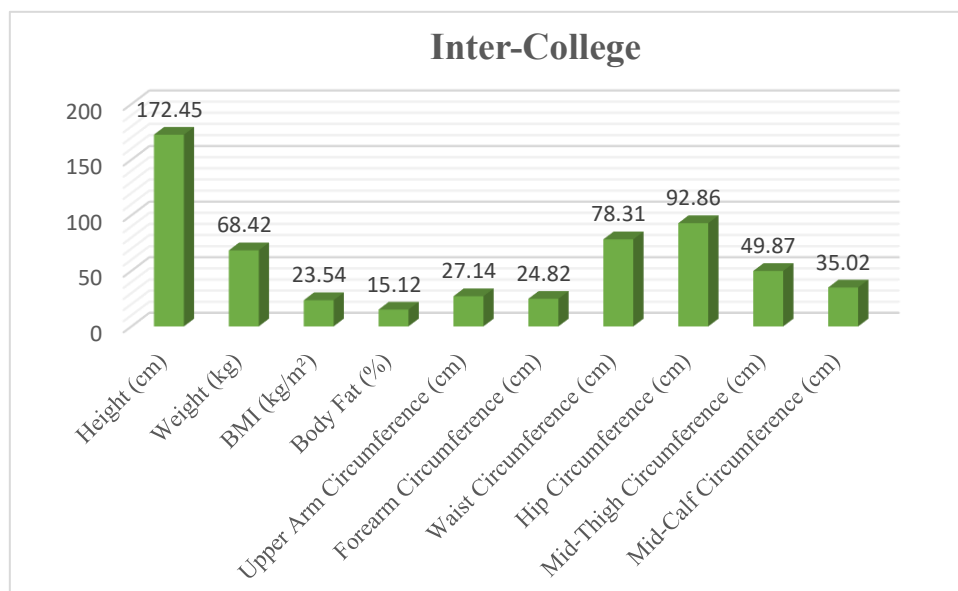


Figure 2: Shows the Descriptive Statistics of Anthropometric Variables of Inter-College Male Taekwondo Players

Table 3: Descriptive Statistics of Anthropometric Variables of Inter-University Male Taekwondo Players

Variable	Mean	SD
Height (cm)	177.42	6.88
Weight (kg)	70.94	12.64
BMI (kg/m ²)	22.42	2.89
Body Fat (%)	14.08	2.63
Upper Arm Circumference (cm)	28.91	1.19
Forearm Circumference (cm)	26.21	1.12
Waist Circumference (cm)	75.96	3.27
Hip Circumference (cm)	94.72	2.81
Mid-Thigh Circumference (cm)	53.64	2.91
Mid-Calf Circumference (cm)	36.98	1.47

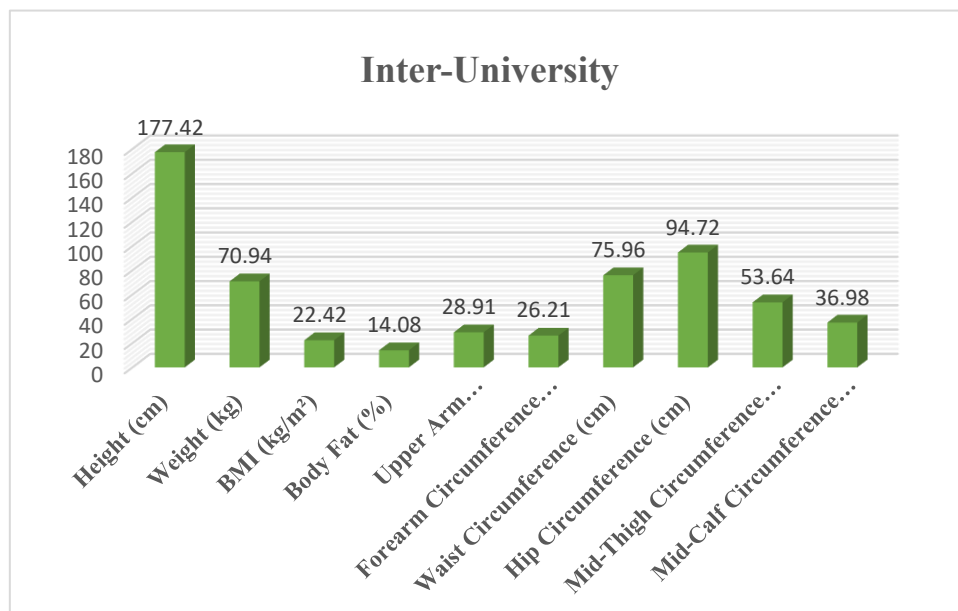


Figure 3: Shows the Descriptive Statistics of Anthropometric Variables of Inter-University Male Taekwondo Players

Table 4: Pearson's Correlation between Selected Anthropometric Variables and Motor Fitness Performance

Anthropometric Variable	Pull-Ups	50-Yard Dash	Shuttle Run 10×2
Height (cm)	0.48*	-0.44*	-0.47*
Weight (kg)	0.36*	-0.33*	-0.35*
BMI (kg/m²)	-0.12	0.18	0.16
Body Fat (%)	-0.51*	0.46*	0.48*
Upper Arm Circumference (cm)	0.41*	-0.29*	-0.32*
Forearm Circumference (cm)	0.39*	-0.27*	-0.30*
Waist Circumference (cm)	-0.33*	0.31*	0.34*
Hip Circumference (cm)	-0.25	0.21	0.23
Mid-Thigh Circumference (cm)	0.44*	-0.38*	-0.41*
Mid-Calf Circumference (cm)	0.31*	-0.26*	-0.29*

* Significant at 0.05 level

6. Discussion

The current study investigated the association between anthropometric variables and motor fitness performance among Inter-College and Inter-University male Taekwondo players of Uttar Pradesh. The results demonstrated significant differences in motor fitness variables between the two competitive levels, highlighting the role of training experience and physiological development in higher-level athletes. Inter-University players exhibited higher Pull-Up repetitions and faster sprint and agility times, indicating superior muscular strength, power and speed-endurance capabilities.

Correlation analysis revealed that height, upper arm and forearm circumferences, mid-thigh circumference and body weight were positively associated with Pull-Up performance, suggesting that greater limb length and muscle mass contribute to upper body strength and functional performance. Conversely, higher body fat percentage was negatively correlated with Pull-Ups and positively correlated with 50-Yard Dash and Shuttle Run times, underscoring the detrimental effect of excess adiposity on strength, speed and agility. BMI and hip circumference showed weaker or non-significant associations, indicating that general body mass indices may be less predictive of performance than specific anthropometric traits in Taekwondo athletes.

The findings align with previous research emphasizing the importance of lean body mass and limb circumference in enhancing strength, power and agility in combat sports. The study

underscores the need for individualized conditioning programs targeting muscle hypertrophy and body composition optimization to maximize performance. Moreover, anthropometric profiling can serve as a valuable tool in talent identification and selection processes in competitive Taekwondo.

7. Conclusion

1. Inter-University male Taekwondo players demonstrated significantly superior motor fitness performance compared to Inter-College players in Pull-Ups, 50-Yard Dash and Shuttle Run 10×2.
2. Anthropometric variables such as height, upper arm circumference, forearm circumference, mid-thigh circumference and weight were significantly positively correlated with strength performance (Pull-Ups).
3. Body fat percentage adversely affected strength, speed and agility, indicating the importance of lean body composition for optimal motor fitness in Taekwondo.
4. BMI and hip circumference were not strongly associated with motor fitness outcomes, suggesting that specific anthropometric measures are more relevant predictors of performance than general indices.

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