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COMPARATIVE ASSESSMENT OF PHYSICAL FITNESS COMPONENTS AMONG DISTRICT, STATE AND NATIONAL LEVEL MALE CRICKET PLAYERS

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ABSTRACT

Background: Cricket demands a high level of physical fitness to perform batting, bowling, fielding, and running tasks effectively. However, limited evidence is available comparing the physical fitness characteristics of male cricket players across different competitive levels. Aim: This study aimed to compare muscular strength, muscular power, muscular endurance, running speed, and running agility among district-, state-, and national-level male cricket players.

Methods: An analytical cross-sectional study was conducted on 120 male cricket players (50 district, 40 state and 30 national) aged 18–28 years selected through purposive sampling. Physical fitness was assessed using the handgrip strength test, standing broad jump, push-up test, 50-m sprint, and 4 × 10-m shuttle run. Data were analyzed using descriptive statistics, one-way ANOVA, and Scheffe's post hoc multiple comparison test at a significance level of $p < .05$.

Results: Significant differences were found among the three competitive groups in muscular strength ($F = 286.22$, $p < .001$), muscular power ($F = 373.05$, $p < .001$), muscular endurance ($F = 181.58$, $p < .001$), running speed ($F = 213.41$, $p < .001$), and running agility ($F = 249.46$, $p < .001$). Scheffe's post hoc analysis showed that national-level players outperformed district- and state-level players in almost all physical fitness components, while state-level players generally performed better than district-level players.

Conclusion: Physical fitness improved progressively with competitive level, with national-level players demonstrating the highest performance in all measured variables. These findings highlight the importance of systematic physical conditioning and may assist coaches and sports scientists in player development and talent identification.

KEYWORDS: Physical fitness; Muscular strength; Muscular power; Muscular endurance; Running speed; Running agility; Male cricket players; Talent identification.

INTRODUCTION

Cricket is one of the most popular team sports worldwide and demands a combination of technical skills, tactical awareness and high levels of physical fitness. The introduction of fast-paced formats such as Twenty 20 (T20) has increased the physical demands of the game, requiring players to perform repeated sprints, explosive movements and rapid changes of direction and prolonged fielding efforts (Noakes & Durandt, 2000; Pont & Walter, 2023). Consequently, physical fitness has become an essential determinant of cricket performance at all competitive levels. Among the various components of physical fitness, muscular strength, muscular power, muscular endurance, speed and agility are particularly important in cricket. Muscular strength enhances batting, bowling and throwing performance, whereas muscular power contributes to explosive batting strokes, bowling actions and fielding movements. Muscular endurance enables players to sustain performance throughout long matches, while speed and agility improve running between the wickets and fielding efficiency (Bompa & Buzzichelli, 2019; Webster & Travill, 2018). Scientific assessment of physical fitness has become an integral part of modern cricket. Coaches and strength and conditioning specialists use standardized fitness tests to monitor player development, identify performance limitations, reduce injury risk and design sport-specific training programmes (Pyne et al., 2014). Fitness profiling also plays an important role in talent identification and selection for higher levels of competition. Previous studies have reported that elite cricketers generally demonstrate superior physical fitness compared with sub-elite players because of greater training exposure and competitive experience (Pont & Walter, 2023). Research has also shown significant differences in physical characteristics among batters, bowlers and all-rounders, indicating that fitness requirements vary according to playing role (Stretch, 2003).

Previous studies have reported significant differences in the physical characteristics of cricket players based on playing position and competitive standard. Noorbhai and Khumalo (2021) examined the anthropometric and physical fitness characteristics of male university cricket players and found that physical profiles differed according to playing position and height categories, highlighting the importance of sport-specific fitness evaluation. Similarly, Weldon et al. (2021) compared international bowlers and batters and reported differences in physical profiles associated with the specific physiological demands of different playing roles. Research conducted in India has also emphasized the contribution of physical fitness to cricket performance. Wagh et al. (2022) reported that physical fitness plays a significant role in overall

cricket performance and recommended regular fitness assessment for improving athletic ability. Likewise, Tahoor and Koley (2019) demonstrated that anthropometric characteristics and physical fitness variables differed among competitive female cricket players, suggesting that systematic fitness profiling can assist in talent identification and training programme development. In India, several researchers have investigated anthropometric characteristics and selected fitness variables of cricket players. Koley et al. (2012) reported significant relationships between physical fitness and cricket performance among inter-district male players. Similarly, Singh et al. (2014) observed differences in muscular strength and muscular power among cricket players of different standards. However, most previous studies have focused on individual fitness variables, playing positions or anthropometric characteristics rather than comparing multiple physical fitness components across different competitive levels.

Existing studies have mainly focused on the physical fitness of elite, university, or position-specific cricket players, with limited attention to comparisons across different competitive levels. There is a lack of research comparing muscular strength, muscular power, muscular endurance, running speed and running agility among district, state and national-level male cricket players using standardized fitness tests. Therefore, the existing study addresses this gap by comparing these physical fitness components across three competitive levels to provide evidence for talent identification and training programme development. The present study aimed to investigate differences in selected physical fitness components including muscular strength, muscular power, muscular endurance, running speed and running agility among district, state and national-level male cricket players. By comparing players across different competitive standards, the study intends to establish a comprehensive fitness profile that can support scientific talent identification, optimize conditioning programmes and inform long-term athlete development strategies in competitive cricket.

Study Objectives

- To examine the differences in muscular strength among district, state and national-level male cricket players.
- To evaluate variations in muscular power among district, state and national-level male cricket players.
- To assess differences in muscular endurance across district, state and national-level male cricket players.
- To investigate differences in running speed among male cricket players competing at district, state and national levels.
- To compare running agility among district, state and national-level male cricket players.
- To determine whether significant differences exist in the selected physical fitness components among district, state and national-level male cricket players.

MATERIAL AND METHODS

Study Participants

The participants for this study comprised 120 male cricket players aged 18-28 years, representing three competitive levels. A total of 50 district-level, 40 state-level and 30 national-level players were selected through purposive sampling from experienced competitive cricketers actively participating in district, state and national cricket tournaments. All participants had a minimum of three years of competitive playing experience, were medically fit and were free from any musculoskeletal injury at the time of data collection. Prior to participation, informed consent was obtained from all players and the study was conducted in accordance with established ethical guidelines for research involving human participants.

Study Design

The present study employed an analytical cross-sectional comparative research design to compare selected physical fitness components among district, state and national-level male cricket players. The study was conducted at a single point in time without any experimental intervention. Participants were categorized according to their competitive playing level and standardized field-based fitness tests were administered to assess muscular strength, muscular power, muscular endurance, running speed and running agility. The collected data were statistically analyzed to determine differences in physical fitness characteristics across the three competitive levels.

Assessment tests

- Handgrip Strength Test: Muscular strength was assessed using a calibrated handgrip dynamometer. Participants performed two maximal trials with their dominant hand while standing in an upright position and the highest value recorded in kilograms (kg) was considered for statistical analysis.
- Standing Broad Jump Test: Muscular power was evaluated using the standing broad jump test. Participants performed a two-footed horizontal jump from a standing position and the longest jump distance, measured in centimetres (cm), was recorded.
- Push-up Test: Muscular endurance was assessed using the standard push-up test. Participants performed the maximum number of correctly executed push-ups without rest and the total number of repetitions completed was recorded.
- 50-Metre Sprint Test: Running speed was measured using the 50-metre sprint test. Participants sprinted a distance of 50 metres at maximal effort and the completion time was recorded to the nearest 0.01 second using a digital stopwatch.
- Shuttle Run Test (4 × 10 m): Running agility was assessed using the 4 × 10-metre shuttle run test. Participants completed repeated changes of direction between two parallel lines set 10 metres apart and the total time taken to complete the test was recorded in seconds.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics (Version 31.0). Descriptive statistics, including mean and standard deviation (SD), were computed for all physical fitness variables. The normality of the data distribution was

assessed using the Shapiro-Wilk test. Differences in muscular strength, muscular power, muscular endurance, running speed and running agility among district, state and national-level male cricket players were analyzed using one-way analysis of variance (One-Way ANOVA). When a statistically significant F-value was obtained, Scheffe's post hoc multiple comparison test was performed to identify pairwise differences among the district, state and national-level male cricket players. Statistical significance was established at $p < 0.05$ for all analyses.

RESULTS

Table: 1. Descriptive statistics and analysis of variance for the variable muscular strength, muscular power, muscular endurance, running speed and running agility among district state and national level male cricket players.

DESCRIPTIVE AND ANOVA						
Variables	**Positions**	**N**	**Mean**	**S.D**	**f-Ratio**	**Sig.**
Muscular Strength	District	50	40.20	2.10	286.22	.00
	State	40	44.10	2.71		
	National	30	55.10	3.52		
Muscular Power	District	50	40.94	3.81	373.05	.00
	State	40	52.47	3.42		
	National	30	65.80	4.79		
Muscular Endurance	District	50	26.36	3.25	181.58	.00
	State	40	31.50	2.70		
	National	30	39.63	2.98		
Running Speed	District	50	7.60	.32	213.41	.00
	State	40	6.95	.24		
	National	30	6.33	.17		
Running Agility	District	50	10.46	.45	249.46	.00
	State	40	9.34	.29		
	National	30	8.71	.18		

The above table presents the mean, standard deviation and one-way ANOVA results for muscular strength, muscular power, muscular endurance, running speed and running agility among district, state and national-level male cricket players. The results showed that national-level players performed better than state- and district-level players in all physical fitness components. District-level players had the lowest mean scores for muscular strength (40.20 ± 2.10), muscular power (40.94 ± 3.81) and muscular endurance (26.36 ± 3.25), while national-level players recorded the highest mean scores of 55.10 ± 3.52, 65.80 ± 4.79 and 39.63 ± 2.98, respectively. For running speed, national-level players recorded the fastest time (lowest mean), followed by state-level and district-level players. Similarly, national-level players showed the best performance in running agility, whereas district-level players recorded the slowest time. The one-way ANOVA revealed statistically significant differences among district, state and national-level players for muscular strength ($F = 286.22$, $p < .001$), muscular power ($F = 373.05$, $p < .001$), muscular endurance ($F = 181.58$, $p < .001$), running speed ($F = 213.41$, $p < .001$) and running agility ($F = 249.46$, $p < .001$). The findings indicate that the level of competition has a significant influence on physical fitness. National-level players demonstrated superior physical fitness compared with state- and district-level players across all selected variables.

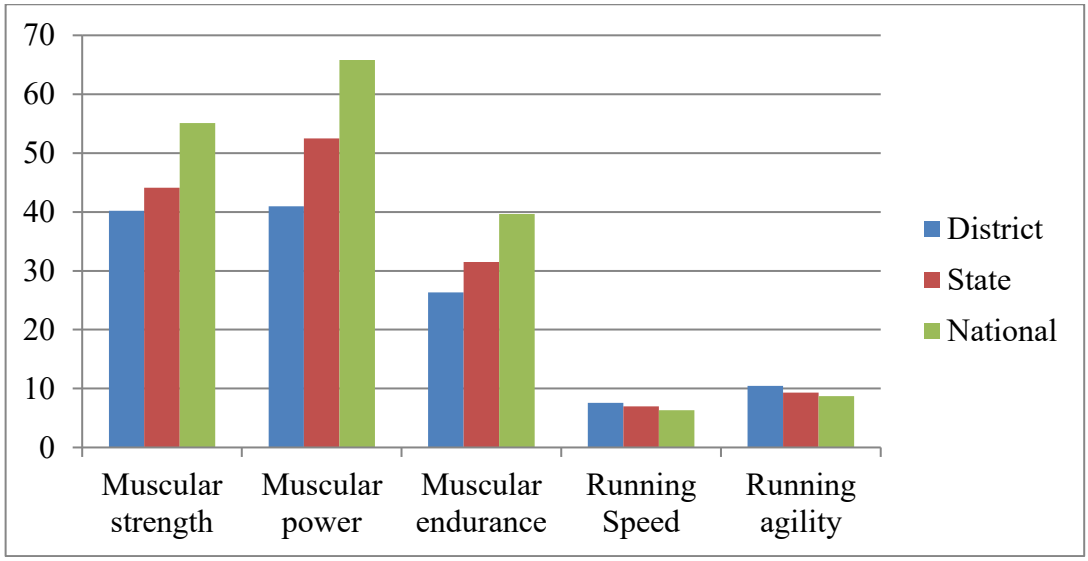

Figure: 1. Graphical representation of mean score of variable muscular strength, muscular power, muscular endurance, running speed and running agility among district state and national level male cricket players.

Table: 2. Scheffe post-hoc multiple comparisons among district, state and national level male cricket players on the variable muscular strength, muscular power, muscular endurance, running speed and running agility.

Variables	District vs State	District vs National	State vs National
	M.D	M.D	M.D
Muscular Strength	3.90*	14.90*	11.00*
Muscular Power	11.53*	24.86*	13.32*
Muscular Endurance	5.14*	13.27*	8.13*
Running Speed	.65*	1.26*	.61*
Running Agility	1.11	1.74*	.62*

The above table presents the Scheffe post-hoc multiple comparison results for muscular strength, muscular power, muscular endurance, running speed and running agility among district, state and national-level male cricket players. The post-hoc analysis showed significant differences in muscular strength between district and state players MD = 3.90, district and national players MD = 14.90 and state and national players MD = 11.00. Similarly, muscular power differed significantly among all three group comparisons, with mean differences of 11.53, 24.86 and 13.32, respectively. For muscular endurance, significant differences were observed between district and state players MD = 5.14, district and national players MD = 13.27 and state and national players MD = 8.13. In running speed, all pairwise comparisons also showed significant differences, indicating that national-level players were significantly faster than both state and district-level players, while state-level players were significantly faster than district-level players. For running agility, a significant difference was found between district and national players MD = 1.74 and between state and national players MD = 0.62. However, the difference between district and state-level players MD = 1.11 was not statistically significant. The findings of Scheffe post-hoc analysis confirmed that national-level players performed significantly better than district and state level players in most of the selected physical fitness components. These findings indicate that physical fitness improves progressively with increasing levels of cricket competition.

DISCUSSION

The purpose of this study was to compare selected physical fitness components among district, state and national-level male cricket players. The findings demonstrated statistically significant differences in muscular strength, muscular power, muscular endurance, running speed and running agility across the three competitive levels. Overall, national-level players achieved superior performance in all measured variables, followed by state-level players, while district-level players recorded the lowest performance. These findings suggest that progression to higher levels of cricket competition is associated with enhanced physical fitness. Similar observations were reported by Weldon et al. (2021), who found that international cricketers exhibited superior physical profiles compared with players of lower competitive standards, emphasizing the importance of physical fitness for elite cricket performance. The higher muscular strength observed among national-level players may be attributed to long-term participation in structured resistance training, greater training experience and exposure to advanced strength and conditioning programmes. Adequate muscular strength contributes to force production during batting, bowling, sprinting and fielding, thereby improving overall performance. The present findings are consistent with those of Noorbhai and Khumalo (2021), who reported that higher-level cricket players demonstrated better strength-related characteristics than less experienced players, highlighting muscular strength as an important performance indicator. Muscular power also increased progressively from district to national level. Explosive power is essential for batting, bowling, jumping and rapid acceleration between wickets. National-level players are more likely to undergo systematic power training, which may explain their superior performance. Similarly, Wagh et al. (2022) concluded that muscular power and other fitness components play a significant role in cricket performance and should be regularly assessed to enhance athletic development. A similar pattern was observed for muscular endurance, with national-level players demonstrating significantly greater endurance than state- and district-level players. Improved muscular endurance enables players to sustain repeated high-intensity efforts throughout prolonged matches while delaying fatigue. These findings are supported by Noakes and Durandt (2000), who emphasized that the physiological demands of cricket require well-developed muscular endurance to maintain performance during extended periods of play. The results for running speed revealed that national-level players recorded the fastest sprint times, followed by state- and district-level players. Sprint speed is essential for effective running between wickets, fielding efficiency and rapid responses during match situations. Likewise, running agility was highest among national-level players, reflecting their superior ability to change direction quickly during fielding and other game-specific movements. Pont and Walter (2023), in their systematic review, identified speed and agility assessments as fundamental components of cricket fitness profiling and highlighted their importance in distinguishing higher-performing players. Overall, the findings indicate that physical fitness improves progressively with increasing competitive level. Regular participation in scientifically designed strength and conditioning programmes, greater training volume and higher competitive exposure are likely to contribute to the superior physical fitness of national-level players. These findings reinforce the importance of comprehensive physical fitness assessment in talent identification and long-term athlete development programmes for cricket.

CONCLUSIONS

The present study concludes that significant differences exist in muscular strength, muscular power, muscular endurance, running speed and running agility among district, state and national-level male cricket players. National-level player's

consistently demonstrated superior physical fitness compared with state and district-level players, indicating that higher competitive standards are associated with enhanced physical performance. These findings highlight the importance of developing strength, power, endurance, speed and agility through structured and sport-specific conditioning programmes. The results may assist coaches, trainers and sports scientists in designing evidence-based training interventions, monitoring athlete development and identifying talented players capable of progressing to higher levels of competition.

Declaration of generative AI and AI-assisted technologies in the writing process
During the preparation of this work the authors didn't use of AI in the writing of the article.

Conflicts of interest
The authors declare no conflicts of interest.

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