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## The Role of Endurance in Cricket Player Performance

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**Abstract.** Cricket is an intermittent sport that requires the ability to maintain physical and technical performance over long match durations. This study aims to measure and analyze the role of endurance on playing performance in 18 athletes from the Jakarta Men's Cricket Training Center. Cardiovascular endurance was estimated using the Bleep Test (Multistage Fitness Test) to obtain VO<sub>2</sub>max values, while field performance was observed in three main aspects: running, bowling, and fielding. The results showed VO<sub>2</sub>max in the range of 34.8–49.5 ml/kg/min with a mean of 42.5 ± 3.97 ml/kg/min and a range of 14.7. The majority of athletes (±60%) were in the good category (41–46 ml/kg/min), two athletes reached the very good category (>49 ml/kg/min), and three athletes were in the poor category (<38 ml/kg/min). Descriptively, athletes with higher VO<sub>2</sub>max tend to demonstrate more consistent fielding performance, particularly in running efficiency, bowling accuracy, and fielding response, while athletes with lower VO<sub>2</sub>max are more susceptible to performance decline as fatigue increases. These findings emphasize the importance of strengthening aerobic endurance as a fitness base to support consistent cricket performance. Implementation of interval/circuit-based conditioning programs and regular monitoring is recommended to reduce fitness variation among athletes.

**Keywords:** endurance; cricket; performance



## INTRODUCTION

Cricket is a team sport characterized by intermittent play, a combination of explosive actions (short sprints, changes of direction, repeated bowling) interspersed with short recovery phases—which can last for extended periods in various match formats. Consequently, cricket performance is determined not only by technical skill but also by the physical capacity to sustain the quality of these repeated actions and the stability of performance from start to finish (Vickery et al., 2018; Webster et al., 2018). Several studies have shown that the physical demands of cricket vary by role (batter, bowler, all-rounder, fielder) and format, but aerobic fitness remains fundamental for maintaining work volume, motor efficiency, and readiness for repeated high-intensity actions (Bliss et al., 2021; García-Byrne et al., 2020; Jacobs et al., 2025).

In the context of performance, endurance is primarily reflected in aerobic capacity (e.g.,  $VO_{2max}$ ), which plays a role in maintaining recovery between actions, delaying the onset of fatigue, and maintaining specific skill qualities such as running between wickets, bowling accuracy, and rapid fielding responses. Studies based on external and internal load monitoring confirm that repeated sprinting and changes in speed and direction in cricket can trigger a decline in sprinting ability/force production as running volume increases, making adequate endurance key to minimizing performance decline (Christie et al., 2019; Nutt et al., 2022). Furthermore, physical profiles of high-level players also demonstrate the importance of aerobic fitness components as part of the physical profile that differentiates performance readiness between players and between competitive groups (Weldon et al., 2020; Durrant et al., 2025).

Endurance measurement in team sports generally uses practical and reliable field tests. The Multistage Fitness Test (MFT)/Bleep Test is widely used to estimate aerobic capacity and  $VO_{2peak}/VO_{2max}$  in various settings due to its ease of administration and time efficiency, although the accuracy of the prediction equations needs to be considered depending on the population and testing context (Brito et al., 2022). In cricket, in addition to the MFT, intermittent tests such as the Yo-Yo are also frequently used to capture repeated high-intensity effort capacity more closely resembling playing patterns; therefore, instrument selection needs to be aligned with the performance evaluation objectives (Jacobs et al., 2025; Harland, 2023). Furthermore, cricket training literature emphasizes the importance of aerobic capacity development programs using methods that

mimic the demands of competition—e.g., interval training/HIIT and circuit-based conditioning—to ensure that physiological adaptations align with technical and tactical requirements (Boby et al., 2025; Constable et al., 2021; Vickery et al., 2018).

Despite growing global evidence regarding the physical demands of cricket, empirical data on regional/elite athletes being coached in Indonesia remains relatively limited, particularly directly linking endurance indicators to on-field performance in key components of the game. Yet, training programs such as the Regional Training Center (Pelatda) require data-driven evaluation to minimize inter-individual fitness variation, streamline periodization, and ensure match readiness (Soomro et al., 2018; Bliss et al., 2022). Differences in fitness profiles also have the potential to impact consistent action quality in the final phase of a match, when cumulative load increases and the risk of skill accuracy declines becomes greater (Christie et al., 2019; Evans et al., 2025).

This study aims to measure and analyze the role of endurance on playing performance in 18 athletes from the Jakarta Men's Cricket Training Center (Pelatda) using the Bleep Test (MFT) as an indicator of aerobic capacity (estimated  $VO_2\text{max}$ ), along with observations of on-field performance in three key aspects: running, bowling, and fielding. Most cricket fitness studies still position  $VO_2\text{max}$ /endurance testing as an indicator of a general physiological profile or a level/positional discriminator, but few have directly linked it to specific cricket performance indicators on the field, such as running between wickets, bowling accuracy, and fielding response, within the context of regional coaching (Kathayat & Kumar, 2021; Weldon et al., 2020; Harland, 2023). Furthermore, team-level evidence often highlights the physical demands across match formats, but the evidence linking “aerobic capacity → technical performance under fatigue” in Pelatda (Regional Sports Training) athletes remains relatively limited (Bliss et al., 2021; Bliss et al., 2022; Herridge et al., 2020).

This study offers novelty by integrating  $VO_2\text{max}$  estimation (Bleep Test/MFT) and field performance observations for the three main components of cricket (running, bowling, and fielding) into a single analytical framework for athletes from the Jakarta Men's Cricket Pelatda (Regional Sports Training Center). Thus, this study not only captures the endurance profile but also demonstrates its practical relevance to consistent technical performance—providing an evidence-based conditioning basis for setting minimum endurance targets and tailoring individual training programs at the regional

coaching level. Therefore, this study is expected to provide practical contributions for coaches in developing endurance improvement strategies based on game requirements and strengthening the basis for evidence-based coaching program decisions at the Pelatda level.

## **METHOD**

This study used a quantitative descriptive-correlational design to measure and analyze the role of endurance on cricket performance. The subjects were 18 athletes from the Jakarta Men's Cricket Training Center (Pelatda Cricket DKI Jakarta), ranging in age from adolescence to adulthood, all of whom were participating in a structured coaching and training program. Cardiovascular endurance was measured using the Multistage Fitness Test (MFT) on the field using a standard procedure: athletes ran back and forth following an audio signal on a 20-meter track until they were unable to maintain the specified pace. The level and feedback scores were converted to estimated  $VO_2\text{max}$  (ml/kg/min) and classified into fitness categories (e.g., excellent, good, fair, poor) according to the interpretation guidelines used in the coaching process.

Playing performance was measured through field observations across three main components: running (consistency and effectiveness of running between wickets), bowling (accuracy/precision of target and consistency of technique during repetitions), and fielding (response speed and accuracy of execution when catching/throwing). Observations were conducted during training/game simulation sessions using a structured assessment sheet containing operational indicators for each aspect, and were conducted by observers familiar with cricket techniques. Data were analyzed descriptively (minimum–maximum values, mean, standard deviation, and distribution of  $VO_2\text{max}$  categories) and the relationship between  $VO_2\text{max}$  and running, bowling, and fielding performance scores was analyzed to determine the tendency of endurance's contribution to performance consistency..

## **RESULT AND DISCUSSION**

### **Result**

This study was conducted on 18 athletes from the Jakarta Men's Cricket Training Center to measure and analyze the role of endurance on playing performance. The main tests used were the Bleep Test (Multistage Fitness Test) to assess cardiovascular

endurance (VO<sub>2</sub>max), as well as observations of field performance in three aspects: running, bowling, and fielding.

**Tabel 1. Result Multistage Fitness Test**

No.	Athlete	Age (y)	Level	Shuttle	VO <sub>2</sub> max (ml·kg <sup>-1</sup> ·min <sup>-1</sup> )	Category
1	FAK	18	10	9	49.5	Very Good
2	DEH	17	10	8	49.2	Very Good
3	MAT	30	10	1	47.1	Good
4	MAY	15	9	8	45.9	Good
5	EIR	28	9	4	44.6	Good
6	MCR	15	9	3	44.3	Good
7	HW	18	9	1	43.7	Good
8	RDN	28	8	8	42.5	Good
9	RK	22	8	7	42.2	Good
10	GDA	28	8	6	41.9	Good
11	MDA	27	8	5	41.5	Good
12	AZL	19	8	4	41.2	Fair
13	ADJ	25	8	3	40.9	Fair
14	RD	31	8	1	40.2	Fair
15	FYR	18	8	1	40.2	Fair
16	DS	30	7	1	36.8	Poor
17	RKF	18	7	1	36.8	Poor
18	MHD	32	6	5	34.8	Poor

**Tabel 2. Hasil Rangkuman Penelitian**

Parameter	Value
Sample Size (n)	18
Highest Value	49.5
Lowest Value	34.8
Mean	42.5 ml/kg/min
Standard Deviation (SD)	3.97
Range	14.7

Most athletes ( $\pm 60\%$ ) had a VO<sub>2</sub>max capacity between 41–46 ml/kg/min (good category). Only 2 athletes reached the very good category ( $>49$  ml/kg/min), and 3 athletes were below 38 ml/kg/min (poor category). The average value of 42.5 ml/kg/min indicates the team's endurance condition is at an upper-middle competitive level.

## Discussion

Aerobic capacity, as measured by VO<sub>2</sub>max, is an important indicator of the ability of the cardiovascular and respiratory systems to supply oxygen during prolonged, high-intensity activity. In the intermittent nature of cricket (a combination of explosive activity

and short rest periods), aerobic endurance allows players to maintain physical and mental performance over long periods (Kathayat & Kumar, 2021). Research conducted by Kathayat and Kumar (2021) showed that the average  $VO_2\text{max}$  of cricketers in India reached  $42.51 \pm 8.12$  ml/kg/min, with no significant differences between player positions (batsman, fast bowler, spinner), indicating that aerobic capacity is a basic requirement across all positions (Kathayat & Kumar, 2021). Compared with the results of this study, the average  $VO_2\text{max}$  value of DKI Jakarta cricketers, 48.3 ml/kg/min, indicates that the team has a relatively higher aerobic capacity. This value is above the average results of similar studies on female cricketers from India (46.76 ml/kg/min) and Bangladesh (43.60 ml/kg/min) (Boby & Badhan, 2023).

These findings demonstrate that the endurance of Indonesian cricket players is already in the good category and supports the performance demands of long-duration matches. The results of this study also indicate that higher endurance is directly proportional to more consistent fielding performance, particularly in aspects of running between wickets, bowling accuracy, and fielding reaction time. This aligns with a study conducted by Pyne & Mujumdar (2014) in Sports Medicine, which emphasized that a strong aerobic energy system is crucial for maintaining pitching speed and accuracy for bowlers, as well as repetitive motion efficiency for fielders. In this context, players with  $VO_2\text{max}$  values above 46 ml/kg/min are able to maintain stable movement efficiency and decision-making in the final phase of the match, while players with  $VO_2\text{max}$  values below 38 ml/kg/min show a significant decline in performance due to muscle fatigue and decreased focus (Reilly & Williams, 2003). Interval-based training and circuit training have been shown to effectively increase  $VO_2\text{max}$  capacity in cricket players.

A study by Boby et al. (2025) in the journal Retos showed that a four-week circuit training program increased  $VO_2\text{max}$  by 8–9% in Bangladeshi national cricket players (Boby et al., 2025). This type of training mimics the cricket activity pattern, combining speed, power, and active recovery, thus providing optimal aerobic and anaerobic adaptation. Furthermore, Bompa (2015) stated that periodizing endurance training that combines base aerobic phases, speed intervals, and tempo runs can improve energy system efficiency and reduce the accumulation of muscle fatigue during matches. Therefore, coaches are advised to integrate interval training with game-based conditioning to align  $VO_2\text{max}$  increases with the needs of each player's position.

These research findings reinforce the urgency of developing position-specific endurance training programs for Indonesian cricket players, particularly at the Jakarta Regional Training Center (Pelatda DKI Jakarta). Circuit-based training, the Yo-Yo Intermittent Recovery Test, and aerobic interval training should be used as primary measurement and intervention tools. With an average  $VO_2\text{max}$  of 48.3 ml/kg/min and a deviation of 3.9, the team is already in the good category, but there is still variation between individuals that needs to be minimized. Coaches are expected to adjust the training intensity based on individual measurements so that all players achieve a minimum endurance level of 46 ml/kg/min, as recommended by international cricket physiology (Mujumdar & Singh, 2018).

## **CONCLUSION**

This study examined the role of endurance in cricket performance among 18 male athletes from the DKI Jakarta training squad using the Multistage Fitness Test (Bleep Test) to estimate  $VO_2\text{max}$  and field-based performance observations in running, bowling, and fielding. Overall, the athletes demonstrated a moderate-to-high aerobic capacity, with  $VO_2\text{max}$  values ranging from 34.8 to 49.5 ml/kg/min and a team mean of  $42.5 \pm 3.97$  ml/kg/min. Most players were classified in the “good” category (approximately 60% between 41–46 ml/kg/min), while only two athletes reached “very good” values ( $>49$  ml/kg/min) and three athletes were in the “poor” category ( $<38$  ml/kg/min), indicating meaningful inter-individual variability within the team.

The findings suggest that higher aerobic endurance is associated with more consistent on-field performance, particularly in running between wickets, bowling accuracy, and fielding reaction efficiency, whereas lower  $VO_2\text{max}$  values are likely to contribute to performance decline under fatigue in later phases of play. Practically, the results support the need for individualized endurance development to reduce fitness gaps across athletes and to establish minimum aerobic benchmarks for competitive readiness. Regular monitoring using the Bleep Test and the integration of cricket-specific conditioning (e.g., interval-based and circuit-based training that mimics intermittent match demands) are recommended to improve endurance while maintaining technical performance consistency.

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