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Association Of Explosive Power And Endurance Among Cricketers Of State Level

[1]Anagha Ghosalkar
[2]Shishir Nigam
[*3]Preeti Saini

ABSTRACT

Background: Often, cricket is stated as an aerobic sport; however, when broken down, the game is played by the players performing at various speeds and intensities-jumping, sprinting, catching, diving, majority of the play is in intervals, and the activity does not last for extended periods (e.g., batting, bowling, fielding, wicket keeping, making a run). The study aims to determine the association between explosive power & endurance in state-level cricket players. Previous studies have investigated physical performances concerning injury incidence and prevention. In this study, physical aspects such as power and aerobic and anaerobic fitness shall be considered. Also, due to the lack of evidence and studies in this literature, it is essential to find an association between the explosive power and endurance among cricket players at the state level.

Methods: The present study was conducted in Faridabad, with 100 male state-level cricketers from different cricket academies included in the study. Subjects in the age group of 16-23 were taken in the study. Screening and assessment protocol was followed to select participants. Performance tests were measured. Explosive power with vertical jump test and endurance using yo-yo intermittent recovery test level.

Results: The study results revealed that the correlation between explosive power and VO2 max was .237* and was significant at .017.

Conclusion: The study concluded that explosive power is positively correlated with the V02 max levels in state-level cricketers.

Keywords: vo2max, anaerobic capacity, fitness testing, professional cricket, performance.

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[1]Masters Student, Faculty of Allied Health Sciences, Department of Physiotherapy, Manav Rachna International Institute of Research and Studies. Faridabad, India.
[2]Assistant Professor, Faculty of Allied Health Sciences, Department of Physiotherapy, Manav Rachna International Institute of Research and Studies. Faridabad, India. shishir.fas@mriu.edu.in.

CORRESPONDING AUTHOR

[*3]Preeti Saini

Assistant Professor, Faculty of Allied Health Sciences, Department of Physiotherapy, Manav Rachna International Institute of Research and Studies. Faridabad, India.
Email: preeti.fas@mriu.edu.in

INTRODUCTION

Cricket is a sport played by millions from all corners of the globe. All over the world, three cricket formats have been practiced and are famous [1]. Cricket is recognized to pose physiological demands on various parts of the human body like a muscular system, cardiovascular system, strength, and endurance involving the human body's great physiological demands. As an aerobic sport, it requires speed, agility, flexibility, and cardiac conditioning. Often cricket is stated as an aerobic sport; however, when broken down, the game is completed by the athletes playing at a range of speeds and intensities-jumping, sprinting, catching, diving; the more significant part of the sport is in pauses and the movements do not last for extended periods (e.g., batting, bowling, fielding, wicket keeping, making a run).

Cricketer's performance is influenced by leg strength and speed. These two elements influence the speed and agility meant for fielding, wicket keeping, and running between wickets. It is even essential for bowlers because it helps them monitor and practice their ability to absorb the legs' forces during delivery [2]. Another study by (Tyson (1987) stated that the strength of the muscles of the lower extremity, upper extremity, and trunk is of utmost importance for both batters and bowlers for the execution of ground strokes [3].

There is a changing stressor in cricket as it requires a varying degree of change, like batting, bowling, and wicket keeping. Fielding cricket is an endurance game and requires probable stamina for excellent performance. Anaerobic power and capacity are of immense significance, as most depend only on the player's ability to move quickly and powerfully. International cricket types have posed greater demand as five-day matches have more demand on the physiological system than one day for each term, extended seasons, and additional regular touring [4]. Physiological cricket requirements may substantially alter amongst various roles, such as batsmen, fast bowlers, wicket-keepers, and fielders. According to longitudinal research to quantify cricketers' movement patterns for all positions in T20, a day match of fifty over, multiday, or first-class matches stated a vast variation among game formats. Also, the cricket's physical needs' concise layouts (T20/1 day) are more exhaustive per part of interval and have a more significant overall physical load for the specific positions. Energy expense is expected to change depending on players' tasks, stance, or cricket format [5].

Cricket is termed as an interval sport with equally anaerobic and aerobic components. [6]Technical performance may be reduced by physical attributes, physical fitness, and performance qualities (Saini 1996, Sindhu & Grewal 1984). Also, cardiorespiratory fitness in terms of max O2 uptake (VO2max) reflects a person's physical fitness; hence, VO2 max is the single preeminent measure of cardiorespiratory capacity benchmark to quantity CVS functional capacity and aerobic fitness [7].

There is a lack of study in which explosive power and endurance of cricket players have been assessed, and its association with endurance has been evaluated

METHODOLOGY

Scope on Population

The inclusion criteria included male cricket players aged 16 to 23 playing at the state level for at least one year. The present study was conducted in Faridabad with 100 sports players aged 16 to 23 years, and they signed informed consent. The subjects were within the normal BMI range; subjects taken were male cricket players who played for at least one year at the state level. The demographic details such as height (Cms) and weight (kgs.) were recorded using a stadiometer and digital weighing machine, respectively, and BMI. After assessment testing for vertical jump and Yo-Yo IRT level, one was done after a general warm-up

Sargent chalk jump test: Subjects stood with one side against a wall, heels together. With the heels together, the subject was asked to mark as high as possible on the wall. Then, they were required to jump as high as possible to make another mark on the wall; the score was calculated at a distance in centimeters between the reach mark and the highest jump mark attained by the subject.

Cardiovascular Fitness (Yo-Yo Intermittent Recovery Test-Level 1): Before the test commenced, subjects were given instructions and explanations on the test protocol. This test required the subjects to run 20 meters continuously, turning in the opposite direction after each straight 20-meter run with a 5-meter resting interval before the following beep; the audio playback instructed the running. After every 40-meter run, they had an active break of 10 seconds before rerunning 40 meters. At regular intervals, the required running speed increased. The flat surface with a 5-meter distance from cone A to B and 20 meters from cone B to cone C with 25 meters in the total distance was used in this test. They were asked to run from the starting line cone B to cone C and run back toward cone B before the second beep, then jog to cone A and back to cone C while waiting for the following beep. The test was stopped when the subject failed to reach the line for two consecutive ends.

The total distance covered, the level/number achieved, or speed level and shuttles were recorded. The statistical tests were applied, including mean, standard deviation, and Karl Pearson correlation, for assessing the correlation between explosive strength and VO_{2max}. SPSS 22 version was used as a statistical tool

RESULT

The present study revealed the following results.

Table 1: Descriptive characteristics of Age and BMI (mean ± standard deviation)

VARIABLES	MALES (N=100)
AGE (years)	17.49 ± 1.68
BMI ($kg/m^{2)}$	22.76 ± 2.61

Table 1 depicts the distribution of subjects based on age and BMI among various sports players. For example, it depicts the mean and standard deviation of age and BMI variable of 100 male cricket players with a mean age of

17.49±1.68 years and BMI of 22.76±2.61. The differences were statistically significant (p<0.05).

Table 2: Descriptive statistics of explosive power test.

VARIABLE	MEAN ± SD
Vertical jump height (cms)	53.1 ± 7.52

Table 2: depicts the mean and standard deviation of the vertical jump height of 100 male cricket players who underwent the study

Table 3: Descriptive statistics of the VO2max (endurance) test.

VARIABLE	MEAN ± SD
Yo-Yo intermittent recovery level test (ml/min^{-}/kg^{-})	44.5 ± 2.66

Table 3: Depicts the distribution of subjects based on Variables and Mean score. The data revealed that most of the above table's sports players depict the mean and standard deviation of Yo-Yo intermittent recovery test level 1 of 100 male cricket players who participated in the study.

Table 4: Correlation between explosive power (vertical jump height) and VO2 max (Yo-Yo intermittent recovery test level-1).

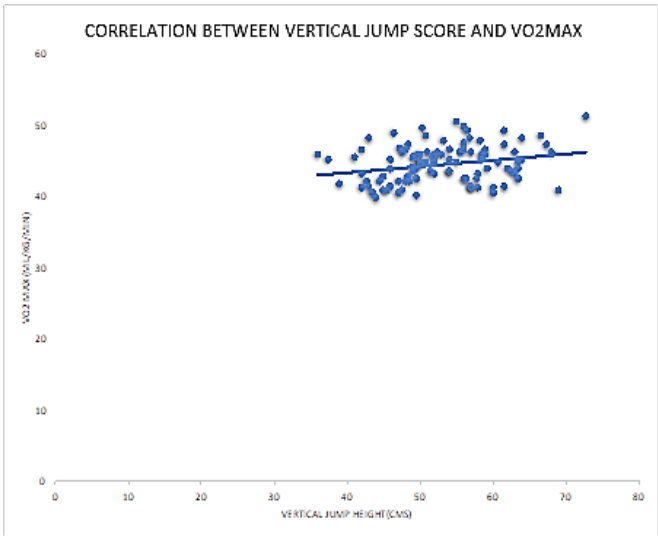
VARAIABLE	r-value	p-vale
Vertical jump height and VO2 max	.237*	.017

** Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2- tailed).

The table above shows a positive correlation between explosive power and VO2 max. The correlation between explosive power and VO2 max was .237*, significant at .017. Suggests that there exists a positive correlation between Explosive Power and Aerobic capacity

Graph 1: Correlation between vertical jump and VO_2 max



The graph represents the relationship between vertical jump height and VO2 max (Yo-Yo IR1 test) score of 100 male cricket players. It shows a positive correlation between explosive power and VO2 max, with an r= .237* and p=.017.

DISCUSSION

This study aimed to determine an association between explosive power and VO2 max of State level cricketers. The subjects were taken from mentioned academies, including 100 male state-level cricket players of 16-23 years with normal BMI (<25).

The study's first objective was to assess cricket players' explosive power. According to the present study result, the mean explosive power (cms) scores were 53.10. Similar studies stated there was limited research on enhancing athletic performance. However, he stated that a study on professional rugby players had a better or significant impact of lower body explosive power and speed on their physical playing performance.[8] On the contrary longitudinal studies on rugby players found no differences in explosive strength due to physical performance [9]. A study by Carret al. (2017) on elite cricket players measuring their explosive power over a range of seasons (start and end off-season) showed improvements in lower body power scores overall the seasons [5]. Studies by Johnstone in the year (2010) on explosive power differences in batsmen and bowlers showed negligible differences among them [10]. Jakovljevic (2018), through his studies, concluded, "explosive power is an essential prerequisite for sports that demand explosiveness and fast maximal energy production and finds need to be incorporated for planning and training, performance prediction and talent identification in various sports" [11]. Castagna (2016) has also further emphasized the varying role of explosive power and explosiveness in various sports like cricket and basketball, which is essential for improving their performance [12].

The study emphasized that the mean scores of VO2 (ml/kg^{-}/min^{-}) max, obtained in state-level cricketers, was 44.5. The endurance of the player was higher in the Cricketers, and the results of the present study were supported by the study done by Noakes and Durandt (2000). They studied cricketers' energy requirements and found that batsmen had higher maximum O_2 uptake values and were faster and quicker in the running than bowlers [13]. Candice Jo-Anne Christie (2012) did similar work on assessing cricket and cricketers' energy expenditure [15]. Study on the physiological profile of professional cricketers and stated possible differences among on-field playing positions [10]. A study on basketball players stated that the VO2 max or Oxygen uptake was higher in reducing fatigue and increasing the longevity of performance in under nineteen basketball players [14]. There was a scarcity of studies done on these physiological parameters of cricketers

The study's last objective was to establish the association between explosive power and VO2 max of cricket players, which states with increased explosive power, there is a positive increase in subjects' VO2 max levels that help to sustain for longer, increasing the longevity of the performance in the game Results stated explosive power showed a mild positive correlation (r=.237*) when compared with VO2 max, although it was not significant (p=0.17). Bangsbo also stated that Yo-Yo is an extremely

useful performance indicator for intermittent exercise with a high aerobic component towards the end of the test [16]. Andrew Thomas (2016) stated Yo-Yo test is a strong measure of VO2 max and a strong predictor of field tests. [17] Study (2009) studied the aerobic and explosive power performance in elite Italian regional-level basketball players and found that explosive power played a role in influencing the rapid shift from eccentric to concentric contractions regimes and related to the total distance covered.[12]

A weak association has been established between explosive power and VO2 max by this study but still should be carried out further to strengthen the base

CONCLUSION

Over the last decade, there have been massive changes in cricket concerning technique, tactics, and the formats in which the game is played. Due to the introduction of newer playing formats in cricket like T20 and long sporting season/sessions, there is an increasing demand for optimal physical, physiological, and motor performance.

Previous studies have investigated the physical performances concerning injury incidence and prevention. In this study, the physical aspects such as power and aerobic and anaerobic fitness shall be considered. Also, due to the lack of evidence and studies in this literature, it is vital to find an association between explosive power and endurance among cricket players at the state level. The study's findings can be used by physiotherapists, coaches, trainers, or sports professionals to train the team on certain aspects that need improvement to achieve better performance.

RECOMMENDATIONS

Future studies in this study may be:

1. A similar study can be done on female athletes to determine a possible effect on performance.
2. Studies can be done using more functional tests to determine performance outcomes.
3. Studies can be done with more accurate measures to obtain VO2max levels.
4. A similar study can be done on players playing at different levels and formats of the game.
5. Playing position-specific studies can be done in future studies.

Ethical clearance was taken from the Manav Rachna International Institute of research and studies committee

DECLARATION

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Conflict of Interest: There is no Conflict of Interest between the Authors

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