

COMPARATIVE PHYSICAL AND PHYSIOLOGICAL PROFILES OF CRICKETERS: EVIDENCE FROM PREVIOUS STUDIES

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Abstract

Research conducted over the course of the last several decades in the scientific community has brought to light the significance of physical and physiological profiling in the context of comprehending the performance requirements of cricket. The objective of this review research is to investigate and analyze the scientific information that is currently available regarding the physiological and physical characteristics of cricket players who compete at varying levels. Variables such as body composition, muscular strength, speed, agility, aerobic and anaerobic capacity, heart rate response, and recovery ability are shown to be considerably different between playing standards and are strongly connected with performance outcomes, according to the research that was evaluated. The importance of rigorous training and exposure to competition is seen in the fact that top cricket players routinely display higher fitness profiles in comparison to sub-elite and amateur players. Furthermore, the data show that variances in physical and physiological features among cricket players are caused by the demands that are particular to roles and formats. Taking everything into consideration, the data that was examined highlights the importance of scientific profiling for the purpose of talent discovery, training prescription, performance development, and injury prevention. This study emphasizes the importance of continuing research that makes use of standardized assessment procedures in order to get a deeper comprehension of the differentiations in cricket performance that occur at different levels.

Keywords: *Physical profiling, Physiological profiling, Cricket performance, Competitive levels, Fitness characteristics*

Introduction

Players need to possess a unique combination of technical talent, understanding of strategy, physical and mental power, and mental and physical strength because cricket is such a difficult game. Over the course of the last several decades, cricket has evolved from a delightful pastime into a sport that is quite challenging. In order to be successful in modern cricket, players need to possess a considerable amount of physical strength, speed, durability, flexibility, and mental acuity. The physical and physiological make-up of a cricket player has a significant influence on the player's overall performance. Their capacity to do challenging motor skills, maintain a high level of effort for extended games, and recover fast from stress is evaluated based on this fact. It is vital to have an understanding of the physical and

physiological characteristics of bowlers at all levels, including club, district, state, national, and international, in order to successfully locate talent, develop training programs, and enhance performance.

Cricket players have a physical description that includes their height, weight, body composition, limb length, and somatotype. This description also includes the length of their limbs. The importance of these factors cannot be overstated when it comes to determining how effectively individuals perform in a variety of roles and styles within the team. For instance, fast bowlers often have more mesomorphic features and more muscle mass, which makes it simpler for them to generate speed and maintain high-intensity efforts. This is because they have developed more muscle mass. Spin bowlers and batters, on the other hand, typically have a balanced meso-ectomorphic structure, which provides them with speed, stamina, and the ability to regulate their movements with fine muscles. According to research conducted by Stretch and Bartlett (2002) and Christie (2013), top bowlers had lower percentages of body fat and a greater amount of lean body mass than players who are at a lesser level of competition. It appears from this that physical fitness is a role in the process of climbing the ranks of the competition. The length of your legs and arms, as well as other anthropometric characteristics, might also provide you with a technical advantage while you are batting or bowling. With the ability to keep your body in the greatest possible form via the use of planned training and nutrition regimens, one of the most crucial aspects of playing cricket at a high level is the ability to maintain your body.

Physical & Physiological Profiles

The visible characteristics and quantitative abilities of athletes are referred to as their physical and physiological profiles. These profiles have a direct influence on the athletes' performance. In sports like cricket, which need a high degree of speed, power, endurance, and recovery, these traits are particularly significant for measuring an athlete's functional preparation, training state, and fitness level. Examples of such sports are football, basketball, and tennis. It is becoming more usual to make use of these profiles in order to evaluate existing capabilities, monitor progress, and tailor training programs to individual needs. With a comprehensive understanding of these features, sports scientists and coaches are able to maximise performance while simultaneously reducing the likelihood of injury.

Resting Heart Rate (RHR)

The normal pace at which the heart beats is referred to as the resting heart rate (bpm), and it occurs while the body is at rest. Both the efficiency with which the circulatory system functions and the efficiency with which the heart pumps blood with little effort are evaluated by this test. An excellent sign of cardiovascular fitness and the power of the heart muscle is having a resting heart rate that is lower than the average. In the general population, the resting heart rate (RHR) may range anywhere from sixty to one hundred beats per minute (bpm), but for competent athletes, it often falls somewhere in the range of forty to sixty beats per minute (bpm). By monitoring resting heart rate over a period of time, it is possible to distinguish between overtraining, weariness, and underlying medical concerns. The majority of the time, measurements are taken in the morning, when the body is in its most relaxed state.

Resting Blood Pressure

A phenomenon known as blood pressure occurs when the blood that is circulating exerts pressure on the interior of the blood vessels. It is more accurate to take a person's blood pressure while they are at rest, either sitting or lying down. This is the optimum time to take their blood pressure. This measurement is divided into two halves: the systolic pressure and the diastolic pressure. Both of these pressures measure the pressure that is present inside the heart during the contraction and relaxation phases of the heartbeat, respectively. At rest, a value of 120 over 80 mm Hg for blood pressure is considered to be within the normal range. Athletes often have a somewhat lower blood pressure than the general population because their cardiovascular systems are more efficient than the general population. It is essential to undertake consistent monitoring in order to maintain one's health and be ready to perform, since aberrant readings may indicate that one is experiencing stress, dehydration, cardiac difficulties, or overexertion.

Objective

The objectives of the study will be:

1. To study the level of various fitness components of College and University level Cricketers.
2. To study various body dimensions of College and University level Cricketers.

Method

A quantitative research technique was utilized in this study in order to investigate the physical and physiological characteristics of cricket players who were competing at varying levels of performance. The method of purposive sampling was utilized to choose a total of 150 male cricket players between the ages of 18 and 25 from a variety of colleges. Participants had previous experience competing and were actively involved in training and competitions, which ensured that they were physically fit and free of injuries. Standard tests were used to examine the participants' physical and physiological data, and informed permission was acquired from each and every participant. When doing research with human beings, ethical norms were adhered to in a methodical manner.

Data analysis

Statistical Analysis of Physiological and Physical Variables

A better understanding of the physiological, and physical aspects that are associated with higher levels of performance among college cricket players was the purpose of the following study. Within this section, the analysis of the data and the interpretation of the results are discussed. Participants in the study were one hundred college cricket players, both male and female, who participated in the Intercollegiate Cricket Tournament during the 2016–2017 academic year. The participants were selected for the study. They varied in age from 19 to 22 years old. Some of the physical criteria that were selected included speed, explosive power, grip strength, arm strength, and flexibility. Another element was flexibility. Some of the physiological characteristics that were measured included the resting pulse rate, peak flow rate, breath-holding duration, maximum oxygen consumption, and respiratory rate.

The subject of the study consisted of fifteen independent variables, which included the physical and physiological components that were identified earlier, as well as five dependent variables, which were

the skill levels of the cricket players. The information that was gathered was subjected to statistical analysis in order to determine the extent to which these elements were connected to the accomplishments of the athletes. In order to determine the nature of the relationship between the independent and dependent components, as well as the degree of strength of that relationship, the Pearson product-moment correlation was utilised. In addition, multiple regression analysis was utilised in order to determine the degree to which the separate factors were able to accurately predict the overall skill level of the players combined. Our search for the predictor variable that had the most significant connection to the dependent variable was accomplished through the use of the forward selection approach. Adding each significant predictor to the regression equation one at a time was the method that was utilised to accomplish this. When putting the study's hypotheses to the test, a significance threshold of 0.05 was consistently utilised. Through the utilisation of this particular kind of study, the researcher was able to determine which aspects of cricket success were the most significant. The results of this study provided them with information that was both descriptive and predictive on the ways in which physical and physiological elements influence the development of athletic abilities.

Physical and Physiological Profile of Men

Physical Variables

By looking at the physical factors, one can gain a better understanding of the characteristics of the study sample as well as the range of variation. In order to demonstrate the central tendency, dispersion, and general distribution of the data, descriptive statistics were utilised for the selected physical elements under consideration. Height, weight, body mass index (BMI), flexibility, agility, speed, and other quantifiable physical attributes that are significant to the research aims are some examples of the elements that fall under this category. The summarized version of these descriptive statistics can be found in Table 4.1.1. The mean, the standard deviation, the minimum, the maximum, and the range are some of the significant points that are displayed for each personal measurement. Mean is a statistical measure that provides an average value that indicates the general level of the trait in the sample group. Alternatively, the standard deviation is a measure that illustrates the degree to which the values are dispersed around the mean. Both the lowest and highest figures represent the extremes that were seen in the sample, while the range illustrates the degree to which the scores of the various individuals were distributed throughout the board.

It is of the utmost importance to take into consideration these physical aspects since they provide us with a foundation upon which to build our comprehension of the group that we are researching. With the aid of these sorts of specific facts, we are able to gain a better understanding of the typical body profile and the ways in which individuals differ from one another. In addition, these numbers are utilised as a starting point for additional in-depth analysis, such as comparing groups, searching for correlations, or testing ideas regarding the ways in which physical characteristics influence performance or other outcome aspects. As a result of presenting the information in the form of a table, Table 4.1.1 provides a concise yet comprehensive overview. Both the comparison of elements and the identification of any intriguing patterns, trends, or outliers that may require further investigation are made simpler as a result of this. This methodical technique ensures that the study is based on quantifiable data, which enables the physical characteristics of the individuals to be appropriately assessed and conclusions to be reached.

Table 1 A Rundown of Characteristic Data On A Few Athletic Attributes Of Male Cricket Players

Descriptive Statistics	Speed (Sec)	Explosive Power(cm)	Grip Strength (Kg)	Shoulder strength (Pts)	Flexibility (cm)
N	50	50	50	50	50
Mean	7.14	61.58	95.00	9.20	22.06
Std. Deviation	0.16	1.44	1.78	3.14	2.01
Minimum	6.8	58.0	91.0	5.0	18.0
Maximum	7.5	65.0	99.0	18.0	26.0

A statistical analysis was done on the data on the selected physical characteristics that were connected with playing ability. The results of this study are presented in Table 4.1.2. The Pearson product moment correlation was utilised in the process of undertaking the study.

Table 2 Table of Pearson's product-moment correlations between a number of physical characteristics and male cricket players' performance on the pitch

Correlation Matrix	Playing Ability	Speed	Explosive Power	Grip Strength	Shoulder strength	Flexibility
Playing Ability	1.00	0.90*	0.92*	0.13	0.20*	-0.06
Speed	0.90*	1.00	0.94*	0.23	0.18	-0.08
Explosive Power	0.92*	0.94*	1.00	0.21	0.20	-0.05
Grip Strength	0.13	0.23	0.21	1.00	-0.12	0.28*
Shoulder Strength	0.20*	0.18	0.20	-0.12	1.00	-0.13
Flexibility	-0.06	-0.08	-0.05	0.28*	-0.13	1.00

The required table 'r' value is 0.195 at 0.05 level of confidence.

As can be observed in the table that is located above, the Pearson correlation values that were obtained, which were 0.90, 0.92, and 0.20, are significantly higher than the table value of 0.195 with df 98 at the .05 level of confidence at the time of the analysis. Because of this, it was found that the playing ability of college-level cricket players was significantly related to their speed, explosive power, and shoulder strength. On the whole, the abilities of cricket players were explained by speed to the extent of 90%, explosive power to the extent of 92%, and shoulder strength to the extent of 20%. As a result of this, cricket players place a high value on possessing explosive power, shoulder strength, and agility.

Graphs of the correlation matrices between playing skill and the chosen physical parameters are given in figure 4.1.1.

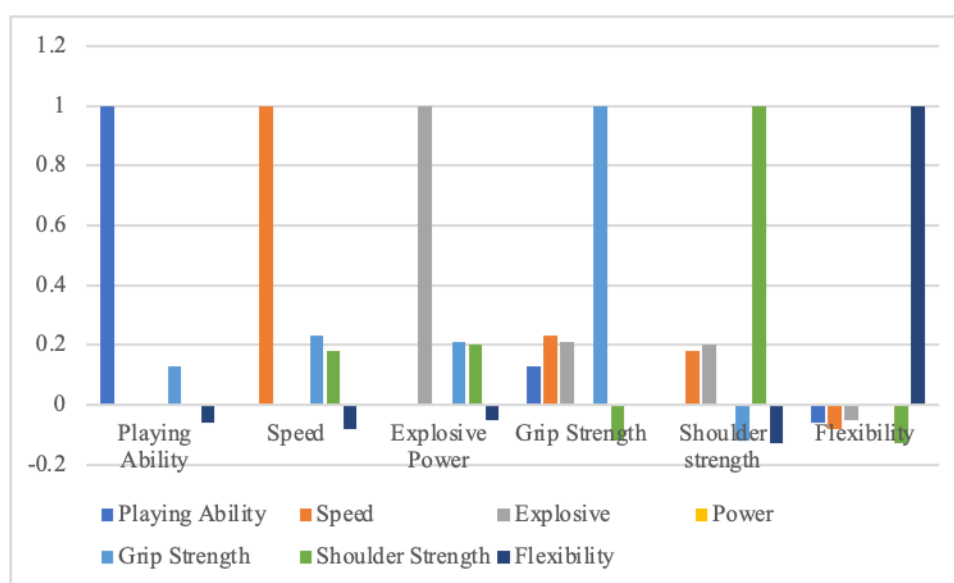


Figure 1 The Correlation Matrix Values of Playing Ability with The Selected Physical Variables.

Physiological Variables

As indicators of how the body reacts to different stimuli, physiological variables give light on people's health and functional capacities. The study used descriptive statistics to summarise the central tendency, variability, and distribution of the selected physiological variables within the participant sample. Resting heart rate, blood pressure (systolic and diastolic), cardiovascular endurance, respiratory efficiency, and other pertinent physiological measures that reveal the subjects' total physical health and performance capacity may be included in these variables.

For each physiological variable, Table 4.1.3 summarises the descriptive statistics and gives an exhaustive review of important measurements such as the mean, standard deviation, minimum, maximum, and range. The mean provides a basis for understanding typical physiological performance as it indicates the average level recorded in the study population. The standard deviation shows the extent to which responses deviate from the mean and provides insight into the dispersion of these responses around the mean. The sample's extremes are shown by the minimum and maximum values, while the range shows how the data are spread out generally.

In order to understand the functional health profile of the participants, it is required to evaluate certain physiological characteristics. Finding trends, patterns, and potential outliers in the data is made easy with descriptive analysis like this. In addition, these statistics lay the groundwork for additional inferential analyses, which can compare groups, test hypotheses about the impact of physiological qualities on particular variables of interest, or investigate correlations between physiological aspects and performance outcomes. The study gives a comprehensive and organised overview of the data in Table 4.1.3, which helps researchers to successfully understand physiological parameters. By following this methodical procedure, we can be sure that our analyses will be based on reliable, quantitative data, which will allow us to draw meaningful conclusions about the participants' health and functioning abilities.

Table 3 Statistical Synopsis of Some Physiological Characteristics of Male Cricket Players

Descriptive Statistics	Resting Heart Rate (bpm)	Peak flow rate(lr/mnt)	Breath Holding Time (Sec)	VO2max (ml/kg/min)	Respiratory Rate (in No.)
N	50	50	50	50	50
Mean	66.20	510	46.02	35.27	14.92
Std. Deviation	2.06	0.45	1.81	1.97	1.08
Minimum	62.0	4.1	42.0	31.0	13.0
Maximum	72.0	6.2	50.0	38.7	17.0

Results from a statistical analysis of the selected physiological variables related to playing ability are shown in Table 4.1.4. The analysis was conducted using Pearson product moment correlation.

Table 4 Matrix Showing the Relationship Between Several Physiological Factors and Cricket Performance in Males

Correlation Matrix	Playing Ability	Resting Heart Rate	Peak flow rate	Breath Holding Time	VO2max	Respiratory Rate
Playing Ability	1.00	0.25*	(-0.17)	(-0.13)	(-0.11)	(-0.06)
Resting Heart Rate	0.25*	1.00	0.11	0.02	0.08	(0.26*)
Peak flow rate	(-0.17)	0.11	1.00	0.01	0.21	(-0.11)

Breath Holding Time	(-0.13)	0.02	0.01	1.00	0.25	(-0.20)
VO2 max	(-0.11)	0.08	0.21	0.25	1.00	(-0.30)
Respiratory Rate	(-0.06)	(-0.26*)	(-0.11)	(-0.20)	(-0.30)	1.00

The required table 'r' value is 0.195 at 0.05 level of confidence.

The Pearson correlation values that were achieved are 0.25, which is greater than the number that was printed in the table, which was 0.195 with a degree of freedom of 98 and a level of confidence of 0.05. This is evident from the table, which makes it plain that the result is higher than the number that was stated in the table. Consequently, the conclusion that was arrived at was that there was a significant connection between the playing talents of college level cricket players and their resting heart rate. This was the conclusion that was obtained. The resting heart rate was found to be responsible for explaining twenty-five percent of the correlation that exists between the resting heart rate and the overall playing ability of cricket players. Additionally, in order for cricket players to demonstrate their performance, the resting heart rate is given the attention that it deserves before performing.

Discussion

The current research discovered that there is a link that is statistically significant between the skill level of cricket players and a variety of parameters that are independent of one another. For the purpose of this study, the playing ability of cricket players was predicted by using a combination of physical variables, such as speed, explosive power, grip strength, and shoulder strength; physiological variables, such as resting pulse rate, peak flow rate, and respiratory rate; avariables, such as achievement motivation. There was a comparison made between the movement patterns of the players at each position. Facilities in Australia that are State of the Art for Cricket 42 cricket players were monitored over the course of two seasons using global positioning system (GPS) technology to determine their gait patterns. These gait patterns included walking, jogging, running, striding, and sprinting. At the batting, fast bowling, spin bowling, wicket keeping, and fielding positions, the players represented the five different positions that are available. It was estimated that the quantity of sprinting that was required every hour for One Day and Twenty20 Cricket was around fifty to one hundred percent higher than that required for multi-day competitions. The longer period of multi-day cricket, on the other hand, resulted in a 16–130% increase in the amount of sprinting that was done each day. After taking everything into consideration, the physical toll of playing cricket over many days is greater than that of playing Twenty20 or One Day, which are shorter formats.

Conclusion

One of the many aspects of cricket that requires strength, speed, agility, and endurance is the batting, bowling, and fielding. These are just a few of the many other aspects. Players' physical and physiological characteristics undergo major transformations as they go from the amateur level to the elite level. These transformations are brought about by structured training, exposure to competition, and physical maturity.

These developments may be measured and analysed in order to determine whether or not they are ready to start performing and whether or not they have potential. Through the investigation of and physiological parameters, it is possible to get a greater understanding of the mental and physical preparation that an athlete goes through in order to be ready for a game, as well as the ways in which these qualities change throughout various levels of championship competition. In cricket, the structural dimensions and composition of the human body, which are together referred to as characteristics, are very important contributing elements. Height, weight, skinfold dimensions, body fat percentage, and body mass index (BMI) are some of the elements that determine how effectively an athlete performs a particular activity. Other factors include the athlete's height and weight. On the other hand, fast bowlers are more effective when they have height and longer limb lengths to build momentum. Batsmen may perform better with a smaller frame since it helps them maintain their balance and respond more quickly. Compared to their less gifted colleagues who may not have had the same level of training, top-tier cricket players often have a more mesomorphic body type, which means they are lean and powerful. This is in contrast to their colleagues who have received less training.

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