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Analysis of physical, physiological and psychological profiles of cricket players in Jammu and Kashmir

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Abstract
Cricket, as a sport, is not only a test of physical prowess but also mental resilience and strategic acumen. The study employs a mixed-methods approach, combining quantitative assessments of physical fitness, physiological parameters, and psychological evaluations with qualitative insights gathered through interviews and surveys. A sample of cricket players from various levels of competition is recruited, ensuring representation from different demographics and skill levels. Physical assessments encompass measurements of strength, agility, flexibility, and endurance, providing insights into the players' athletic capabilities. Physiological evaluations focus on parameters such as cardiovascular health, respiratory efficiency, and metabolic rates, shedding light on the players' overall fitness levels and performance potential. In addition to physical and physiological aspects, the thesis explores the psychological dimensions of cricket players in Jammu and Kashmir.

Keywords: Cricket, physical fitness, physiological parameters

Introduction
The game of cricket, particularly short format cricket, is a highly skilled and technical one where players' responsibilities vary greatly dependent on their positions in the game (Scanlan *et al*., 2016) [1]. Noakes and Durandt, 2000 [2], assert that being physically fit alone is unable to fully compensate for the severe physical and mental abilities required for cricket, particularly the capacity for sustained concentration (Sholto *et al*., 2020) [3].

T20 is a fast-paced, highly unpredictable variation of cricket that is played over a fixed number of overs. Performance in the batting, bowling, and fielding departments all have a big influence on the outcome of a match (Moore *et al*., 2012) [4]. There is a chance that the Olympic calendar will include the T20 format. It may be the most important format in the near future. It has frequently been noted that the performance of a single player may make the difference between winning and losing. As stated by Siddiqui and Humphrey, Since T20 cricket is a fast-paced game, many people watch it. Over the past ten years, a great deal of research has been done to examine morphological traits, fitness requirements, physiological demands, movement patterns, performance-indicating factors, and match outcome prediction in cricket. The results have shown that these components vary greatly depending on the type of match (Biswas and Biswas, 2021 and Vickery *et al*., 2018) [5, 6].

The batters' main objective is to score as many runs as they can in the fewest balls without being out of the game. The batter must have a wide variety of strokes since he or she may strike the ball in a 360-degree circle (Surita, 2020) [7]. The player's and team's strike rate determined how aggressive the batting performance metrics were. The batsmen may be dismissed based on their inability to plan and execute a suitable reaction in a very little amount of time in response to a delivery (Lemmer, 2011) [8].

Historically Cricket players never trained themselves as hard as other sportsmen in team-based sports such as Rugby and Soccer and in fact, many were overweight which dispelled any reason to be trained for their sport. This scenario changed when the Australians (Cricket) and New Zealanders (Rugby) demonstrated that, by focusing on physical training, one can improve one's performance. This paved the way for more scientifically based physical training programs before their Cricket and Rugby World Cup wins in 1991 and 1987 respectively.

Further, the increasing demands bestowed on many Cricketers compelled them to be in peak physical condition not only for performance but also for the prevention of injury. International Cricketers are now exposed widely which is reflected by more five-and One Day matches per season, longer seasons, and more frequent touring (Noakes & Durandt, 2000) [2]. For example, during the 1998/1999 Cricket season, the South African Cricket team played eight five-day Test matches, and 17 One- 5 Day International games and were eligible to play in eight four-day and ten one-day provincial (county) Cricket matches - 99 days of playing. In 1970, in contrast, players were asked to play 35 days of Cricket.

Methodology

Design of the Study

The research adopted a survey (cross-sectional) research design, allowing for the comprehensive assessment of physical, physiological, and psychological profiles of male cricket players within a specific timeframe.

Sources of Data

As per the direction of the supervisor and suggestions of the experts, it is projected to collect primary data from the following sources.

- 25 cricket players from the Jammu.
- 25 cricket players from the Kashmir

Primary sources of data 50 cricket players will be selected as a subject for this study to accomplish the objective of the study.

Sampling Method

A random sampling technique (lottery method) was employed to select 50 male cricket players within the age group of 18 to 25 who actively participated in the Inter-College Tournament during the academic year 2023-24 in Jammu and Kashmir.

Selection of Subjects

To achieve this purpose of the study, 50 Cricket players from Jammu and Kashmir were selected as subjects. The research concentrated on male cricket players in the geographic area of Jammu and Kashmir, specifically targeting individuals who satisfy the designated age criteria and have taken part in the Inter-College Tournament.

Table 1: Shows Subjects Distribution

S. No	Subjects	Total no.
1	From Kashmir	25
2	From Jammu	25

Collection of Data

Data collection involved a combination of direct assessments and surveys. Physical assessments will include speed and flexibility tests, physiological data such as resting pulse rate and VO2 max measurements, and psychological assessments for anxiety and aggression levels. Surveys will explore playing ability, contributing to the relationship analysis.

Tools & Techniques

Physical assessments were used for standardized tests for speed (50-yard dash) and flexibility (sit and reach test). Physiological data will be collected using pulse rate monitors and VO2 max testing equipment. Psychological assessments were conducted through established psychometric tools for anxiety and aggression (Aggression scale by Km. Roma Pal and Anxiety by Dr. A.K.P Sinha and Dr. L.N.K Sinha).

Results and Discussion

This chapter discusses the data's analysis and interpretation. The goal of the current study was to determine how certain physiological, psychological, and physical characteristics related to Jammu Kashmir cricket players' playing abilities.

Physical Variables

Table 2 displays the summary of descriptive statistics that were computed based on the chosen physical variables.

Table 2: A clip of descriptive statistics for particular physical data relating to 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

Table 3 presents the results of a statistical analysis of the data on the chosen physical factors with playing ability using Pearson product-moment correlation.

Table 3: Shows the Pearson Product-Moment Correlation Matrix between the male cricket players' playing ability and the chosen physical variables

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 necessary value for the table's "r" at the 0.05 confidence level is 0.195

The aforementioned table clearly shows that the calculated Pearson correlation values are 0.90, 0.92, and 0.20, all of which are higher than the 0.195 table value with df 98 at a .05 level of confidence. Consequently, it was determined that college-level cricket players' playing skill and their speed, explosive power, and shoulder strength were significantly correlated. For cricket players' total playing skill, speed, explosive power, and shoulder strength explained 90%, 92%,

and 20% of the connections, respectively. In order for cricket players to perform, speed, shoulder strength, and explosive force are therefore given the proper weight. Figure 1 shows a visual representation of the playing ability correlation matrix values with the chosen physical factors.

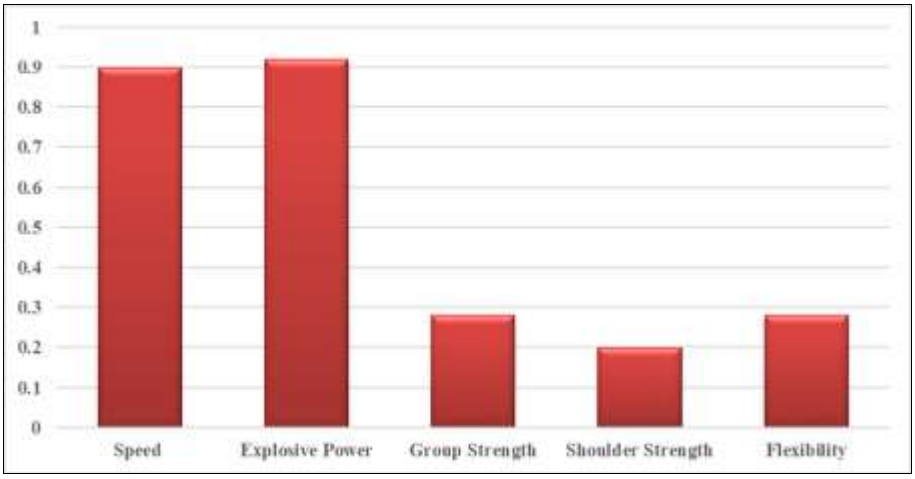

Fig 1: The correlation matrix values of playing ability with the selected physical variables

Physiological Variables

Table 4 displays the summary of descriptive statistics that were computed based on the physiological variables that were chosen.

Table 4: Shows a synopsis of descriptive statistics for particular physiological factors of men playing cricket

Descriptive Statistics	Resting Heart Rate (bpm)	Peak flow rate (LR/mnt)	Breath Holding Time (Sec)	VO_2max (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

A Pearson product-moment correlation was used to statistically analyse the data on the physiological indicators related to playing ability that were chosen. The findings are shown in the table.

Table 5: Shows the Pearson Product Moment Correlation Matrix between the male cricket players' playing ability and the selected physiological variables

Correlation Matrix	Playing Ability	Resting Heart Rate	Peak flow rate	Breath Holding Time	VO_2max	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)
VO_2 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 necessary value for the table's "r" at the 0.05 confidence level is 0.195

The table above clearly shows that, at a.05 level of confidence, the computed Pearson correlation value is 0.25, which is higher than the table value of 0.195 with df 98. Consequently, it was determined that college-level cricket players' resting heart rates and playing skill were significantly correlated. The resting heart rate of cricket players explained 25 percent of the link with their total playing skill. Therefore, it is important for cricket players to display their resting heart rate in order to perform.

Figure 2 shows a visual representation of the correlation matrix values between playing skill and the chosen physiological variables.

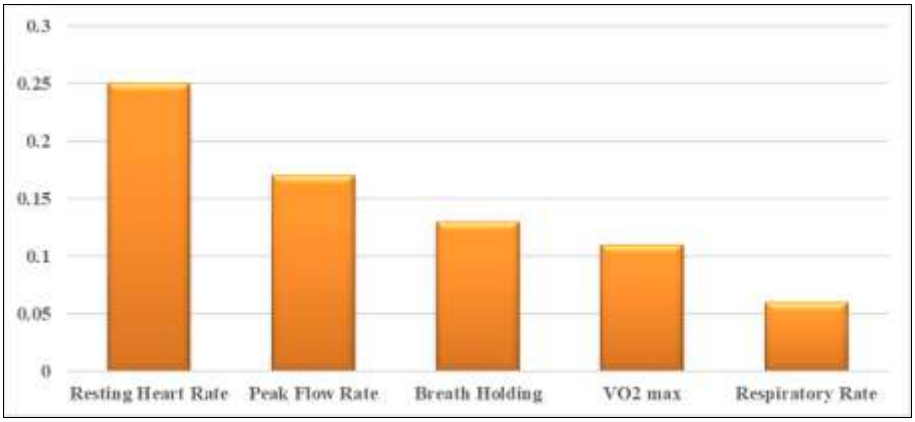

Fig 2: The Correlation Matrix Values of Playing Ability with the Selected Physiological Variables

Psychological Variables

Table 6 displays the summary of descriptive statistics based on the chosen psychological factors.

Table 6: Shows summary of descriptive statistics for a selection of male cricket players' psychological variables

Descriptive Statistics	State Anxiety	Achievement Motivation	Aggression	Self- Concept	Stress
N	50	50	50	50	50
Mean	42.04	25.08	15.84	19.22	24.60
Std. Deviation	6.93	1.70	2.00	1.93	1.81
Minimum	24.0	21.0	11.0	15.0	22.0
Maximum	55.0	28.0	20.0	23.0	30.0

(Scores are represented in points).

Table 7 presents the findings of a statistical analysis of the data on the psychological factors that were selected in connection to playing ability using Pearson product-moment correlation.

Table 7: Shows Pearson Product-Moment Correlation Matrix Between the Men's Cricket Players' Playing Ability and the Selected Psychological Variables

Correlation Matrix	Playing Ability	State Anxiety	Achievement Motivation	Aggression	Self- Concept	Stress
Playing Ability	1	.050	-.004	.232*	.896*	-.164
State Anxiety	.050	1	.121	.077	.044	-.048
Achievement Motivation	-.004	.121	1	.004	.187	-.016
Aggression	.232*	.077	.004	1	.189	-.063
Self-Concept	.896*	.044	.187	.189	1	-.214
Stress	-.164	-.048	-.016	-.063	-.214	1

The necessary value for the table's "r" at the 0.05 confidence level is 0.195

The aforementioned table makes it clear that the calculated Pearson correlation values are 0.23 and 0.896, which are higher than the 0.195 table value with df 98 at the.05 confidence level. Consequently, it was determined that there was a strong correlation between college-level cricket players' self-concept and their capacity to play with aggression. Psychological factors have also demonstrated a noteworthy correlation with cricket players' playing prowess. Therefore, a player's aggressiveness and sense of self-worth are crucial in determining how well they perform in stressful situations.

Figure 3 shows a visual representation of the correlation matrix values between playing skill and the chosen psychological factors.

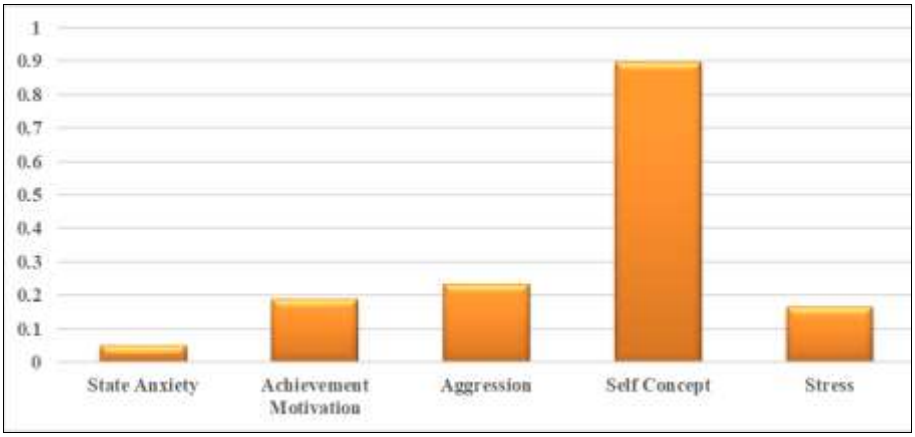

Fig 3: Depicts the correlation matrix values of playing ability with the chosen psychological variables.

Men's Playing Capabilities with Certain Variables

Only when the multiple correlation was high enough to support prediction using the multiple regression equation was the multiple regression equation computed. The independent variables that should be included in the regression equation and their order are then determined by the correlation. Table 8 displays the results of the forward selection method's computation of multiple correlation using the cricket players' data.

Table 8: Shows the multiple correlation coefficient for the male cricket players playing ability predictors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.918	0.843	0.840	0.32525	0.843	257.524	1	48	0.000
2	0.928	0.862	0.856	0.30831	0.019	6.419	1	47	0.015
3	0.935	0.874	0.856	0.29804	0.012	4.293	1	46	0.044
4	0.942	0.888	0.878	0.28346	0.015	5.857	1	45	0.020
a. Predictors: (Constant), Explosive Power									
b. Predictors: (Constant), Explosive Power, Resting Heart Rate									
c. Predictors: (Constant), Explosive Power, Resting Heart Rate, Speed									
d. Predictors: (Constant), Explosive Power, Resting Heart Rate, Speed, Achievement Motivation									
e. Dependent Variable: Playing Ability									

Table 8 reveals that the strongest multiple connection with cricket playing skill is produced by predictors including explosive power, resting heart rate, speed, and achievement motivation, with a multiple correlation value of 0.942. The following is the order in which R square values display the percentage contribution of predictors to playing skill (the dependent variable).

1. Regression model with one predictor Explosive Power explained almost 92% of the variation in playing skill.
2. Using explosive power and resting heart rate as its two variables, the regression model explained almost 93% of the difference in playing ability. Resting heart rate accounts for an extra 1% of the diversity in playing skill.
3. Using explosive power, resting heart rate, and speed as its three predictors, the regression model described approximately 93.5% of the difference in playing ability. Speed accounts for an extra 0.5% of the difference in playing skill.
4. The regression model with four predictors explosive power, resting heart rate, speed, and achievement motivation explained almost 94% of the difference in playing ability. Achievement motivation accounts for an extra 0.5% of the variable in playing skill.

Table 9: Shows the results of the computation of the multiple regression equation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero Order	Partial	Part
1.	(Constant)	-24.236	1.982		-12.229	.000			
	Explosive Power	.516	.032	0.918	16.048	.000	.918	.918	.918
2.	(Constant)	-27.750	2.335		-11.883	.000			
	Explosive Power	.515	.031	0.916	16.889	.000	.918	.927	.916
	Resting Heart Rate	.054	.021	0.137	2.534	.015	.151	.347	.137
3.	(Constant)	-28.869	2.321		-12.437	.000			
	Explosive Power	.341	.089	0.605	3.813	.000	.918	.490	.200
	Resting Heart Rate	.054	.021	0.137	2.609	.012	.151	.359	.137
	Speed	1.664	.803	0.329	2.072	.044	.903	.292	.109
4.	(Constant)	-28.217	2.224		-12.688	.000			
	Explosive Power	.301	.086	0.536	3.484	.001	.918	.461	.174
	Resting Heart Rate	.056	.020	0.143	2.867	.006	.151	.393	.143
	Speed	2.097	.785	0.415	2.673	.010	.903	.370	.133
	Achievement Motivation	-.060	.025	-0.125	-2.420	.020	-.004	-.339	-.121
a. Dependent Variable: Playing Ability									

Regression coefficients with the playing ability of male cricket players for the predicted variables.

The following regression models for cricket players with dependent variables were obtained from Table 9.

1. Regression Equation in obtained scores form = X_C

Where, Xc = Playing Ability
A= Explosive Power
B = Resting Heart Rate
C= Speed
D = Achievement Motivation

2. Regression Equation in standard scores form = Z_C

Where,

Zc = Playing Ability
Z_1 =Explosive Power
Z_2 = Resting Heart Rate
Z_3 =Speed
Z_4 = Achievement Motivation

Explosive power, resting heart rate, speed, and accomplishment motivation are all included in the regression equation used to predict a cricket player's skill. The multiple correlation between the combined effect of these independent factors and playing skill is extremely significant, indicating a high productive validity for the regression equation that was developed. Therefore, it is possible to choose college-level cricket players using this equation.

Conclusion

Within the limitations of the present study, the following conclusions were drawn.

1. There was a significant relationship between the playing ability and speed, explosive power and shoulder strength of college-level men Cricket players.
2. There was a significant relationship between the playing ability with resting heart rate of college-level male Cricket players.
3. There was a significant relationship between the playing ability with aggression and the self-concept of college-level men Cricket players.
4. The regression equation for the prediction of Cricket playing ability among male players includes explosive power, resting heart rate, speed, and achievement Motivation. Regression Equation in obtained scores form = XC XC = 0.301 A + 0.056 B + 2.097 C+ (-.060)D + (-28.22) Where, Xc = Playing Ability A= Explosive Power B = Resting Heart Rate C= Speed D = Achievement Motivation Thus, this above equation may be successfully utilized in selecting interuniversity/ intercollegiate men Cricket players.

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