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Associationship Between Selected Biomechanical Variables and the Performance of Cover Drive Shot

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ORIGINAL ARTICLE

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ASSOCIATIONSHIP BETWEEN SELECTED BIOMECHANICAL VARIABLES AND THE PERFORMANCE OF COVER DRIVE SHOT

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ABSTRACT

Purpose of the study was to find out the significant relationship between cover drive shot with selected biomechanical variables of university level male Indian cricketers. Only ten (10) men University-level cricketers from Lakshmibai National Institute of Physical Education NERC Guwahati Assam India were selected. The performance variable was the cover drive shot, whereas the other biomechanical variables were balance, the center of gravity (CG), angle of the left elbow, angle of the right elbow, angle of the left knee, and angle of the right knee. During collecting data, two-dimensional (2D) videography was performed, and data was finalized using Kinovea software as filming protocols. Pearson coefficient correlation ('r') statistics are used at 0.05 level of significance to analyze a correlation between the variables. The study's findings did not correspond to the hypothesis formulation. Several factors could have influenced the study's outcomes. The number of subjects was significantly lower which affects the means of the variables because number of the subject may play a crucial role here since here, we are correlating means of the two variables at a single time. The current study found that the selected biomechanical variables had no significant correlation with cover drive performance among university level male participants in this study.

Keywords: *Biomechanical, Cover Drive, Cricket, Kinovea, Balance*

INTRODUCTION

In the modern era of sports, the use of technology to analyze sports performance has changed significantly. The study of bodily movements during athletic performance is referred to as biomechanics. A coach can use several biomechanical attributes to comprehend faulty movement in the body when the players are performing activities. Technology is crucial to understanding improper movement in sports. Understanding inappropriate movements in sports demands the use of technology. Suppose the runner's course of running is not straight in 100 meters; he or she won't be able to decrease the time required to travel the distance. Similarly, if the runner makes any incorrect body gestures while running, the runner may not generate rapid motions. Overall, biomechanics teaches us about basic body position and efficient actions to save time and effort. These technical components are addressed by biomechanics, and the team's performance is entirely dependent on each player's skill proficiency. Coaches and scientists are working continuously to improve their athletes' efficiency in performing their skills, so they must have scientific information about these skills to improve their performance. Coaches and scientists must analyze and teach each talent to ensure players perform optimally with the least effort. Sports science is important in analyzing the skill. Tests and measurements are used to determine a player's present state, and anthropometry is used to determine the correct body composition for the appropriate sport.

Cricket performance is heavily reliant on sports science. Cricket is a team sport that requires both external and internal components. It's a game that demands a significant amount of technical knowledge as well as physical components. To execute certain skills, a greater degree of technical ability is needed than physical ability, and the cover drive is one such skill where the judgment of the length and speed of the bowl is crucial. In cricket, batters play many different kinds of shots on the ground to score runs. The cover drive is a shot that is both attractive to play and to watch. In the cover drive, the player strikes a grounded shot towards the covers with a straight bat while maintaining proper posture and body balance. Perhaps the most technical and elegant cricket shot done by a batter is the cover drive. This shot, however, is too severe and systematic to be biomechanically studied.

Athletes and coaches are continuously experimenting with different techniques to overcome the problem of hitting the ball with exact timing during the cover drive. This study attempted to correlate biomechanical variables with cover drive performance using 2D video analysis. Therefore, the researcher was inspired to look into the relationship between cover drive performance and biomechanical factors in male Indian crickets.

RESEARCH METHODOLOGY

Research Design

Ten university-level right-handed batsmen [n = 10] from the Lakshmibai National Institute of Physical Education, the Ministry of Youth Affairs and Sports, and the Government of India were purposefully selected for the study. The subjects varied in age from 17 to 28. The entire participant had university-level participation in the cricket.

Selection of Variables:

- Performance Variable;
  - Cover Drive
- Biomechanical Variable;
  - Balance
  - Centre of Gravity (CG)
  - Angle of the Left Elbow
  - Angle of the Right Elbow
  - Angle of the Left Knee
  - Angle of the Right Knee

Criterion Measures

Table-01

Name of Variables	Measuring unit
Cover drive shot	Nominal Scale
Flamingo Balance Test	In second
Centre of Gravity	Centimeter
Angle of the left elbow,	Degree or Radian
Angle of the right elbow,	Degree or Radian
Angle of the left knee,	Degree or Radian
Angle of the right knee,	Degree or Radian

Criteria Measure:

Cover Drive Performance: For this, three scorers were appointed to give marks out of 10 based on performance. Each batsman was given three trials, and the average of the three scorers was selected as the final score.

- Balance: It was measured using the flamingo balance test.
- Centre of Gravity: It was measured using Kinovea software using video protocols.

- Angle of the Left Elbow, Angle of the Right Elbow, Angle of the Left Knee, and Angle of the Right Knee: These four variables were measured by videotaping the shot and then analyzing it with Kinovea software.

Research Respondents

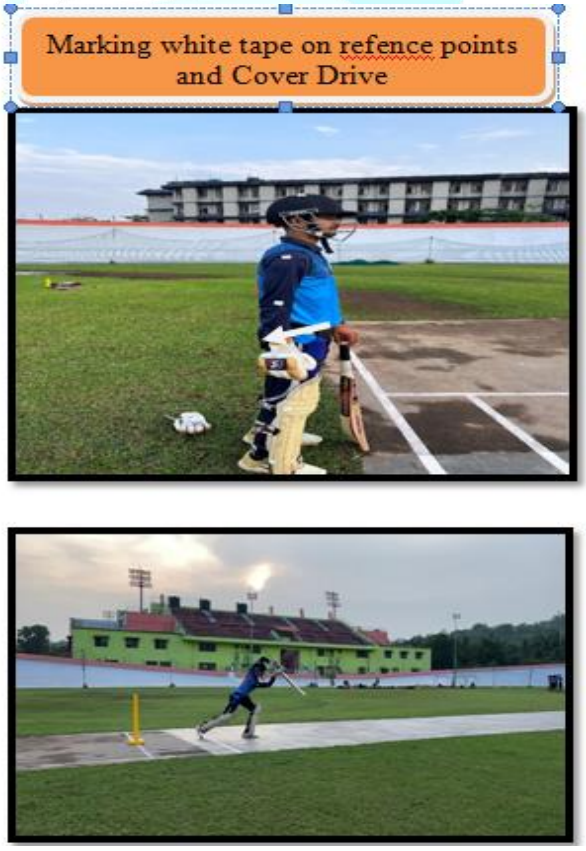
The selected subjects [N = 10] were informed in advance about the day and time of the test for the purposes of the study. The researcher gathered the subjects on the day of the test and provided them with all of the instructions regarding the technique and administration of the test. Subjects were given an appropriate warm-up before the test. Three jury members were appointed to award subjective grades based on the performance of the cricketers on cover drive shots. Three trials were given to each batsman, and the average of the three scores was recorded as the final score. The test was held in the evening at the LNIPE Cricket Field.

Research Instrument

A comprehensive warm-up was carried out before the test. Batsman also did some shadow practise for the cover drive shot. The experiment was conducted in real-time shooting conditions. Proper videography was employed to keep data collection errors to a minimum. White tape was placed on the axes of body components to calculate the required angles.

Filming protocol and analysis:

The video was taken by a professional photographer who is considered an expert in this area. The subject was filmed only in the sagittal plane. After the loading of the video, images were shot by pausing the video at the desired time using the Kinovea software. The camera was set at 0.85 metres above ground level, and the horizontal distance of the camera was 7 metres. The two-meter reference line was drawn for calibration. Based on the videography obtained by the researcher, the researcher improvised the stick figures in which data about various kinematic variables were taken. The stick figures were improvised by using the joint point method with the help of Kinovea software.



Camera Specification:

- iPhone 13,
- 12-megapixel camera,
- f/1.6 aperture,
- 26 mm focal length,

- 13mm f/2.4 super wide angle lenses, 30 fps.

- Pink line –Distance between camera and batsman 07 mtrs.
- Blue line- C.G height
- White line- 2mtrs reference line for calibration

Data Analysis

The following statistics were used by the researcher to determine the association of chosen biomechanical variables with the performance of the cover drive: Statistics that are descriptive and the correlation coefficient 'r' were used, and the level of significance was set at 0.05. The data were computed using SPSS version 22.

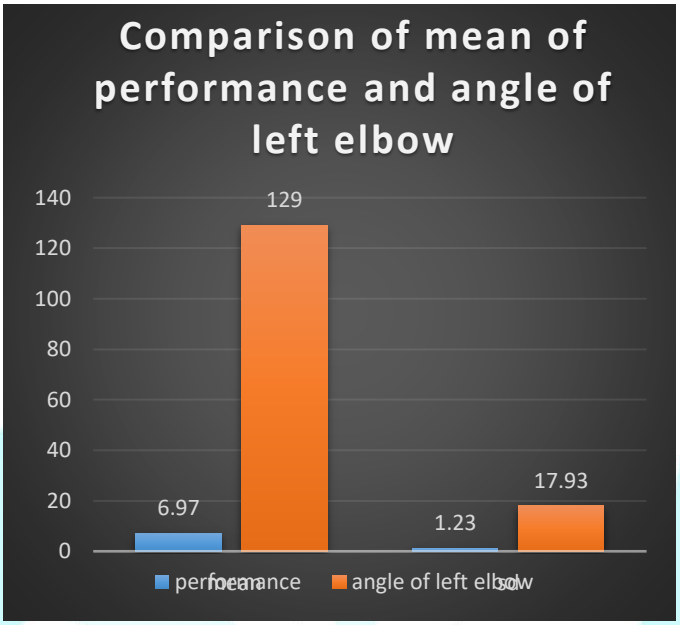
RESEARCH FINDINGS AND DISCUSSION

Table- 01:- Presentation of descriptive & 'r' statistics to find out relationship between angle of left elbow and cover drive performance

Variable	Mean	SD	Standard error of mean	'r'
Performance	6.97	1.23	.39	-.111
Angle of Left Elbow	129	17.93	5.67	

*At 0.05 level of significance.

Graph 01:- Presentation of mean and standard deviation graphs to see the relationship between angle of left elbow and cover drive performance.



Photograph 01: Angle of left elbow:

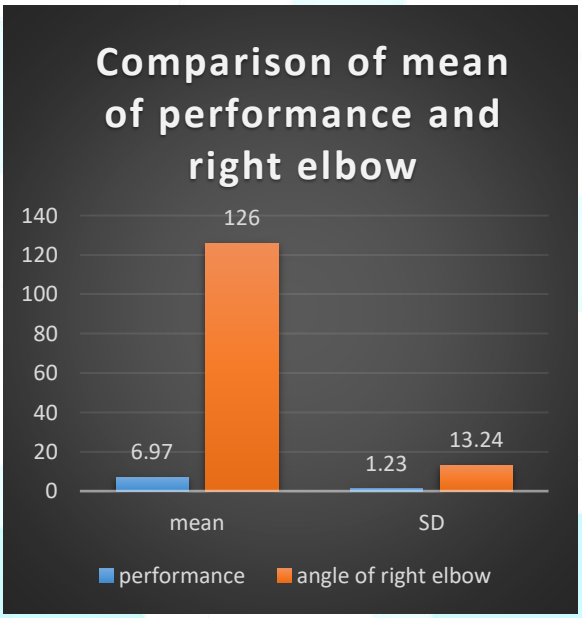
From Table 1, it was found that there was no significant relationship between cover drive performance and angle of left elbow because (cal. r = -.111) is lower than that tabulated value (r =.576) at the 0.05 level of significance. From graph 1, it was also found that there was no relative saturation of mean and standard deviation data of cover drive performance and angle of left elbow.

Table 02: Presentation of descriptive and 'r' statistics to find out the relationship between cover drive performance and angle of right elbow.

Variable	Mean	SD	Standard Error of mean	'r'
Performance	6.97	1.23	.39	-.194
Angle of right Elbow	126	13.24	4.19	

*At 0.05 level of significance.

Graph 02: Presentation of mean and standard deviation graphs to see the relationship between cover drive performance and angle of right elbow.



Photograph 02: Angle of right elbow

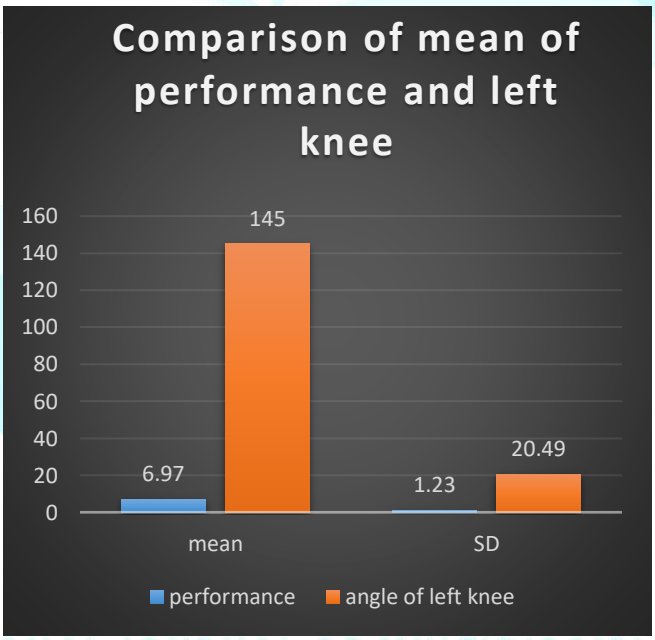
From Table 02, it was found that there was no significant relationship between cover drive performance and angle of right elbow because the calculated value (r = -.194) is lower than the tabulated value (r =.576) at the 0.05 level of significance. From graph 02, it was also found that there was no relative saturation of the mean and standard deviation data of cover drive performance and angle of right elbow.

Table 03: Presentation of descriptive and 'r' statistics to find out the relationship between cover drive performance and angle of left knee

Variable	Mean	SD	Standard error of mean	'r'
Performance	6.97	1.23	.39	-.642
Angle of left knee	145	20.49	6.48	

* At 0.05 level of significance.

Graph 03: Presentation of mean and standard deviation graphs to see the relationship between cover drive performance and angle of left knee.



Photograph 03: Angle of left knee

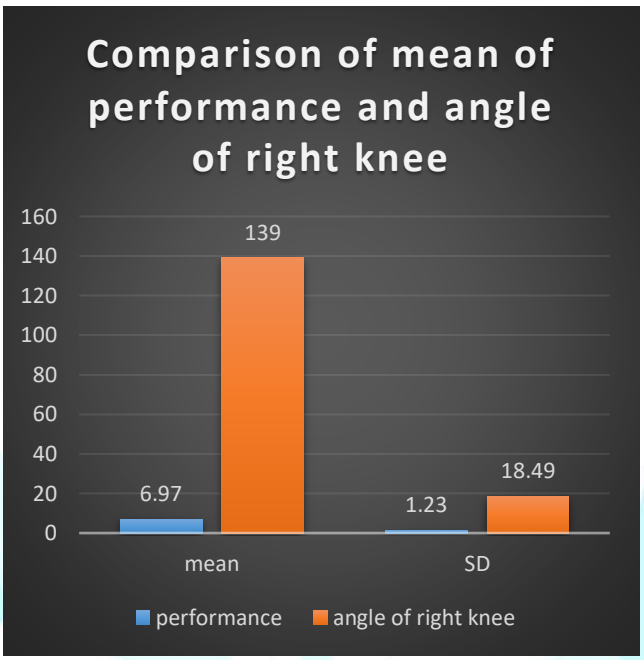
From Table 03, it was found that there was no significant relationship between cover drive performance and angle of left knee because the calculated value (r = -.642) is lower than the tabulated value (r =.576) at the 0.05 level of significance. From graph 03, it was also found that there was no relative saturation of the mean and standard deviation data of cover drive performance and angle of left knee.

Table 04: Presentation of descriptive and 'r' statistics to find out the relationship between cover drive performance and angle of right knee.

Variable	Mean	SD	Standard error of mean	'r'
Performance	6.97	1.23	.39	-.070
Angle of right knee	139	18.49	5.85	

* At 0.05 level of significance.

Graph 04: Presentation of mean and standard deviation graphs to see the relationship between cover drive performance and angle of left knee



Photograph 04: Angle of right knee

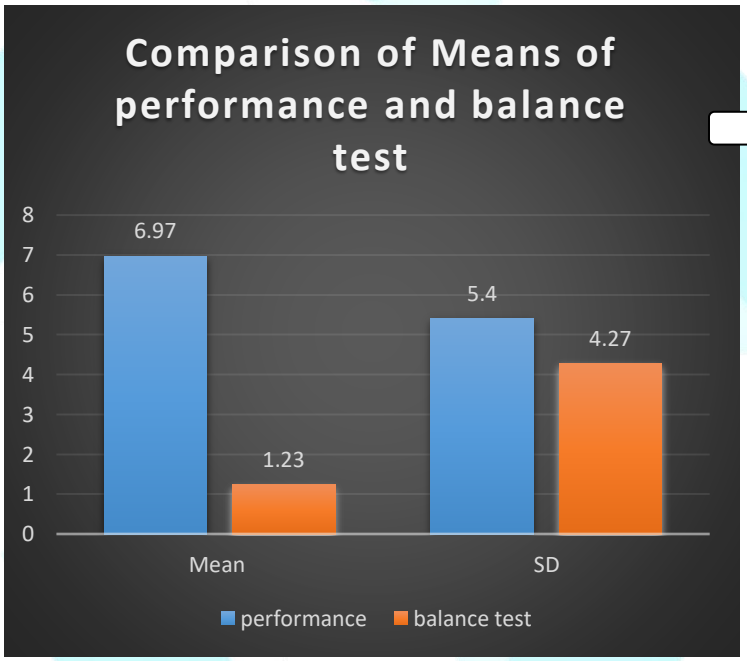
From Table 04, it was found that there was no significant relationship between cover drive performance and angle of right knee because the calculated value (r = -.070) is lower than the tabulated value (r =.576) at the 0.05 level of significance. From graph 4, it was also found that there was no relative saturation of the mean and standard deviation data of cover drive performance and angle of right knee.

Table 05: Presentation of descriptive and 'r' statistics to find out the relationship between cover drive performance and balance test

*At 0.05 level of significance

Variable	Mean	SD	Standard error of mean	'r'
Performance	6.97	1.23	.39	-.392
Balance test	5.40	4.27	1.35	

Graph 05: presentation of mean and standard deviation graph to see the relationship between cover drive performance and balance test.



Photograph: 05 Flamingo Balance Test

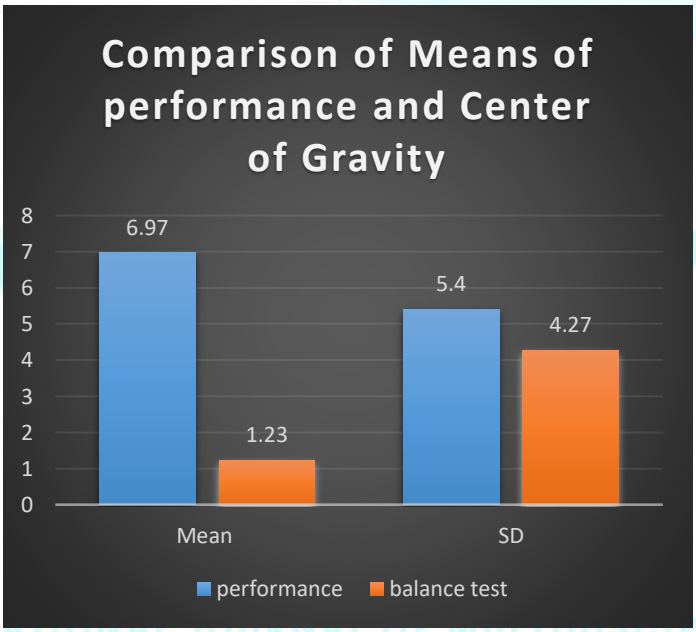
From Table 5, it was found that there was no significant relationship between cover drive performance and balance test because the calculated value (r = -.392) is lower than the tabulated value (r =.576) at the 0.05 level of significance. From graph 05, it was also found that there was no relative saturation of mean and standard deviation data of cover drive performance and angle of right knee.

Table 06: Presentation of descriptive and 'r' statistics to find out the relationship between cover drive performance and height of centre of gravity.

Variable	Mean	SD	Standard error of Mean	'r'
Performance	6.97	1.23	.39	-.729
Height of CG	70.60	6.33	2.00	

*At 0.05 level of significance

Graph 06: Presentation of mean and standard deviation graphs to see the relationship between cover drive performance and height of center of gravity



Photograph 06: Height of Centre of Gravity

From Table 06, it was found that there was no significant relationship between cover drive performance and height of CG because the calculated value (r = -.729) is lower than the tabulated value (r =.576) at the 0.05 level of significance. From graph 06, it was also found that there was no relative saturation of the mean and standard deviation data of cover drive performance and height.

During the planning of this study, the researcher assumed that those selected biomechanical variables would show some significant relationship with the performance of cover drives in cricket, and that's why research had made a similar kind of hypothesis, but after statistical calculation of the data, it was found that "there was no significant relationship between biomechanical variables and the performance of cover drives among batters". The result of the study was supported by the result of a research paper done by Pratibha Dhake (2017), in which she found a relationship between selected biomechanical variables and the performance of the cricket player in cover drive shots among 12 male university-level cricket players and also found no relationship among those variables. In 2017, Kumar also did a similar type of study to see the relationship between kinematic variables and the performance of the cover drive, but not a single variable showed a significant relationship with the performance of the cover drive. In 2022, Mondal and Ghosh also did a study to see the relationship between biomechanical variables and the performance of on-drive in cricket. The study showed an insignificant relationship with the overall performance of subjects in forward driving. In 2021, Narvariya and Singh conducted a study to see the relationship between Kinematic variables and the method of the pull shot in cricket. He selected five male cricketers at the university level. In it, the angle of the left shoulder and the angle of the left elbow show a significant relationship with the overall performance. The result of the study was not as per the expectation or formulation of the hypothesis. There may have been several factors that influenced the result of the study. The number of subjects was less, which affected the means of the variables. When it comes to other factors, the subject's number can be very important. We are the correlating mean of the two variables at a single time. If we talk about the mean of performance, which is out of 10, and the left elbow, which is more than 100, a small number of subjects may have some unnoticeable impact on the correlation. We were doing this study in 2D, which is why some variables had to be measured for

the estimation of their parameters. If we had a 3D view of the shot, there may be a chance of a change in some values of variables, which may impact the result. The performance is correlated with a single variable, like the angle of the left elbow. In it, we correlate the mean of both variables, but some other factors like the player's height, weight, reflexes, strength, and coordination may have a great impact on the performance of the cover drive shot.

CONCLUSION

There was no significant relationship between balance and cover drive performance in cricket in the study. There was no significant role of Centre of the gravity (CG) and cover drive performance in cricket in the study. There was no significant association between the angle of the left elbow & angle of the right elbow with cover drive performance in cricket in the study. There was no significant association between the angle of the left knee & angle of the right knee and cover drive performance in cricket in the study.

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