

Relationship of selected Anthropometric and Biomechanical Variables with the technique on back foot punch (Back foot on drive & Back foot off drive) in cricket

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Abstract: The purpose of this study was to investigate the relationship of selected anthropometric and biomechanical variables with the technique on back foot punch (back foot on & off drive) in cricket. The subjects of this study were 10 male university level cricket players of ITM university Gwalior, Madhya Pradesh, India. Sequential photographic technique was employed in order to register the technique of the subjects in back foot punch. A motor driven Nikon Model was used and the subjects were photographed in sagittal plane. Segmentation method was employed in order to assess the center of gravity of the body during moment stance and contact. The best technique in back foot punch was used as the criterion measure for this study. The data was analyzed by using Pearson's Product Moment Co-relation to ascertain the relationship of the selected linear kinematic and anthropometric variables with the technique of back foot punch of the subjects, selected anthropometric variables were height sitting height, leg length and arm length.

Keywords: Anthropometric, variables, Back foot punch, Angular kinematic, Linear kinematic.

INTRODUCTION

In order to analyze the technique of sports and games, photography is probably the most popular method.

Although this is not a recent development, photography was formally limited to the filming of few sports only. It is now being applied to many sports at an increasing rate. Thus, as athletics continues its tremendous growth, knowledge of photography continues to take an increased importance. Looking at the present scenario in the world of sports, Cricket has become one of the most popular game in the world and of all major games in India. It is the only one that has been jealously preserved by all those who play or support it. The back foot punch skill in the game of cricket is played to punish the ball at 6 critical a ball which bounced short of a good length, usually just outside the line of stumps in such a way as to prevent a batsman being dismissed. In a study on cinematographically analysis of two selected baseball swing, it was concluded that the extending of front leg and lower arm at the instant of impact seemed to increase hitting with power. Proper coordination apparently summated the available power that seems to produce a maximum effort. A lack of coordination and timing of the wrist snap led to a loss in power. Poon analyzed cinematographically the arm action on basketball one hand jump shots by six varsity basketball players who were filmed with a 16mm camera at 24 frames/ sec. Arm angles were measured at 6 critical positions in the complex area of the shot as a basis for recommending arm movements for executing the shot properly.

Objective of Study:

The purpose of the study was to measure the relationship of selected anthropometric and bio-mechanical variables with the technique of technique in back foot punch in cricket.

Methodology:

In this study ten male students of ITM University Cricket team, who were well skilled and trained at, ITM university Gwalior were selected as subjects for the study. Majority of them had played in Vizzy Trophy Tournament in the year 2018-19 held at ITM University Gwalior as well as in West Zone Intervarsity Cricket Tournament held at Gwalior MP. The age of the subjects ranged between 18 to 23 years.

The criterion measure chosen for testing the hypothesis of the present study was the technique of back foot punch in batting. (Reliability of Data) To obtain reliable measurements, standard and calibrated equipment like camera, stadiometer, weighing machine, steel tape, etc. were used. In order to establish the reliability of anthropometric measurements which were taken on two consecutive days, test retest co-efficient of correlation were calculated. The results had shown high degree of reliability.

Procedure for collection of Data:

On the basis of the three judges evaluation the technique of the subjects on back foot punch in batting was collected. Five points scale were used. For each batsman the average of three judges were considered as the final point.

Filming Protocol:

For the biomechanical analysis of front foot punch in batting ,sequential photography technique was employed. The camera used for this purpose was a standard Nikon Model DSLR (with motor drive in a controlled condition the individual photographic sequence was taken. The camera was placed from the subject at a distance of 11.60 meters and was fixed at 1.37 meters height. The frequency of the camera was 6 frames / second.

Angular Kinematics:

For the study two moments were selected for analysis i.e. Stance and Contact point. The subjects were given three trials to perform the technique and the best trial was used for the analysis. On the basis of the sequence photograph obtained, the scholar developed stick figures from which various angular measurement were taken. The stick figures were developed by using joint point method in which body projection at the joint facing the camera were angled at ankle joint facing the camera were considered. Selected angular kinematic variables When angle at ankle joints (left and right). knee joints (left and right). hip joints (left and right), shoulder joints (left and right) right), elbow joints (left and right), wrist joints (left and right). linear kinematic variables were, the height of center of gravity at moments stance and contact points.

Linear Kinematics:

The center of: gravity of each subject both at stance and contact point was located by using segmentation method suggested by Hay.

Anthropometric Variables:

For the purpose of the study Height, Leg Length, Sitting Height and Am Length were used as anthropometric variables. Measuring procedure of these anthropometric variables were done as described by Carter and Diego

Analysis of Data

The relationship of selected of anthropometric and biomechanical variables with the technique of cricket playing was calculated by using Pearson's Product Moment Correlation. For testing of hypothesis the level of significance was set at 0.05.

Findings

Table 1 MEANS AND COEFFICEINT OF CORRELATION OF SELECTED ANGUL KINEMATICS VARIABLES WITH THE TECHNIQUE OF BACK FOOT PUNCH

S.no	Variables	Stance Mean (Degrees)	Stance (Degrees)	Contact Mean (Degrees)	Contact (Degrees)
1	Angle of Ankle Joint (Front leg)	110.8	-0.54	136.4	0.17
2	Angle of Knee Joint (Front Leg)	148.2	0.50	172.2	0.08
3	Angle of Hip Joint (Left)	48.2	0.19	67.2	-0.83
4	Angle of Ankle Joint (Rear Leg)	107.2	-0.72	113.0	-0.27
5	Angle of Knee Joint (Rear Leg)	159.2	0.01	183.8	0.35
6	Angle of Hip Joint (Right)	56.6	-0.65	80.2	-0.35
7	Angle of shoulder joint (Right)	15.6	-0.61	24.2	-0.87
8	Angle of Elbow Joint (Right)	40.6	0.66	30.0	-0.07
9	Angle of Wrist Joint (Right)	22.8	-0.26	24.4	-0.58
10	Angle of shoulder joint (left)	25.4	-0.55	141.2	0.65
11	Angle of Elbow Joint (Left)	45.8	0.54	86.4	-0.67
12	Angle of Wrist Joint (left)	18.0	0.58	26.8	0.22

Significant at 0.05 level. $r=0.87$

26.8 0.22

As seen in table 1, none of the selected angular kinematic variables elected angular at moment stance have significant relationship with the technique of the subjects. However, at moment contact (execution) the angle of right shoulder joint has shown significant negative relationship with the technique of the subjects

Table 2
MEANS AND COEFFICIENT OF CORRELATION OF SELECTED LINEAR KINEMATIC VARIABLES WITH THE TECHNIQUE OF BACK FOOT PUNCH

Variables	Stance Mean (Degrees)	Stance (Degrees)	Contact Mean (Degrees)	Contact (Degrees)
Height of CG	93.3	0.94	102.8	0.96

"Significant at 0.05 level. -0.87

As shown in table 2, the height of center of gravity at moments stance and a contact point (Execution) has significant relationship with the technique of the subjects in back foot off drive.

Table 3
MEANS AND COEFFICIENT OF CORRELATION OF SELECTED ANTHROPOMETRIC VARIABLES WITH THE TECHNIQUE OF BACK FOOT PUNCH

S. No.	Variables	Mean (cm)	'r' (cm)
1	Height	173.6	0.88
2	Sitting Height	88.4	0.38
3	Leg length	97.2	0.18
4	Arm length	78.2	0.88

Significant at 0.05 level. r-0.87

As shown in table 3, the height and arm length have a significant relationship with the technique of subjects in back foot punch, while leg length and sitting height has not exhibited significant relationship with the technique of back foot punch.

Conclusion

Since the results have shown significant relationship of some of the selected biomechanical and anthropometric variables to the technique of players in back foot punch, the null hypothesis is rejected, however in case of other variables the hypothesis is accepted. In angular kinematics variables none of the of co-efficient of correlation at moment stance was found significant but this trend does not mean that the angles at different joints at selected moments do no play any important role while executing back foot punch. However, at the moment execution, right shoulder joint had shown a significant relationship with technique of subjects in back foot punch. The relationship of linear kinematic variable i.e. the height of C.G. at moment stance and execution with the technique of the subjects was found significant. It proved that if the height of C.G. can be increased, the technique of back foot punch may improve further. In case of selected anthropometric variables, height and arm length has revealed a significant relationship with the technique of the subjects in back foot punch, while the coefficient of correlation of leg length and sitting height showed a close but insignificant relationship with the technique in back foot punch. It was well known that the height and arm length play an important role in back foot punch. Because after pitching the ball, the ball reference a certain height and a player having good height can play the ball easily from the region of waist and trunk. If the player possesses less height, ball may come to his chest level. Then the player force to play pull or hook shot instead of back foot punch. Arm length help the player to teach a greater radius of rotation creates greater momentum at the time of back lift to execution. As a whole, the variables which have shown higher relationship with the technique must have contributed towards the technique of back foot punch. Along with these variables, other motor components also might have contributed to the performance. In case of other variables which have shown low values of co-efficient of correlation does not means, that these variables were not contributing to the performance of back punch.

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