

Relationship of Selected Kinematic Variables to The Technique of Pull Shot in Cricket

Pushpendra Narvariya¹ and Prof. Joseph Singh²

¹Ph.D. Scholar, Department of Sports Biomechanics, LNIPE, Gwalior, INDIA.

²HOD, Department of Sports Biomechanics, LNIPE, Gwalior, INDIA.

¹Corresponding Author: pushpendranarvariya@gmail.com

ABSTRACT

The current study aims to analyze the relationship of selected kinematic variables to the technique of pull shot in cricket. For the purpose of the study the researcher purposively selected five male inter-university cricket players from LNIPE, Gwalior of 18 to 24 years., the technique of pull shot in batting performance of each selected subjects was recorded on the basis of certain criteria (point system). It was divided into 2 components; 1. placement of feet and 2. execution (contact) each consist of maximum 10 points. The angles at selected joints were recorded to the nearest degree. The c.g. was measured nearest to the 1/10th of the centimetre. On the basis of sequence photographs obtained from the videography, the scholar developed stick figures from which selected kinematic variables was calculated. The center of gravity of whole body was determined by kinovea software. To find the the relationship of selected kinematic variables to the technique of pull shot in cricket pearson product moment correlation coefficient was used by means of spss software. It was found that, in case of moment execution angle at left shoulder joint and angle at left elbow joint showed significant relationship with performance.

Keywords- Kinematic Variables, Pull shot, Cricket.

I. INTRODUCTION

Cricket is a major world sport in terms of participants, spectators and media. It is a bat and ball game, which includes a variety of skills. Of all cricket's skills, batting is the most glamorous. At the highest level of the game, scoring runs and not being dismissed will bring fame and glory of a kind that is possibly unique in the world of sports. In the 1930's, the cricketing world regarded Sir Donald Bradman with the kind of awe reserved for monarchs and film stars; and Brian Lara's 375 against England in 1994 earned him similar status. At the summit of batting achievement lies immense prestige. Playing the pull shot well from an early age will give the young batter a big advantage. Most young bowlers tend to drift down the leg side and bowl short, inviting the pull shot. At higher levels of the game, playing the pull shot is more often than not dictated by a field setting that favours the off side. The batsman then looks at ways of manipulating the ball into areas where runs are more freely available. Playing the pull is

probably the most natural shot in the game. You swing as though chopping down a tree, smacking a blanket or a rug hanging on a washing line. In fact, many coaches, when teaching a youngster to play for the first time, start by teaching the pull, which always stimulates young batsmen. It's fun to hit the ball hard! When to play the shot, this shot is played to a short ball (commonly called a 'long-hop') delivered by a medium-pacer or slow bowler, going down the leg side at waist height. The shot may also be played to a slow short ball pitching outside the off stump. This is a bad delivery and the batsman should take full advantage by putting it away to the boundary. It is an ideal shot against the off-spinner who pitches the ball short because you are hitting with the spin and by rolling the wrists keeping it down. It should be played only off those balls which are very short in length (long hop) in line with the wicket or just outside the off-stump.) Bear in mind the faster the pitch the shorter the ball needs to be. The ball is played in an area between mid-wicket and square leg. The back-lift should be high so that the bat can be swung down onto the ball. At the top of the back-lift the bottom hand assumes control. Move the bat towards gully so that it can be brought down through the shortest possible arc. The front elbow remains well up and away from the body. Kinematic variables are involved in the description of the movement, independent of forces that cause that movement. They include linear and angular displacements, velocities, and accelerations. The displacement data are taken from any anatomical landmark: center of gravity of body segments, center of rotation of joints, extremes of limb segments, or key anatomical prominences.

II. METHODS

Five male inter-university cricket players of 18 to 24 years were selected as subjects for the present study. The following variables of pull shot technique were selected for the purpose of this study: -

A. Linear kinematic variables:

1. Height of centre of gravity at selected moments.
 - i) Placement of the foot
 - ii) Execution (contact)

B. Angular kinematic variables- angles at:

1. Ankle joint
2. Knee joint

3. Hip joint
4. Shoulder joint
5. Elbow joint

For the purpose of present study, the technique of pull shot in batting performance of each selected subjects was recorded on the basis of certain criteria (point system). It was divided into 2 components; 1. placement of feet and 2. execution (contact) each consist of maximum 10 points. The angles at selected joints were recorded to the nearest degree. The C.G. was measured nearest to the 1/10th of the centimetre.

Evaluating criteria of technique of sweep

- i) The performance was recorded in 1/10th of point.
- ii) The angle at selected joint was recorded in nearest degree.
- iii) Time taken in complete skill or movement was recorded in second.
- iv) Distance, displacement and height of Center of gravity were measured in meter.
- v) The technique of the subjects, filming protocol and analysis obtained are described as under:

Technique of the subjects

Technique of the subjects on pull shot in batting was collected on the basis of the judge evaluation. The averages of three judges on the selected trial were considered as the final points obtained by each batsman.

Filming protocol

CANON-70D with the frequency of 30 frames per second was placed on the sagittal plane. The distance of the camera from the subject was 4.30 meters away and the height of the lens was 1.13 meters from the ground. Only two moments was selected for the analysis i.e. placement of the foot and execution. On the basis of sequence photographs obtained from the videography,

the scholar developed stick figures from which selected biomechanical variables was calculated. The stick figures will be developed by using joint point method. The subjects performed the technique three times and the best trail was used for the analysis. The center of gravity of each subject, at two moments (i) Placement of the Foot and (ii) execution will be located by using kinovea software.

Procedure for location of center of gravity

After video recording, the stick figures of each moment i.e. placement of feet and execution, were converted into photographs & recorded on transparency by the joint point method for all selected subjects. The center of gravity of whole body was determined by kinovea software. The angle of various joints was measured by kinovea software from photograph.

Statistical procedure

The relationship of selected kinematic variables to the technique of pull shot in cricket were obtained by employing the Pearson’s product moment correlation method and for testing the hypothesis the level of significance was set at 0.05.

III. RESULTS

The statistical analysis of the data, collected on five cricket players and the results of the study have been presented in this chapter. Pearson’s product moment correlation was used to find out the relationship of selected kinematic variables with the technique of the subjects in pull shot. The level of significance was set at 0.05.

Table 1: Mean and Standard Deviation of Angular Kinematic Variables at Moment Placement of Feet in Technique of Pull Shot

KINEMATIC VARIABLES	MEAN (In degrees)	STD. DEVIATION
Right ankle joint	120.20	20.73
Left ankle joint	114.00	10.84
Right knee joint	144.20	8.98
Left knee joint	147.40	7.44
Right hip joint	169.40	5.22
Left hip joint	132.60	13.67
Right Shoulder joint	42.40	9.07
Left Shoulder joint	11.80	11.95
Right Elbow joint	48.20	26.81
Left Elbow joint	94.40	13.96

Table 2: Mean and Standard Deviation of Linear Kinematic Variable at Moment Placement of Feet in Technique of Pull Shot

KINEMATIC VARIABLE	MEAN (In cm)	STD. DEVIATION
Center of gravity	.86	.04

Table 3: Mean and Standard Deviation of Angular Kinematic Variable at Moment Execution in Technique of Pull Shot

KINEMATIC VARIABLES	MEAN (In degrees)	STD. DEVIATION
Right ankle joint	109.00	19.18
Left ankle joint	133.00	19.95
Right Knee joint	143.00	6.44
Left Knee joint	161.80	16.63
Right Hip joint	171.40	8.59
Left Hip joint	164.40	13.09
Right Shoulder joint	68.20	9.50
Left Shoulder joint	79.80	18.36
Right Elbow joint	126.80	15.79
Left Elbow joint	167.60	16.06

Table 4: Mean and Standard Deviation of Linear Kinematic Variables at Execution in Technique of Pull Shot

KINEMATIC VARIABLES	MEAN (In cm)	STD. DEVIATION
Center of gravity	.95	.05

Table 5: Relationship of Selected Angular Kinematics Variable at Moment Placement of Feet to The Technique of Pull Shot

S.NO	VARIABLES CORRELATED	COEFFICIENT OF CORRELATION (r)
1	Angle at right ankle joint	-.815
2	Angle at left ankle joint	.225
3	Angle at right knee joint	-.692
4	Angle at left knee joint	-.136
5	Angle at right hip joint	.237
6	Angle at left hip joint	.105
7	Angle at right shoulder joint	-.741

8	Angle at left shoulder joint	.544
9	Angle at right elbow joint	-.268
10	Angle at left elbow joint	-.588

Table 6: Relationship of Selected Angular Kinematic Variables at Moment Execution to The Technique of Pull Shot

S.NO	VARIABLES CORRELATED	COEFFICIENT OF CORRELATION (r)
1	Angle at right ankle joint	-.462
2	Angle at left ankle joint	.754
3	Angle at right knee joint	.223
4	Angle at left knee joint	.865
5	Angle at right hip joint	-.568
6	Angle at left hip joint	.769
7	Angle at right shoulder joint	-.832
8	Angle at left shoulder joint	-.893*
9	Angle at right elbow joint	.846
10	Angle at left elbow joint	.976*

Table 7: Relationship of Linear Kinematic Variables to The Technique of Pull Shot

S. NO	VARIABLES CORRELATED	COEFFICIENT OF CORRELATION (r)
1	Height of C.G. at the moment placement of the foot	-.854
2	Height of C.G. at the moment execution	-.606

IV. DISCUSSION

In case of selected kinematic variables, none of the angular kinematic variables has exhibited significant relationship to the technique of subjects in pull shot at moment placement of feet. In case of moment execution angle at left shoulder joint and angle at left elbow joint showed significant relationship with performance. Angle at left shoulder joint showed negative correlation with performance it means that if angle at left shoulder joint increases than the performance of pull shot decreases and if angle at left shoulder joint decreases than the performance of pull shot increases. Angle at left elbow joint showed positive correlation with performance of pull shot it means that if angle at left elbow joint increases than the performance of pull shot increases and if angle at left elbow joint decreases than the performance of pull shot decreases.

The relationship of selected linear kinematic variable (height of centre of gravity at selected moments) to the technique of the subjects selected moments showed insignificant relationship. As in the study the research scholar was only confined to the

relationship of height of centre of gravity at selected moments with the Technique of the subjects pull shot but significant relationship may be obtained by studying the path or displacement of centre of gravity at selected moments. A significant result may also be obtained by increasing the sample size or by using the sophisticated equipment's. Some other causes of insignificant result of selected kinematic variables at moment of placement of feet in pull shot may be due to the different patterns adopted by the batsmen during judgment of ball in technique of pull shot. Further Arm moment is not purely in sagittal plane due to which, measured arm angle through 2D analysis might not be accurate.

Majority of the kinematic variables follow a non-linear relationship with performance which could have affected the findings. It may also be due to the low level of performance of athlete, low sample size and use of different quality techniques by the athlete during test. Similar kind of study is conducted by many other researchers and found insignificant relationship, bagchi (2014), singh (2012), kumar (2014).

On the whole, the low value of coefficient of correlation shown by the variables does not mean that

these variables are not contributing to the technique of subjects in pull shot. They do contribute but the insignificant value of coefficient of correlation of these variables with the technique may be due to small sample size and non-availability of sophisticated equipment's. Since, the results of selected kinematic variables to the technique of subjects in pull shot and showed insignificant relationship.

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