

## Biomechanical Analysis of Throwing Technique in Cricket

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DOI: <https://doi.org/10.55968/ijems.v12i01.244>

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This study focuses on synthesizing and analysing the biomechanical research which has been carried out on over-head throwing in men's cricket. Specifically, it relates to those elements of the throwing technique which contribute towards significance effect on overhead throwing. Total Two male cricket players were selected Indian male cricket players who had represented at First-class cricket level as a sample on the basis of performance in preceding competition. The age of both the subjects was ranged above 27 years. The selected kinematical variables were Horizontal velocity of Elbow joint, Vertical velocity of Elbow joint at the time of over-head throwing technique from 30 yard circle and performance of male cricket players. The Kinematic Analysis of Throwing Technique mean, standard deviation and Karl Pearson's product moment coefficient correlation were used with the help of statistical package of SPSS. The level of significance was set at 0.05. The outcome of the study shows that significant relationship with performance (.458, .580) of over-head throwing technique in both variables.

**Keywords:** Throwing, Biomechanics, Horizontal Velocity, Vertical, Elbow Joint, 30yard Circle

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Kayjeet Singh, Research Scholar, Department of Physical Education, Punjabi University, Patiala, Punjab, India. Email: <a href="mailto:kayjeetsingh0010@gmail.com">kayjeetsingh0010@gmail.com</a>	Kayjeet Singh, Amarpreet Singh, Biomechanical Analysis of Throwing Technique in Cricket. IJEMS. 2023;12(01):55-60. Available From <a href="https://ijems.net/index.php/ijem/article/view/244">https://ijems.net/index.php/ijem/article/view/244</a>	

<b>Manuscript Received</b> 2023-01-03	<b>Review Round 1</b> 2023-01-27	<b>Review Round 2</b> 2023-02-14	<b>Review Round 3</b> 2023-02-28	<b>Accepted</b> 2023-03-15
<b>Conflict of Interest</b> NIL	<b>Funding</b> NO	<b>Ethical Approval</b> YES	<b>Plagiarism X-checker</b> 17%	<b>Note</b>
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## Introduction

### OVERHEAD-THROWING

A throw made with the arm moving above the height of shoulder line is called an over-head/arm. Throwing in which at the instant of release the throw's trunk is tilted toward the non-throwing arm side of the body, and upper arm is pointing up to the right. Phases of overhead throwing: fielding phase, step phase, cocking/loading phase, acceleration phase and follow through phase: from ball release until 500 milliseconds after the ball has been released. Altham, H. S. (1962).

**FIELDING PHASE:** In this phase the fielder performs an overhead throw, the fielder must align himself to catch it off the ground or in the air, usually with two hands, and must build up controllable momentum as he approaches the ball. To ensure that the athlete's trunk is parallel to the target during the following stages of the throw, the feet are placed on either side of the ball.. (Fleisig, 2010)

**STEP PHASE:** After fielding the ball, the fielder takes the steps towards the target so that the back foot is closer to the target than the front foot. Body position in this phase should be upright. (Fleisig, 2010)

**COCKING PHASE:** In the Cocking Phase positions of the body to enable all body segments to contribute to ball propulsion. It can be further divided into two sub-phases:

- Early cocking phase
- Late cocking phase

The wind up and cocking phase together constitutes 80% of the duration (approx. 1500 milliseconds) Cross, R. (2004).

**ACCELERATION PHASE:** The acceleration phase is highly explosive. It consists of the quick release of two forces: the forceful internal rotation from the internal rotators (subscapularis, pectoralis major, latissimus dorsi, teres major) and the elastic force stored in the tightly bound fibrous tissue of the capsule. Due to the excessive forces created at the glenohumeral articulation, the cuff muscles must work very hard to maintain the humeral head's position in the glenoid. Ball release, which occurs at roughly ear level, marks the end of the acceleration phase. The acceleration phase

lasts approximately 50 milliseconds which is 2% of the overall time. (Fleisig, 2010)

**FOLLOW THROUGH:** After the ball is released, there is a follow-through phase where extremely strong forces pull the glenohumeral joint forward, placing a significant amount of stress on the structures in the back of the shoulder. The shoulder rotates internally and the arm keeps extending at the elbow. The posterior shoulder structures and the rotator cuff (external rotators) both experience significant stress during this phase, as well as the eccentric contraction of the scapular stabilizers and posterior deltoid fibres. 350 milliseconds, or about 18% of the total time, are spent in this phase. (Garner, J. 2007).

### Statement of the Problem

The Problem entitled as "**Biomechanical analysis of Throwing Technique in cricket**".

### Method and Procedure

#### SELECTION OF SUBJECTS

**Total Two male first-class cricket players were selected as a sample for the study. The age of the both subjects was above 27 years. Data was collected on different places for each sample and two sessions of each player.**

#### SELECTION OF VARIABLES

- (HVe) Horizontal velocity of elbow joint at the time of Over-head throwing.
- (VVe) Vertical velocity of elbow joint at the time of Over-head throwing.

#### CRITERION MEASURE

The criterion measure for this study was the performance of the over-head throwing technique in cricket. The standardized 30 yard circle fielding from cover position to stumps was used for the study. Semi-new English leather balls and flexible stumps were used in this study. Total 25 trials were given to each player and the performance of each trial was recorded. The height of the camera was set at 1.30 meters. Digital video camera was placed 8 meter away at the side of the Thrower (lateral axis). The selected biomechanical variables such as Horizontal velocity

Of elbow joint at the time of throwing and vertical velocity of elbow joint at the time of throwing were analysed.

## FILMING PROTOCOL

Through Quintic coaching v-17 software motion capture technique was used in this study. To record the video of Over-head throwing technique, while performing the technique digital video camera (50 fps) was used by a professional photographer. After obtaining the recorded video, the video was analyzed through Quintic Coaching v-17 software approved by Human kinetics. First video was digitized through Quintic coaching v-17 software. After the procedure of digitizing, the video was calibrated. The calibrated video gave the results through makers, stroboscopic effect technique, stick figures, stopwatch programming, angle manual (horizontal, vertical, and draws angles), linear and angular analysis manual. Motion capture technique/Digital videography was used to analysis the selected kinematical variables of overhead throw in cricket for male players. Digital video camera CASIO EX-FH 100(50 fps) was used for videography of Over-head throw for cricket player performance. The performance of the subjects was recorded with stroboscopic effect from approach to throw toward the target. Digital video camera was placed 8 meter away at the side of the Thrower (lateral axis). The height of the camera was set at 1.30 meters.

## ADMINISTRATION OF THE TEST

Two male cricket players were purposive selected as sample from Patiala for the study. The standardized 30 yard circle distance from cover position to stumps was used for the study. Semi-new English leather balls and flexible stumps were used in this study. The separate data were collected as for both cricket players. All the selected subjects were asked to perform overhead throws with their full potential and accuracy technique. It was determined that subjects possess reasonable level of technique. The subjects were explained about the purpose of the study. The entire selected player have readily agreed and volunteered to act as subject for the study. The coaches provided names of the potential players who will be free of any type of injury in the upper and lower extremities as well as psycho-physiological problems. Twenty(25) attempts

Were given to each player to perform over-head throw. The data was collected at two sessions of each player. Digital video camera was placed 8 meter away at the side of the player (lateral axis). The height of the camera was set at 1.30 meter.

## STATISTICAL PROCEDURE

**With regard to purpose of the study Karl Pearson's Product Moment Coefficient Correlation Statistical technique test was used with the help of SPSS software was calculate between selected kinematical variables with throwing performance of male cricket players. In order to check the significance, level of significance was set at 0.05.**

### Result

Table 1

Shows Relationship between Horizontal Velocity of Elbow Joint and Performance

In Over-head Throwing technique in Cricket.

*Enclosed as Annexure 01*

Table & figure shows that the Mean & S.D value of Horizontal Velocity of Elbow Joint of Cricket Players was 9.12 and  $\pm 4.50$  respectively. The tabulated value of 'r' is 0.205 whereas the calculated value of 'r' is 0.458, which is more than the tabulated value. Hence, it moves that there is significant relationship between Horizontal Velocity of Elbow Joint with their performance.

Figure 1

Shows the Mean and Standard Deviation values of Horizontal Velocity of Elbow Joint and Performance of Over-head Throwing technique.

*Enclosed as Annexure 02*

Table 2

Shows Relationship between Vertical Velocity of Elbow Joint and Performance

In Over-head Throwing technique in Cricket.

*Enclosed as Annexure 03*

Table & figure shows that

The Mean & S.D value of Vertical Velocity of Elbow Joint of Cricket Players was 3.03 and  $\pm 2.25$  respectively, The tabulated value of 'r' is 0.205 whereas the calculated value of 'r' is 0.580, which is more than the tabulated value. Hence, it moves that there is significant relationship between Vertical Velocity of Elbow Joint with the performance.

Figure 2

Shows the Mean and Standard Deviation values of Vertical Velocity of Elbow Joint and Performance of Over-head Throwing technique.

Enclosed as Annexure 04

### Discussion of the Findings

**Horizontal Velocity of Elbow joint:** The result of the study informs that there is significant relationship between Horizontal Velocity of Elbow Joint of Cricket Players with Performance. On the basis of analysis of data, investigator found that the earlier study of Glenn S. Fleisig, Steve W. Barrentine, Nigel Zheng, Rafael F. Escamilla, James R. Andrews. (1999). "Kinematic and kinetic comparison of baseball pitching among various levels of development" Supported the present study".

**Vertical Velocity of Elbow joint:** The result of the study informs that there is significant relationship between vertical velocity of wrist joint of cricket players with performance. . On the basis of analysis of data, investigator found that the earlier study of Glenn S. Fleisig, Steve W. Barrentine, Nigel Zheng, Rafael F. Escamilla, James R. Andrews (1999). "Kinematic and kinetic comparison of baseball pitching among various levels of development" Supported the present study".

### Annexure

Annexure 01

Table 1

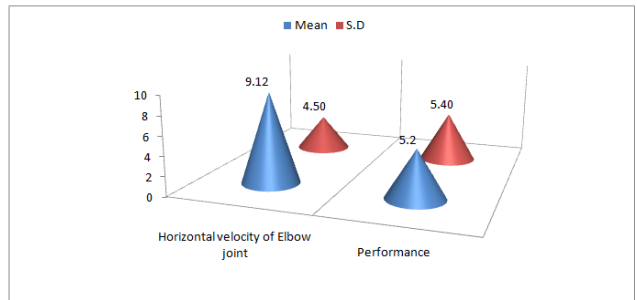
TRAILS	VARIABLES	MEAN	STANDARD DEVIATION	CORRELATION (r) VALUE
50	Horizontal velocity of Elbow joint	9.12	4.50	.458*
50	Performance	5.2	5.40	

<sup>t</sup>r'0.05(40)= 0.205

\*Significant at .05 level of significance

Annexure 02

Figure 1



Annexure 03

Table 2

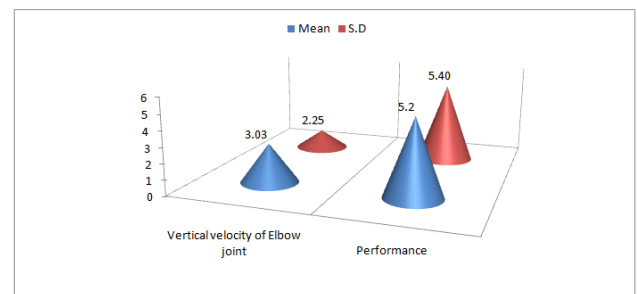
TRAILS	VARIABLES	MEAN	STANDARD DEVIATION	CORRELATION (r) VALUE
50	Vertical velocity of Elbow joint	3.03	2.25	.580*
50	Performance	5.2	5.40	

<sup>t</sup>r'0.05(40)= 0.205

\*Significant at .05 level of significance

Annexure 04

Figure 2



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