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## Biomechanical analysis of javelin throw

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### Abstract

The purpose of the present study was to investigate the relationships between the throw distance and the Kinematic parameter of javelin throw to clarify the individuality of the throwing movement of Punjabi university Patiala javelin throwers. Total five inter-university level male javelin throwers were selected as subjects for the study. The age of subject ranged between 18 to 25 years. The kinematic variables were projection angle, linear velocity of elbow joint and Performance. The Biomechanical Analysis of Javelin athletes mean, standard deviation and Karl Pearson's product moment coefficient correlation were employed with the help of statistical package of SPSS. The level of significance was set at 0.05. The selected projection angle, linear velocity of elbow joint variables of technique in javelin throw have significant relationship with performance of javelin throw with technique.

**Keywords:** Javelin Throw, projection angle, linear velocity and Athletes

### Introduction

A biomechanical analysis evaluates the motion of a living organism and the effect of forces on the living organism. The biomechanical approach to movement analysis can be qualitative, with movement observed and described, meaning that some aspect of the movement measured. The use of the term biomechanics in this text incorporates qualitative component with a more specific quantitative approach. In such an approach, the motion characteristics of a human or an object are described using such parameter as speed and direction, how the motion is created through application of forces both inside and outside the body, and the optimal body positions and action for efficient, effective motion.

The javelin has a strong historic record going back around 3000 years, to the times of the Mycenaean's and the Romans. The javelin was originally designed as an offensive weapon and used in favor of the spear as it was lighter and could be thrown rather than thrust allowing, long distance attacks against an enemy. The javelin saw its introduction to the sporting world in the games of the ancient Greek in around 500BC with a much lighter design that their military counterparts, the objective was to achieve the greatest distance.

The throwing techniques in javelin, the velocity at which the thrower releases the implement is by far the most important factor [Morris and Baruev 1996]. This high percentage shows just how important the movements of the smaller body segments are to the acceleration of the implement. Because the movements of the athlete are so fast during the delivery action, biomechanical analysis equipment [Normally high speed cameras] is often used to provide an objective measure of the throwing techniques of elite athletes.

### Statement of the Problem

The problem is entitled as "The Biomechanical Analysis of Javelin Throw".

### Method and Procedure

#### Selection of Subjects

Five male javelin throwers of all India inter university level from Punjabi university Patiala was selected as subjects for the study. The age of the subjects was between 18-25 years.

#### Selection of Variables

The selected biomechanical variables projection angle, linear velocity of wrist joint, horizontal velocity of wrist joint, linear acceleration of wrist joint, horizontal acceleration of wrist joint, linear velocity of elbow joint, horizontal velocity of elbow joint, linear acceleration of elbow joint, horizontal acceleration of elbow joint.

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**Tools**

Digital Video Cameras, Measurement tape, geometric instruments and specialized motion analyzing software (QUINTIC COACHING 4.01 v17) were used.

**Procedure of Mechanical Analysis**

**Measurement of Projection Angle**

Angle was measured through videography technique. The videos of the technique of javelin throw were traced with the help of quintic software using auto tracking markers in quintic software we diagram the video of projection angle in javelin throw.

**Measurement of Linear Velocity, Horizontal Velocity, Linear Acceleration, Horizontal Acceleration of Wrist Joint**

Linear velocity, Horizontal velocity, Linear Acceleration, Horizontal Acceleration of wrist joint measured thought

software. Digitisation module was interactive with the video file. First we calibrated video was traced with quintic software and click the option auto digitisation of a new trace or manual Digitisation of a new trace. After that click linear analysis” option, software automatically shows the measurements of horizontal velocity, horizontal acceleration, linear velocity and linear acceleration of wrist joint.

**Statistical Analysis**

After the collection of relevant data, it was processed and analyzed with descriptive statistics. The Biomechanical Analysis of Javelin athletes mean, standard deviation and Karl Pearson’s product moment coefficient correlation were employed with the help of statistical package of SPSS. The level of significance was set at 0.05.

**Result and Finding**

**Table 1:** The Relationship between Projection Angle in javelin throws with performance

Trials	Variables	Mean	Standard Deviation	Correlation Values
25	Projection angle	44.73	7.05	-0.97
25	Performance	44.72	3.46	

Significant at .05 level of significance,

r.05 (24) =0.388

Table- 1 shows that the mean value of projection Angle of Javelin throw was 44.7344, whereas the standard deviation (SD) of projection Angle of javelin throw was 7.0581

respectively. The critical value of correlation is -0.97165. The data does suggest that their exist significant relationship between projections Angle of javelin throw with performance.

**Table 2:** The Relationship between Linear velocities of Elbow joint in javelin throws with performance

Trials	Variables	Mean	Standard Deviation	Correlation Values
25	Linear velocity of elbow joint	7.80812	1.50879	-0.53095
25	Performance	44.72	3.46	

Significant at .05 level of significance

r.05 (24) =0.388

Table & Figure- 2 reveals that the mean value of linear velocity of elbow joint of javelin throw was 7.80812, whereas the standard deviation (SD) of linear velocity of elbow joint of Javelin throw was 1.50879 respectively. The critical value of correlation is -0.53095. The data does suggest that their exist significant relationship between linear velocities of elbow joint of javelin throw with performance.

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**Discussion of Findings**

**i. Projection angle**

The present result was supported with previous study of Linthorne NP and Stokes TG (2014) study of “Optimum projection angle for attaining maximum distance in rugby kick” A comparative study which showed significant difference for projection angle in javelin throws with performance. Also support the above findings

**ii. Linear velocity of elbow joint**

The present result was supported with previous study of A Gideon (2005) study of “ Biomechanical analysis of the shot put event at the 2004 Athens Olympic game” A comparative study which showed significant difference for linear velocity of elbow joint in javelin throws with performance. Also support the above findings.

**References**

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