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Kinematical Analysis of Javelin Throw

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Abstract

The purpose of the present study was to investigate the relationship 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. Age of the subject ranged between 18 to 25 years. The kinematic variables were linear acceleration of wrist joint, horizontal 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 linear acceleration of wrist joint, Horizontal velocity of elbow joint variables of technique in javelin throw have significant relationship with performance of javelin throw with technique.

Keywords: Kinematics, Javelin Throw, Linear acceleration, Horizontal velocity, Elbow joint, Wrist joint 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 than their military counterparts, the objective was to achieve the greatest distance

The design of the javelin differed greatly from the design most people have now become accustomed to with the athlete holding onto a thin leather cord wrapped around of the javelin itself. When the javelin was thrown the leather cord would unwind and the javelin would follow a spiraled flight very similar to the way a toy spinning top is made to rotate by pulling a string. The rotation stabilized the javelin in flight. (Engineering sport.com.UK/.../the-story-of-the-javelin-bringing-it-back-dow).The first javelin throwing competition at the Olympic game was held in Athens in 1906.The women held their first Olympic javelin competition in Los Angeles 1932. (Www.wikipedia.com/javelin/History).

Yes want Kale war (2015) ^[11] Quantitative biomechanical analysts are mainly interested in improving performance and reducing injury risk. Use a mixture of experimental and theoretical approaches to seek answers to such question (Bartlett, 2007). The main feature of quantitative information, which has been identified as relevant to the sport or exercise activity being studied. The information required may involve variable such as linear and angular displacement, velocities, accelerations, forces, torques, energies and powers. These may be used for detailed technical analysis of a particular movement.

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Statement of the Problem

The problem is entitled as “kinematical 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 linear acceleration of wrist joint & horizontal velocity of elbow joint.

Tools

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

Procedure of mechanical analysis

Mechanics plays a vital role in attaining high technical performance. It helps in identifying faults in performing the very precisely. There are two methods by which a motor skill can be analyzed i.e. qualitative and quantitative method. The quantitative method is more valid in case of many special skills. The best to evaluate the technique quantitatively is through photography and importing those videos into the motion analyzing software. Software having facilities to

analyze the videos in motion and still (quick snap javelin) mode. In the present study videos were record and analyzed through motion analyzer software (QUINTIC COACHING 4.01 v 17) to measure kinematical variables and all related angles.

Measurement of linear acceleration of wrist joint & horizontal velocity of elbow joint:-linear acceleration of wrist joint & horizontal velocity of elbow joint.measured thought software. Digitisation module was interactive with the video file. First we calibrated video was traced with quantic 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 05.

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 0.5.

Results

For each of the chosen variable, the results pertaining to significant relationship, if any, between selected javelins throw with performance were assessed and are presented in following tables.

Table 1: The Relationship between Linear Acceleration of wrist joint in javelin throws with performance

Trials	Variables	Mean	Standard Deviation	Correlation Values
25	Linear acceleration of wrist joint	44.69	21.72	-0.70
25	Performance	44.72	3.46	

Significant at .05 level of significance $r_{.05} (24) = -0.388$

Table- 1 exhibit that the mean value of Linear Acceleration of wrist joint of javelin throw was 44.69, whereas the standard deviation (SD) of Linear Acceleration of wrist joint of Javelin throws was 21.72 respectively. The critical value of correlation

is -0.70. The data does suggest that their exist significant relationship between Linear Acceleration of wrist joint of javelin throw with performance.

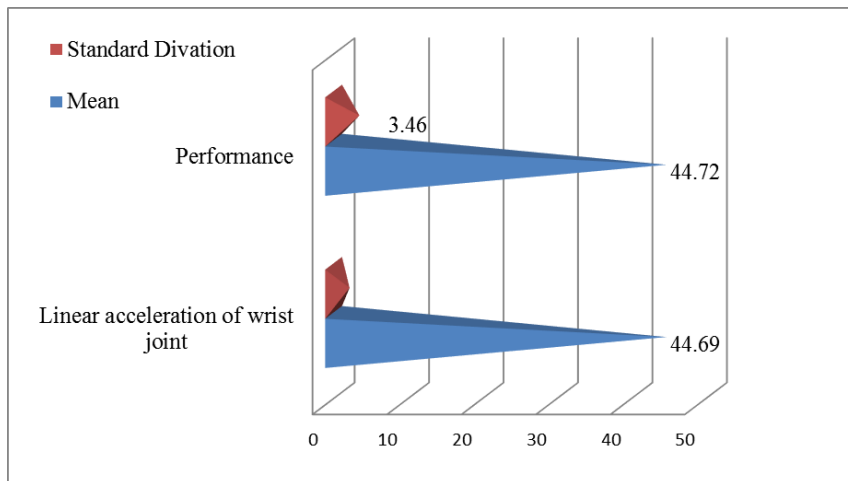


Fig 1: The Relationship between Linear Acceleration of wrist joint in javelin throws with performance

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

Trials	Variables	Mean	Standard Deviation	Correlation Values
25	Horizontal velocity of elbow joint	6.38	1.42	-0.50
25	Performance	44.72	3.46	

Significant at .05 level of significance $r_{.05} (24) = -0.388$

Table- 2 shows that the mean value of Horizontal velocity of elbow joint of javelin throw was 6.38, whereas the standard deviation (SD) of Horizontal velocity of elbow joint of Javelin throw was 1.42 respectively. The critical value of correlation is -0.50. The results suggest that there exists significant relationship exist between Horizontal velocities of elbow joint of javelin throw with performance.

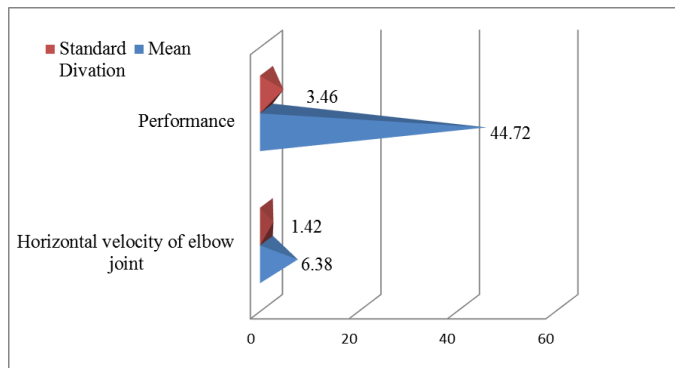


Fig 2: The Relationship between Horizontal velocities of Elbow joint in javelin throws with performance

Discussion

Linear acceleration of wrist joint

The result of the study notify that there was significant difference between biomechanical analysis of javelin throws for their linear acceleration of wrist joint. Deol N.S and Singh L (2015) [2] "Relationship of selected biomechanical variable with performance of jump shot with and without opponent in basketball" supported the present study.

Horizontal velocity of elbow joint

The present result was supported with previous study of Wu T and Gervais P. (2008) [9] study of "An examination of slo-pitch pitching trajectories" A comparative study which showed significant difference for horizontal velocity of elbow joint in javelin throws with performance. Also support the above findings.

Conclusions

- The data revealed that there is significant relationship found between Linear Acceleration of wrist joint of javelin throw with performance.
- The study revealed that there is significant relationship exist between Horizontal velocities of elbow joint of javelin throw with performance.

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