A KINEMATICAL STUDY ON ANALYSIS OF JAVELIN THROW TECHNIQUE OF TRACK AND FIELD

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ABSTRACT:

A study was conducted by the researcher to analyse the javelin throw technique of track and field. A total of five male right handed javelin throwers who had participated in All India Inter-University competition were selected who age were between 17 and 25 years. The variables selected for the study were angles at wrist joint, elbow joint, shoulder joint, hip joint, knee joint, ankle joint, center of gravity at the time of release and angle of release. Pearson correlation coefficient was used for the study at 0.05% level of significance. The study showed significant relationship between performance and knee angle, ankle angle, elbow angle, angle of release at the time of release.

KEY WORDS: Javelin Throw, Kinematic analysis, correlation **.**

INTRODUCTION

The javelin throw is a track and field event where the javelin, a hollow rod like structure about 2.5m (8 ft.2 in) in length, is thrown. The javelin thrower gains momentum by running within a predetermined area. Javelin throwing is an event of both the men's decathlon and the women's heptathlon.Javelin throwing is a highly technical event and requires perfect coordination of multiple joints in different planes of motion. The motor sport objective of javelin throwing is to attain the greatest possible throwing distance. The study was conducted to find out the relationship of selected kinematic variables with the performance of the throw.

METHOD

For the collection of data five male inter-university Javelin throwers of 17 to 25 years were selected as subjects for the present study. As the subjects had been previously trained, on the basis of that training data was collected. Therefore, it was assumed that they possessed a good level of releasing technique. The purpose of the research was explained to all the subjects and subjects were motivated to put their best during each trial.

A total of three trials were given to each subjects and their performance was recorded in meters. The trail with the best performance was selected for the study. The video was analyzed using Kinovea software version 0.8.26.

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The variables selected for the study were angles at wrist joint, elbow joint, shoulder joint, hip joint, knee joint, ankle joint, center of gravity at the time of release and angle of release. The human model in Kinovea was used to find out the center of gravity. And angles were drawn in the selected joints using Kinovea software. The angles were calculated in degrees and center of gravity in meters.

Fig. 1: Centre of Gravity at the time of Release

Fig. 2: Angles at various joints of subject usingKinovea software at the time of Delivery Phase

The statistical technique used for the study was Pearson correlation coefficient at 0.05 level of significance.

RESULTS AND FINDINGS OF THE STUDY

The data collected from the subjects were analyzed using the IBM-SPSS version 20 software. Pearson correlation coefficient was used and the level of significance was set at 0.05. The findings of the study are as follows:

Table no. 1
Descriptive Statistics

	Mean	S. D.	N
Wrist angle	214.0000	13.62246	15
Elbow angle	122.7333	36.20668	15
Shoulder angle	191.7333	28.93457	15
Hip angle	150.6667	20.99206	15
Knee angle	98.3333	21.71131	15
Ankle angle	125.6667	26.83725	15
C.G.	.8487	.04882	15
Releasing angle	44.0000	5.73212	15
Performance in meters	43.0800	4.44837	15

It can be seen that the mean value for centre of gravity of the subjects is .8487 meter with standard deviation .04882 meters. The mean value for wrist angle is 214.0000±13.62246 (degree), elbow angle is 122.7333±36.20668 (degree), shoulder angle is 191.7333±28.93457 (degree), hip angle is

150.6667±20.99206 (degree), knee angle is 98.3333±21.71131 (degree), ankle angle is 125.6667±26.83725 (degree), and releasing angle is 44.0000±5.73212 (degree).

It is seen that the average performance of subjects' is 44.08 meter whereas standard deviation is 4.44837 meter.

The table no. 2 shows the correlation coefficient of performance with other variables along with their p-value and sample size.

Table no. 2
Correlations Table

		wrist	elbow	shoulder	hip	knee	ankle	cg	releasing_angle	performance
performance	Pearson Correlation	-.455	-.561[*]	-.297	.484	.713[**]	.755[**]	.260	-.519[*]	1
	Sig. (2-tailed)	.088	.030	.283	.067	.003	.001	.349	.048	
	N	15	15	15	15	15	15	15	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

From the table it can be seen that for two of the variables, the correlation coefficient was significant at 0.01 level of significance since the p-value is less than 0.01. It can also be seen that two of the variables, the correlation coefficient was significant at 0.05 level of significance. Following conclusions may be drawn from the results in table no. 2:

- The performance of javelin throw was significantly correlated with knee angle and ankle angle at 1% level.
- The performance of javelin throw was significantly correlated with elbow angle and releasing angle at 5% level.
- Out of these four variables, ankle angle is more significantly correlated than others.

DISCUSSIONS OF FINDINGS

In this study four variables were found to be significantly correlated with the performance of javelin throw viz. ankle angle, knee angle, elbow angle and releasing angle during release of the javelin.

The reason for the significant correlation between ankle angle and knee angle with performance of the javelin throw may be due to the reason that the summation of force starts with the ankle to knee. The angle of knee and ankle are very important factors in determining the summation of initial forces.

The reason for the significant correlation between elbow angle and releasing angle may be due to the reason that releasing angle of javelin throw plays an important role in the performance of the throw. The more the releasing angle is close to the optimum angle of release for javelin throw, better would be the performance. The elbow angle is determining factor in deciding the release angle of throw, which may be the reason for significant correlation.

CONCLUSIONS

Based on the analysis and within the limitations of the present study, the following conclusions can be drawn.

- The angular kinematic variables like right knee angle, right ankle angle, right elbow angle and angle of release had shown significant relation with the performance of javelin throw.
- The angular kinematic variables like hip angle, shoulder angle, wrist angle at the time of release has shown insignificant relation with the performance of javelin throw.
- The linear kinematic variable center of gravity has also shown insignificant relation with the performance of javelin throw.

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