

## **“Relationship of Kinematic Variables with the Performance of Standing Broad Jump”**

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**Abstract:** The purpose of investigation was to study the relationship of kinematics variables with the performance of standing broad jump. Subjects were randomly selected from J.N.V. University, Jodhpur and M.D.S. University, Ajmer. The criterion measure used for this study was the performance in standing broad jump and selected kinematics variables. To analyze the raw data coefficient of correlation ( $r$ ) were calculated and results were compared with the help of Analysis of variance (ANOVA) technique where level of significance was set at .05.

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### **I. Introduction**

Education contributes to the development, advancement and perfection of the nation's culture. It is often described as a process that strives to produce desirable changes in the behavior of individual. The modern education is concerned with the development of an individual through integrated to fit in the society, which maintain advances social order.

Games and sports have been part of human life almost since the time immemorial. Be it a necessity for his survival i.e. hunting for food and shelter, safety from wild animals or other enemies or as a pursuit of pleasure, the games and sports have been indispensable to man kind and have been part of his culture. Through the origin of sports is lost in antiquity, it is quite certain that physical activity have been a basic necessity of life, more than fun and diversion, for his survival depended on it. Gradually along with the process of evolution, such activities become more plays become part of culture of tribes. People used sports and games as a means of transmitting the cultural heritage of their tribes, games, sports and physical activities, persisted despite the rise and fall of ancient civilization as a cultural heritage to another. Today games and sports have emerged as universal culture phenomena. (Ajmer Singh, Jagtar, Jagdish Bains, 2000). Training in sports and games is no longer a myth and it has no casual approach, but it provides opportunities for scientific process and verification. Training has been accepted as a highly specialized science. Physical education scientist are striving to understand the various factor affecting skeletal and muscular activity, during variation of human movements with the help of electro – myography and are engaged in analyzing the biomechanics of performances of the top athletes by focusing their attention upon the analysis of sports skills. They are consistently studying factors like strength, limb length, mass, inertia proportions and angular and linear velocity that influence these movements, to get a better insight into the complexities of human motion and performance. The latest approach is aimed at the construction of a mathematical model of a skill in a form which is suitable for computer analysis so that is could be simulated under several carefully controlled conditions for predicting more effective techniques for higher performances. (Doris I Miller and Richard C. Nelson, 1973).

In long jumping (formerly called broad jumping), the contestant dashes along a runway and springs into the air from a take off board, with the aim of covering the greatest possible distance. While still in the air the jumper throws both feet forward of the body. Competitors take three jumps for distance, after which the best performers get three more jumps. A jump is measured along a straight line extending from the front edge of the take off board to the mark made closest to the take off board by any part of the jumper's body as the jumper lands in the sand pit. The athletes are rated on their longest jump. Long jumping requires strong leg and abdominal muscles, running speed, and leg spring. (Microsoft Encarta Encyclopedia 1993-2001).

Simple as well as specialized form of hopping and leaping and hurdling are clustered in a general category of skills called jumps. A jump is accomplished by propelling the body off the ground with the thrust from one or both the legs. The method of launching the body into the air is the essential ingredient of the jump, but in many instances the method of landing is important to skillful performance. Jumping however ordinarily is associated with more vigorous and extensive non-support movement and should be regarded as more difficult skill. (Ralph L. Widestron. 1977). As the foot is raised from the floor no action occurs in the ankle joint except for the slight flexion. In first third of the time between heels raising and the final thrust the ankle is flexed 5 degree. Since ankle flexion carry the C.G. of the body forward and thereby increase the effect of gravitational pull, the difference in the metarsophalangeal action is expected. Beyond this rate until the final thrust. (John M. Cooper and Ruth Balassow, 1969).

**Purpose of the study:** The purpose of this investigation was to study the relationship of kinematics variables with the performance of standing broad jump.

## II. Objectives:

1. To find out relationship between Kinematics variables and performance in standing broad jump with regard to beginners.
2. To find out relationships between kinematics variables and performance in standing broad jump with regard to intermediate athletes.
3. To find out relationship between kinematics variables and performance in standing broad jump with regard to advance athletes.
4. Comparing the standing broad jump performance among the three selected groups.

### **Hypothesis:**

On the basis of the knowledge gained from available literature, research finding and the scholars own understanding of the problems, it was hypothesized that.

1. There may be significant variation in the relationship of kinematics variables with the performance of beginner's in standing broad jump.
2. There may be significant variation in the relationship of kinematics variables with the performance of intermediate in standing broad jump.
3. There may be significant variation in the relationship of Kinematics variable with the performance of advance athletes in standing broad jump.
4. There may be significant variation in the performance of selected groups.

## III. Methodology:

**Subjects:** Thirty male athletes ranging from 17 to 25 years age of J.N.V. University, Jodhpur and M.D.S. University, Ajmer were randomly selected as the subjects for this study.

### **Selected of Kinematical variables were:**

1. Ankle Joints
2. Knee Joints
3. Hip Joints
4. Shoulder Joints
5. Elbow Joints
6. Wrist Joints

**Criterion Measure:** - The score of the subjects in standing broad jump were used as criterion measure for this study.

The criterion measure used for this study was the maximum distance covered in standing broad jump subject was tested from different kinematics variables. Each subject was given three trials and the best trial was recorded as the score.

**Statistical Technique Used:-** To analyze the raw data mean (Garret, 1979) and coefficient of correlation (Verma, 2000) were calculated and result were compared with the help of one way analysis of variance ('F' ratio), technique where level of significance was set at .05.

**Result of the Study:** - The statistical analysis of data pertaining to Relationship of Kinematics variables with the performance of standing broad jump.

**Table – 1** Relationship Of Selected Angular Kinematic Variables With The Performance Of Subject In Standing Broad Jump (N = 30)

S.No.	Variables	Coefficient of Correlation “r”		
		Beginner	Intermediate	Advance
1.	Ankle Joint (L) (R)	0.202 -0.264	-0.268 0.044	-0.449 -0.261
	Knee Joint (L) (R)	0.305 0.341	0.004 0.299	0.435 -0.548
3.	Hip Joint (L) (R)	0.429 0.237	-0.501 -0.430	0.117 -0.168
	Shoulder Joint (L) (R)	-0.108 0.438	-0.221 0.298	0.032 -0.397
5.	Elbow Joint (L) (R)	-0.082 -0.231	0.020 -0.706*	0.362 0.066
	Wrist Joint (L) (R)	----- -0.287	----- 0.136	----- -0.302

L = Left R = Right

As shown in (Beginner Boys) Table – 1 that the values of coefficient of correlation in case of all the selected Kinematics variables were found insignificant at the selected level of significance of 0.05. Since the required value of coefficient of correlation for 8 degree of freedom is 0.632 and the obtained values of coefficient of correlation of selected variables less than the required value.

As shown in (intermediate boys) Table -1 that the values of coefficient of correlation in case of all the selected kinematics variables were found in significant at the selected level of significance of 0.05 except right elbow joint which showed a negative correlation with the performance which shows that decrease in the angle of the right elbow joint will increase the performance. Since the required value of coefficient of correlation for 8 degree of freedom is 0.632 and the obtained values of coefficient of correlation of selected variables less than the required value.

As shown in (Advance Boys) Table-1 that the values of coefficient of correlation in case of all the selected kinematics variables were found in significant at the selected level of significance of 0.05. Since the required value of coefficient of correlation for 8 degree of freedom is 0.632 and the obtained values of coefficient of correlation of selected variables less than the required value.

**Table – 2 Analysis Of Variance Of The Mean Difference Of The Selected Groups**

Source of Variance	df	Sum of square	Mean sum of square	'F' Ratio
Between Groups	2	0.633	.0316	
Within Groups	27	1.676	0.062	5.098*

\*Significance at .05 level of confidence  $F_{.05}$  (2.27) = 3.35.

It is evident from Table – 2 that variability exist among the three group with respect to criterion variable namely performance in standing broad jump among boys.

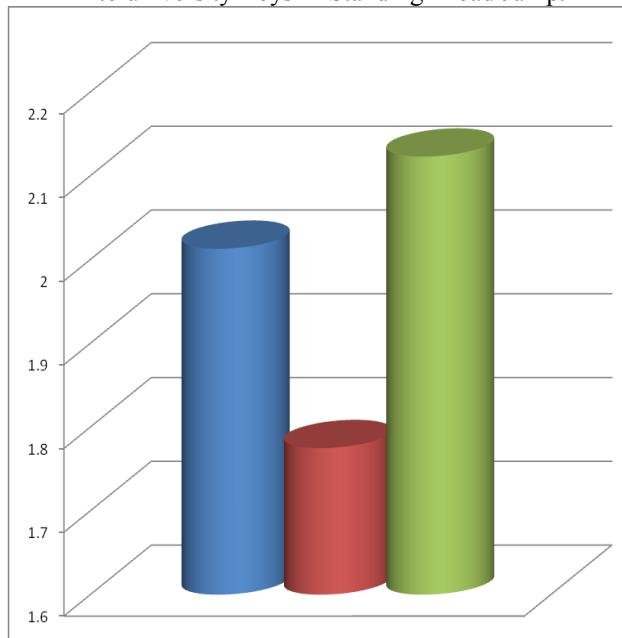
**Table – 3 Least Significant Difference Post Hoc Test For Mean Of The Three Groups**

Beginners	Intercollegiate	Interuniversity	M.D.	C.D.
2.013	1.775		0.238*	
2.013		2.123	.011	0.2282
	1.775	2.123	-0.348*	

\*Significant at .05 level.

The above table shows that there was significant difference between the means of Beginner boys and Interuniversity boys.

**Fig-1.** Bar diagram showing the mean values of performances among Beginner, Intercollegiate and Interuniversity Boys in Standing Broad Jump.



Investigator compared all the groups and data reveals that Interuniversity Group of boys was found to be statistically superior over Intercollegiate and Beginner Group. The Mean of the Interuniversity Group was also greater than the mean of the Beginner group but statistically insignificant difference was found between the

two. Superiority of the visual mental practice group with time over the Intercollegiate and Beginner Group. Probable cause may be that there training methods are more advanced and there skills levels are also better and they have better and they have better quittance of the skill. Beginner Groups superiority over the Intercollegiate Group might have been because of the data was taken after the training of intercollegiate team which was more than training than the activity classes undergone by the Beginners.

#### IV. Conclusions

1. None of the selected angular Kinematics variables that are Ankle Joint (right and Left), Knee Joint (Right and Left), Shoulder Joint (Right and Left), Elbow Joint (Right and Left), Wrist Joint (Right and Left) and hip Joint (Right and Left) has significant relationship with the performance of athletes in Standing Broad Jump. Except right elbow joint in beginner boys which showed a negative correlation.
2. Interuniversity Group in Boys was found to be the superior in the performance of standing broad jump.

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