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Relationship of Selected Kinematics Variables with the Performance of Shot Put

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Abstract – The purpose of the study was to investigate the relationship of selected kinematic variables with the performance of 'O'Brien technique of shot put at the time of release. The subjects for the study were five male shot putters of Lakshmibai National University of Physical Education, Gwalior from the track and field match practice group who were able to perform more than 10 meters. Their age ranged between 17 to 25 years. The performance of each subject was measured by using the standard procedures of IAAF, the horizontal distance covered by the subjects were considered as his performance and the horizontal distance were measured in meters. Three trial were given to each subject and the best one was considered for this study.

Videography technique was employed in order to register the performance of the subjects at the time of release. The data was analyzed by using Pearson's moment product correlation to ascertain the relationship of the selected kinematic variables with the performance of 'O'Brien technique of shot put. The biomechanical variables were consisting of selected angular kinematic variables and the linear kinematics.

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INTRODUCTION:-

All movement of material bodies both of men and animal are subjected, to the law of mechanics as every movement involve mechanical movement and the locomotion of part of mass in space and time. It is the only first test of science to recognize this it is necessary to make this qualification, because movement is not only locomotion, but is also a change in quality in field above the purely mechanical. The concept of optimum skill development is broad and has implication for everyone who deals with movement i.e. the parents, the teacher, the coaches, physical educators, and research in this field.

Recently, video tape has begun to replace conventional motion picture for teaching and coaching purpose. Since videography is erasable, reusable, does not require any developing, it is more economical then film. The relatively inexpensive portable recorders are simple to operate and permit immediate play back. This videotape was significant potential for instruction. Picture taken of students performing motor skill can provide them with further sight into their own action a greater appreciation of the mechanics of sorts' skill and increase interest in improving their performance.

Cinematography has been used more frequently than any other method to examine the external mechanics of human motion from a quantitative stand point. Certain fundamentals are observed, accurate measurements can be obtained from film of subjects, performing under either competitive or controlled laboratory conditions.

Track and field is one of the oldest of sports. The shot put is a track and field event involving "throwing"/"putting" (throwing in a pushing motion) a heavy spherical object the shot as far as possible. The shot put competition for men has been a part of the modern Olympics since their revival in 1896, and women's competition begin in 1947.

To justify a movement as an economic one, it is very essential to analyses the movement first same time, it is very difficult for a human eye to analyses all movements various body segments and joints of the same time, so various instruments like still camera, video camera etc. are used to analyses various movements.

PROCEDURE

Selection of subjects

Five male shot putters of Lakshmibai National University of Physical Education, Gwalior from the track and field match practice group who were able to

perform more than 10 meter for the study and their range of age was between 17 to 25 years. It was assumed that they possess good level of technique. The purpose of the research were explained to the subject and subjects were motivated to put in their best during each attempt.

It was hypothesized that there would be significant relationship between selected kinematic variables with the performance of shot put at the time of release.

Procedure for Administration of Test and collection of the data

Before conducting the test a meeting was called for the subjects and they were briefed about the test i.e. the Obrien technique of shot put. They were also motivated to give their best at the time of the test. Three trial were given to each subject and the best one was considered.

The performance of each subject was measured by using the standard procedures of IAAF, the horizontal distance covered by the subjects were considered as his performance and the horizontal distance were measured in meters. This was evaluated by qualified officials.

The performance was recorded on the basis of execution of the performance.

The centre of gravity of each body segment and the whole body were determined by segmentation method as suggested by James G. Hay. The angles at various joints were also determined.

Statistical Procedure

The relationship of selected kinematic variables with the performance at the time of release of shot put technique were obtained by employing the Pearson's product moment correlation method & for testing the hypothesis the level of significance was set at 0.05 level of confidence.

Results

The collected point of each selected angular and linear kinematic variables and the performance of the subject were analysed by Pearson's product moment correlation to find out the relationship with the performance separately. The significance of the relationship were tested at 0.05.

The coefficient of correlation (r) of selected angular and linear kinematics variables with dependent variable are presented separately.

The results of the product moment correlation which were obtained in order to ascertain the relationship of selected angular kinematics variables i.e. the angle at right ankle joint, right knee joint, right hip joint, right shoulder joint, right elbow joint and right wrist joint and linear variable i.e. Height of centre of gravity of subjects at the time of release, and Height and angle of centre of gravity at the time of release of shot put from the sector with the performance of shot put 'O'Brien technique at the time of release has been presented below:

FINDINGS

Means and standard deviations of angular kinematic variables of shot put technique at the time of release are presented in table 1.

TABLE 1

MEAN AND STANDARD DEVIATION OF ANGULAR KINEMATIC VARIABLES AT THE TIME OF RELEASE OF SHOT PUT

KINEMATIC VARIABLES	MEAN	STD.DEVIATION
(in degrees)		
Angle of release	41.60	1.67
Right ankle	2.48	0.12
Right knee	144.20	22.08
Right Hip	168.00	12.43
Right shoulder	140.60	7.70
Right elbow	178.40	1.82
Right wrist	150.60	13.78

Means and standard deviations of linear kinematic variables of shot put technique at the time of release are presented in table 2.

TABLE 2

MEAN AND STANDARD DEVIATION OF LINEAR KINEMATIC VARIABLE AT THE TIME OF RELEASE OF SHOT PUT

KINEMATIC VARIABLES	MEAN	STD.DEVIATION
(Meter)		
Height of shot at the time of release	2.48	0.12
Height of Center of gravity of subject	1.28	0.10

The points of each of the independent variables of linear and angular kinematic were correlated with the performance of subjects in shot put. The relationship of selected kinematic variables at the time of release with the performance of subject in shot put is presented in table 3.

TABLE-3

RELATIONSHIP OF SELECTED ANGULAR KINEMATICS VARIABLES AT THE TIME OF RELEASE WITH THE PERFORMANCE OF 'O'BREIN TECHNIQUE OF SHOT PUT

S. NO.	VARIABLES CORRELATED	COEFFICIENT OF CORRELATION(r)
1.	Angle at the time of release	-.527
2.	Angle at right ankle joint	-.048
3.	Angle at right knee joint	-.961*
4.	Angle at right hip joint	-.287
5.	Angle at right shoulder joint	-.115
6.	Angle at right elbow joint	-.447
7.	Angle at right wrist joint	-.692

*Significant, r.05 (3) = 0.878

Interpretation of the Output

The results of above table clearly show that the angle at right knee joint at the time of release with the performance of shot put has shown significant relationship at 0.05 level of significance.

The points of each of the independent variables of linear and angular kinematic were correlated with the performance of subjects in shot put. The relationship of selected kinematic variables at the time of release with the performance of subject in shot put is presented in table 4.

TABLE 4

RELATIONSHIP OF LINEAR KINEMATIC VARIABLES AT THE TIME OF RELEASE WITH THE PERFORMANCE OF 'O'BREIN TECHNIQUE OF SHOT PUT

S. NO.	VARIABLES CORRELATED	COEFFICIENT OF CORRELATION(r)
1.	Height of C.G. of subject with shot put performance	-.238
2.	Height of shot at the time of release and shot put performance	-.048

r.05 (3) = 0.878

Interpretation of the Output

The above results in the table indicate that the linear kinematic variable i.e. height of C.G of subject with shot put performance and height of shot at the time of release with the performance of shot put is not significance.

The findings of table 7 clearly revealed that the angle at right knee joint at the time of release had shown significant relationship (r = -.961) with the performance of 'O'Brein technique of shot put. Rest all the variables at the time of release were less than the tabulated value (r=.878) at 0.05 level of significance.

The result of product moment correlation which were obtained in order to ascertain the relationship of the selected linear kinematics variables i.e., height of center of gravity of the subject, height of shot at the time of release, with the performance of 'O'Brein technique of shot put has been presented in table 8.

The findings of table 8 also showed insignificant relationship of all the variables with the performance of the 'O'Brein technique of shot put. Because the value of coefficient correlation (r) in case of all the variables was less than the tabulated value (r=.878) at 0.05 level of significant.

DISCUSSIONS OF FINDINGS

In the present study, there was a significant correlation between the angles at right knee joint at the time of release with the performance of 'O'Brien technique of shot put. This could be owing to the reason that (as per the literature) an angle and height of shot at the time of release are determined by the driving moment of the arm. The final drive with the arm is initiated by the straightening of the right leg from the ankle up to the upward movement of the trunk. The right side of the body extended swing forward and upward in the direction of put. In the beginning of the leg extension the shot still remain against the neck and when the chest faced the putting direction, and the right arm comes into action. A great force is produced by the powerful extension of legs and this strongly affects the result (Schmolinsky 1978).

This finding is supported by Young Michael (2005) in his studies also indicated the right knee correlated significantly.

The finding showed, the linear and angular kinematic variables had insignificant relationship in case of all the variables at the time of release of 'O'Brien technique of shot put with the performance except the angle at right knee. In the study only one camera was used and so the picture could not show all the dimensions to have accurate figure. The other reason could be due to the small size of the sample and unavailability of sophisticated equipment or due to experimental condition.

The linear and angular kinematic variables showed insignificant relationship in case of all the variables at the time of release of 'O'Brien technique of shot put with the performance except the angle at right knee. The similar types of studies were undertaken by other research scholars also and mostly the relationships of selected kinematic variables with the dependant variables were showed insignificant except very less kinematic variables in their area of study. The main

reason of insignificant results could be that the performance of any games and sports depending upon the multidimensional factors such as physical factors, physiological factors, psychological factors and so many other factors. Only due the slight association in the selected kinematics variables, the performance of the athlete can not vary directly.

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