International Journal of Physical Education and Sports Sciences
Vol. 13, Issue No. 06, September-2018, ISSN 2231-3745

Kinematic Analysis of Instep Kick in Soccer

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Abstract – The purpose of the study was to find out the kinematics analysis of instep kick in soccer. Fifteen subjects from All India Inter University participation team were selected who were studying in Lakshmi Bai National Institute of Physical Education Gwalior. The subjects were ranging from 17 to 25 years of age. The study was conducted under controlled conditions. Digital videography technique was employed for conducting the kinematics analysis of instep kick in soccer. The camera in the study used was Canon 70 D, videography was done that moment contact of execution of the ball in sagittal plane. From the photograph stick figures were prepared using kinovea software and various kinematics variables were obtained at the moment of execution and the angles were found out by the kinovea software. The criterion measure was performance of subjects in instep kick.

Kinematics analysis of instep kick was found statistically using Pearson correlation coefficient. From the results of the present study it is found that there is no significant relationship between the kinematic variables with performance of the player in instep kick in Soccer.

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INTRODUCTION

The game of soccer is the most popular team sport worldwide. Soccer kick is the main offensive action during the game and the team with more kicks on target has better chances to score and win a game. For this reason improvement of soccer instep kick technique is one of the most important aims of training program in young players. Success of an instep soccer kick depends on various factors including the distance of kick from the goal, type of kick used, the air resistance and the technique of the main kick which is best described using biomechanical analysis. However it becomes apparent that more research studies into biomechanics of soccer kick has been published within the last decade therefore new aspects of soccer kicking performance are being identified including more details regarding three dimensional kinematics of the movement joint moments that drive the movement mechanism of soccer performance as well as various factors which effect soccer kick biomechanics Such as gender, age, Limb dominance and fatigue. The aim of the present study was examine recent findings on soccer kicking biomechanics and to identify new aspects maybe decisive for soccer kick performance.

METHODOLOGY

For the purpose of study fifteen male right footed footballers of Lakshmi Bai National Institute of Physical Education, Gwalior, who had represented All India intervarsity were selected as subjects for the study. The range of age of the subjects was between 17 to 25 years.

On the basis of researcher's own understanding of the problem and on the basis of discussion with experts the following kinematic variables (linear and angular) were selected.

Linear kinematics variables:

Height of centre of gravity at the time of execution(moment contact)

Angular kinematics variables:

Right hip joint

Right knee joint

Right ankle joint

Three trials were given to all the performers and all the performances were measured by the qualified officials and recorded the distance in metres. Measuring angle in nearest degree at selected joint at the time of execution of ball (moment contact). The performance of each subject was measured by using the standard videography (done by Canon 70D camera) of the subject to develop stick figures on the photograph by applying joint point method with the help of kinovea software and angle joints are

expressed in degrees. Three trials were given to each subject and the best one was considered.

To find out the selected kinematics variables effect of in step kick in Soccer, Pearson correlation coefficient was used. For testing the hypothesis the level of significance was set at 0.05 level.

FINDINGS AND DISCUSSIONS

In order to ascertain the linear kinematics and angular kinematics variable namely right ankle joint angle, at right knee joint angle, at right hip joint and linear kinematics variable height of the centre of gravity at the moment of execution in step kick Pearson correlation coefficient was used for comparison.

Table- 1

Descriptive Statistics

Variables	Mean	Std. Deviation
Centre of gravity	.9087	.04764
Right Hip joint angle	147.8667	11.23049
Right knee joint angle	135.4000	15.73349
Right Ankle joint angle	132.4667	10.70291
Performance	55.5940	3.40045

It can be seen that the mean value for centre of gravity what the subject is 0.9087 mitres with standard deviation .04784 metre. Hip angle is 147. 8667± 11.2 30 and the average knee angle is 130.40 (degree) which standard deviation 15.7 33 in case of ankle angle mean value is 132.4 66± 10.7 02°

It is seen that average performance of subject is 55.594 metre where as standard deviation is 3.400 metre

Table 2

Correlation Coefficient

	Centre of Gravity	Hip Angle	Knee Angle	Ankle Angle
Performance (in metre)	.196	.058	-.053	.085
Pearson Correlation	.484	.839	.850	.764
N	15	15	15	15

From the table it can be seen that for none of the variables the correlation Coefficient was significant because for all the variables the P value is greater than 0.05 which was considered as the level of significance.

In the present study none of the variable was found to be significantly correlated with the performance. One of the reasons for insignificant result may be due to small sample size of the present study; the other reason could be that the performance is also based on many other factors which should have been included as variables like speed of legs swing, strength which could have lead for a significant relationship between the variables. Since no motivational technique was used, it might also be one of the reasons to influence the subjects' performance. It is also justifiable that having only a good technique may not always enable a player to perform better. Many other factors like speed, strength, are also necessary. Similar study was also conducted by Orloff Heidiet (2008) and Levy (1991) and the results also support the findings of the present study.

It was hypothesized that there would be a significant correlation between independent and dependent variables but from the results it can be seen that there is no significant relationship between the variables so the hypothesis was rejected.

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