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KINEMATICAL ANALYSIS OF HIGH DRIVE IN SOCCER

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ABSTRACT

An effort has been made through this study to present kinematical affects in the performance of high drive in soccer in order to understand mechanics of high drive. Ten national male soccer players, volunteered to be subjects. Selected Kinematical variables for the selected skill were angle at right ankle joint, angle at left ankle joint, angle at right Knee joint, angle at left Knee joint, angle at right shoulder joint, angle at left shoulder joint, angle at right elbow joint, angle at left elbow joint, distance of sticking point from the hitting object towards the intended direction and angle of release of the ball. Distance covered in meters by the ball in high drive which was supervised by the experts was the main criteria to measure the performance. Prime objective of the study was to find out the correlation between the selected kinematic variables of the subject and the performance of the subject in set shot. Specialized Motion Pro and Simi Machix software were used to analyze the movements of the subjects. It was observed that the distance of sticking point from the hitting object towards the intended direction and angle of release of the ball having significant relationship with the performance of high drive in soccer. Whereas angle at right ankle joint, angle at left ankle joint, angle at right Knee joint, angle at left Knee joint, angle at right shoulder joint, angle at left shoulder joint, angle at right elbow joint and angle at left elbow joint were not found significantly related with the performance of high drive.

Keywords: Kinematics, High Drive and Force.

INTRODUCTION:

The amendment of rules has completely changed the structure of modern soccer game and Long drive attacks become the main tactic to score. In recently years, the Indian soccer team has good performance in international volleyball competition. Michal E. (1987) studied the effects of kinematical variables on the heading skills, he found that trunk flexion and elbows angles present 50~60% of improvement in the head skill. Moreover, all the upper extremity swing speed and

follow-up also noted as significant in enhancing the performance of the players in head skill. Ching zu chang (2000) studied biomechanical analysis of soccer players during penalty shots and found that stride length and ankle velocity showed high correlation with the performance of scoring plenty goals. The purpose of this study was to analyze the kinematics of High drive in soccer.

In the game of soccer, High Drive is one of the important and frequently used skills. In mature, skillful, soccer players the High drive kick involves a parabola with the intention of providing long distance approach to the ball. High drive skill is executed with subsequent support foot contact with the ground accompanied by sequential transfer of momentum from proximal to distal body segments in the swing or kicking limb. Following the angled approach the support foot is placed alongside and adjacent the ball with the toe of the support foot pointed in the intended direction of ball movement. The kicking limb at subsequent support foot is in a position of hip extension, knee flexion and ankle plantar flexion. In powerful high drive, following preparation of the kicking limb, the hip is forcefully flexed and the knee is sequentially extended so that forces generated can be channeled into propelling the ball. At ball/foot contact powerful kickers keep the foot/ankle complex locked and tightly plantarflexed so forces for propelling the ball can be maximized (Chyzowych, 1979; Hay, 1996; Tsaousidis and Zatsiorsky, 1996).

OBJECTIVE:

To find out the correlation between the selected kinematic variables of the subject and the performance of the subject in set shot.

METHODOLOGY:

Purpose of the study was to analyze the high drive shot in soccer. Ten National level players were selected. Foot dominance was self selected based on the players response to which foot they preferred to kick with for maximal ball velocity. All males were right foot dominant. Their age range was 19-25 years. Body mass average of the subjects was 75.32 kg and height average was 184.15 cm. All subjects declared freedom from physical or orthopaedic injury, which would

prevent them from exerting maximal effort in instep kicking. Prior to data collection all subjects warmed-up with flexibility exercises, light running and high drive kicking. The use of subjects was approved by the qualified soccer coaches. Prior to warm-up, the task to be performed was demonstrated. Following warm-up subjects were randomly assigned to a series of five maximal high drive kicks. Selected Kinematical variables for the selected skill were angle at right ankle joint, angle at left ankle joint, angle at right Knee joint, angle at left Knee joint, angle at right shoulder joint, angle at left shoulder joint, angle at right elbow joint, angle at left elbow joint, distance of sticking point from the hitting object towards the intended direction and angle of release of the ball. The criterion measure for this study was the performance in high drive of the subjects in relation to distance covered in meters by the ball which was supervised by the experts.

VIDEO ANALYSATION:

Specialized Motion Pro and Simi Machix software were used to analyze the movements of the subjects. Two Digital video cameras were used in order to register the High drive. A standard motor driven camera i.e. Kodak ES C875, was used to obtain sequences of selected movements during the high drive. After obtaining the videography and sequential photography, software analyzation technique was used to measure the entire variables. For actual results from the used softwares proper calibration was done.

Figure 01: Showing the quick snap shots of analyzing high drive through the motion pro (ACV) software to collect data.

RESULTS:

The results of the coefficient of correlation which were obtained to get the relationship of selected Kinematical variables namely angle at right ankle joint, angle at left ankle joint, angle at right Knee joint, angle at left Knee joint, angle at right shoulder joint, angle at left shoulder joint, angle at right elbow joint, angle at left elbow joint, distance of sticking point from the hitting object towards the intended direction and angle of release of the ball with performance of high drive in soccer are presented in table 1.

Table-1: Table showing coefficient of correlation of selected kinematic variables with the Performance of high drive in soccer.

Sl.No.	Variables	Coefficient of Correlation
1	Angle at right ankle joint.	.342
2	Angle at left ankle joint.	.036

3	Angle at right Knee joint.	-.310
4	Angle at left Knee joint.	-.137
5	Angle at right shoulder joint.	-.010
s6	Angle at left shoulder joint.	-.487
7	Angle at right elbow joint.	-.502
8	Angle at left elbow joint.	-.065
9	distance of sticking point from the hitting object towards the intended direction	.882*
10	angle of release of the ball	.776*

*Significant at 0.01 level.

The obtained values of coefficient of correlation for the variables namely angle at right ankle joint, angle at left ankle joint, angle at right Knee joint, angle at left Knee joint, angle at right shoulder joint, angle at left shoulder joint, angle at right elbow joint, angle at left elbow joint were found not significant at 0.05 level of significance, therefore the selected variables have shown no significant relationship with the performance in high drive in soccer.

The coefficient of correlation of the variables distance of sticking point from the hitting object towards the intended direction and angle of release of the ball was found significant at 0.01 level. In the present case this can be stated that there is significant relationship between the selected kinematic variables with the performance of high drive in soccer.

In order to get the regression values distance of sticking point from the hitting object towards the intended direction taken as independent variable and performance as dependent variable. The model summary depicted R at .882 with R square at .777. Where as when angle of release of the ball taken as independent variable separately and performance as dependent variable, R exhibited at .776 and R square at .603.

DISCUSSION:

Identification of kinematic variables may play a critical role in teaching and training of aspiring young soccer players.In this research study it can be stated that there is no significant

relationship between the kinematic variable namelly angle at right ankle joint, angle at left ankle joint, angle at right Knee joint, angle at left Knee joint, angle at right shoulder joint, angle at left shoulder joint, angle at right elbow joint, angle at left elbow joint and the performance of high drive in soccer and therefore, these selected variables put no impact on the performance of high drive. The obtained insignificant values of co-efficient of correlations might have been due to small sample size or some other reasons. The kinematic variables distance of sticking point from the hitting object towards the intended direction and angle of release of ball have shown significant relationship with the performance in high drive in soccer. There have been a number of reseach on the mechanics of soccer skills like high drive, instep kicking, heading etc from youth to the elite level (Asami and Nolte, 1983; Barfield, 1993; Barfield, 1995; Barfield, 1997; Rodano and Tavana, 1993) and it was found that releasing angle and force plays important role in performance. distance of sticking point from the hitting object towards the intended direction is actually a good example of principle of distance of application of force on the attempting body. Impact of the distance of sticking point from the intended direction and angle of release of the ball was also found significant through the regression values. Impact of the significant variables Indicated that much of the variation in the performance was being caused by the variable namely distance of sticking point from the hitting object towards the intended direction. Impact Angle of release of ball plays effective part (6%) in the performance.

CONCLUSIONS:

When selected kinematic variables examined in high drive of soccer it was analyzed that

1. Out of ten selected kinematic variables eight of them namely angle at right ankle joint, angle at left ankle joint, angle at right Knee joint, angle at left Knee joint, angle at right shoulder joint, angle at left shoulder joint, angle at right elbow joint and angle at left elbow joint were not found significantly related with the performance of high drive.
2. It was observed that the distance of sticking point from the hitting object towards the intended direction and angle of release of the ball having significant relationship with the performance of high drive in soccer.

3. Distance of sticking point from the hitting object towards the intended direction made highest impact (77%) in the performance.
4. Angle of release of the ball puts about 6% impact in the performance.

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