INTERNATIONAL JOURNAL OF HEALTH, EXERCISE AND SPORTS SCIENCES

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ANGULAR KINEMATIC ANALYSIS OF INSTEP KICK WITH PREFERRED AND NON-PREFERRED FOOT

ABSTRACT

This study aims to find the kinematic pattern of the preferred and non-preferred foot during the instep kick. In the study of the Angular velocity of the hip joint (AVHJ) and angular velocity of knee joint (AVKJ) variables are studied. These variables show the flow of the instep kick. For the collection of data, five inter-university players were selected from Punjabi University Patiala. A test was administered before the data collection. To check the accuracy of the instep kick, a valid J T Finnoff's method (2002) was administered. Five trials were given to each player with both preferred and non-preferred feet. The motion of the kick was captured with a higher-quality camera. The mark was pointed on the target board of each kick during the whole process. To analyze the kinematic variable, silicon coach eight software was used. For the interpretations of the data, SPSS and MS Excel were used. Variable angular velocity of hip joint shows a significant difference between preferred and non-preferred foot during instep kick. But in the variable of the angular velocity of the knee joint did not show any significant difference between kicking with the preferred and non-preferred foot.

Keywords: instep kick, soccer, preferred and non-preferred foot,

INTRODUCTION

Kicking is the most important skill which is used in football during passing and for a goal score. The prime objective of instep kick is the speed or frequency used in long-distance shooting or passing (Kawamoto et.al). Resultant ball velocity depends upon the quality of the impact phase during the ball contact (Asami & Nolte, 1983; Andersen et al, 1999). Swing limb loading is an important phase in the soccer kick chain, which is effective or fast to the action of kick.

Some studies that documented the kicking kinematics have typically captured limb movements at more than 100Hz (Andersen et al, 1999). These studies verify the kinematic action of the limb angular velocity. In a study, the maximum linear velocity of the hip was 5.49±0.53m/s, knee velocity was 10.89±0.63m/s, ankle velocity was 19.36±0.96m/s, and toe velocity was 24.59±1.33m/s calculated (Juarez et al, 2011).

Players always keep in mind the accuracy and ball velocity during the performance. This variable depends on the various other outlines of the action. The player's behavior or motive determines the ball's velocity, and accurate contact time and linear velocity of limb help to move in the right direction to the ball.

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A ball rolled more close to the ground after the kick is the most frequent type of kick in futsal (Barbieri et al, 2008). Kick on a stationary ball is easier than a rolling ball. The main objective of instep or sidekick is accuracy and to protect the ball from our opponent (Kawamoto et.al).

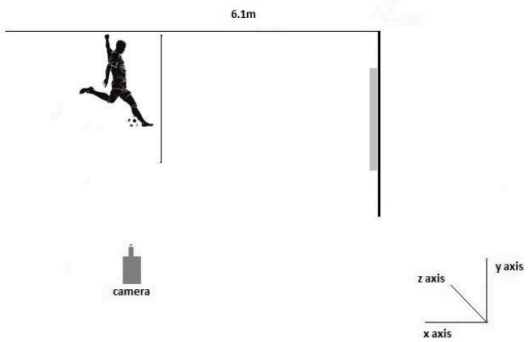
METHOD

SUBJECT

Five interuniversity male football players were selected from the Punjabi university for the collection of the data. Height, Weight, and limb length were measured before the collection of data. The history of medical injuries was also investigated. All players had at least two years of experience in playing soccer at the college and university levels.

TARGET AREA AND TEST SETUP

A systemic setup was prepared before the data collection. A reliable test was used for the collection of the data. A slandered target area was used, which fulfills the demand of the present study. A Wall was used as a board, a white flex chart measuring 243.5cm wide x 122cm high was used as a target area. Carbon paper was hung on the flex chart to get the kick impact mark on the flex chart. Bull's eye (shot point) was marked in the center on the lower corner of the flex chart to check the accuracy of the instep kick. A restraining line was marked 6.1m away on the ground.



VIDEO PROTOCOL

A higher-quality video camera (CASIO EX-FH) was used to capture the body's full motion during the instep kick. It records the motion video @50 frames per second. The Camera was placed perpendicular to the sagittal plane on a tripod in a stationary position at the height of 0.8 meters above the ground level. It was placed 7m away from the instep kick mark.

TEST ADMINISTRATION

A total number of five trails were provided to each subject with each foot. Some experienced research scholars were noting down the important data. Every kick point was marked on the target area after each trail. The kicking mark's width was noted on a score sheet. Each trial was recorded.

RESULTS

Table 3.1 Comparative statistics of the angular velocity of the hip joint of the preferred and non-preferred foot

Variable	Condition	Mean (in degree)	SD	T-value	p-value	Significant value
AVHJ	Preferred	493.88	112.28	-2.25367	0.01441	Significant
	Non-preferred	588.48	177.31			

Table shows comparative statistics of the hip joint's angular velocity, which defines the flow of soccer

Kick and investigates the difference between preferred and non-preferred kicking foot statistically. The study shows a low p-value that defines a significant difference between preferred and non-preferred feet regarding the variable of the angular velocity of the hip joint (AVHJ). The table shows a high angular hip velocity of a non-preferred foot than a preferred foot.

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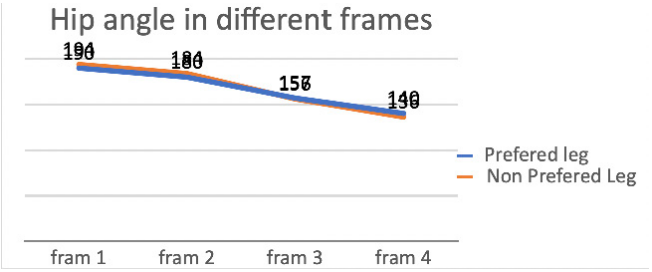

Figure 3.1: Changes in hip joint angle from "cocking phase" to "ball contact phase"

Mean and slandered deviation (MEAN±SD) were calculated regarding variable AVHJ 493.88±112.28 with preferred and 588.48±177.31 with the non-preferred foot. T-value was 2.2536, and p-value 0.01441 showed a significant difference between preferred and non-preferred foot about the variable of the angular velocity of the hip joint.

Table 3.2 Comparative statistics of the angular velocity of the knee joint of the preferred and non-preferred foot

Variable	Condition	Mean	SD	T-value	p-value	Significant value
AVKJ	Preferred	465.24	171.78	1.0825	0.1422	Not significant
	Non-preferred	396.82	265.25			

The table shows the comparative statistics of the angular velocity of the knee joint of the preferred and non-preferred foot during instep kick. The study examined a high mean value of preferred foot. But the p-value did not show any kind of difference between preferred and non-preferred foot.

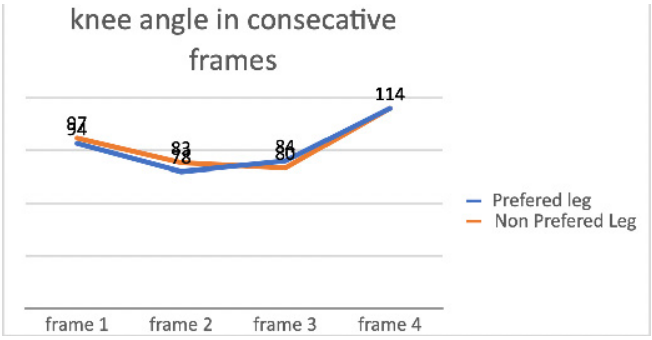

Figure 3.2: Changes in knee joint angle from "cocking phase" to "ball contact phase"

In this study Mean and standard deviation (MEAN±SD) were calculated regards variable AVKJ 465.24±171.78 with preferred and 396.82±265.25 with the non-preferred foot. T-value was 1.0825, and p-value 0.1422 did not show a significant difference between preferred and non-preferred foot regarding the variable of the angular velocity of the knee joint (AVKJ).

DISCUSSION OF FINDINGS

The comparative statistics investigated a significant difference in preferred and non-preferred foot flow during the instep kick. In a study, 15% of the kinetic energy stored in the kicking leg is transferred to the ball (Lees et al., 2010). The present study showed high hip velocity of the non-preferred foot than the preferred foot. The reason could be the difference in muscle mass of the two limbs, thus allowing more force to be generated on one side than the other (Chibber SR, Singh I. (1970). During the instep kick at the initial contact, the elastic energy is saved and later dissipated as the ball leaves the foot (Blazevich 2013).

CONCLUSION

The finding of this study could imply when designing a training program for the soccer players. The limb dominance and associated asymmetry should be considered and evaluated for each player for an optimized performance during kicking in soccer.

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