REVIEW OF RESEARCH

KINEMATIC ANALYSIS OF DIFFERENCES IN KICKING WITH PREFERRED AND NON-PREFERRED KICKING FOOT

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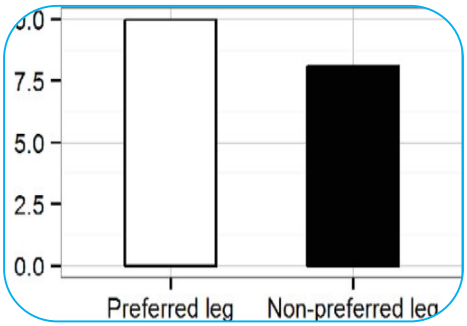

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ABSTRACT:

The study was undertaken with the objective of understanding the kinematic deviations between preferred and non-preferred kicking foot of national level female soccer players. The study was followed under the heading of kinematic analysis of kicking differences when kicking with preferred and non-preferred kicking foot, in addition to this J T finnoff"s method was also administered to test the kicking accuracy of football players. The nature of the study was both descriptive and quantitative. This study used biomechanical method to understand the kinematic deviations and was pursued in lines with the scientific standards. The participants of this study were five elite female soccer players having national level participation and years of experience to their name. The participants were called to an outdoor setting which was set by research scholar at Punjabi university Patiala football ground. Video graphic analysis was employed to record the video footage of soccer players during an 'instep kick'. The data was analyzed using the software packages of silicon coach pro 8 and kinovea..The statistical package SPSS was used to calculate the descriptive and inferential statistical techniques. The kinematic variables namely ball velocity, length of last step, knee angle of support leg and maximum knee flexion in cocking phase were selected for the study. The study resulted in significant differences in variables namely ball velocity and maximum knee flexion in cocking phase.

KEYWORDS: *instep kick, dominant foot, non-dominant foot, ball velocity.*

INTRODUCTION

Instep kicking is significant skill in soccer research (Lees & Nolan, 1998). Dorge, Anderson, Sorensen, and Simonsen (2002) documented the role of producing high ball velocities during kicking movements, noting that it progresses a player's chance of scoring by decreasing the quantity of time a goalkeeper has to react. Instep kicking is the frequently used kicking technique in soccer (Cerrah et al., 2011). Maximal instep kicking has therefore become the mostly explored movement sequence in soccer research by sports scientists.

Carey et al. (2001) presented that soccer players are predominantly one-footed but suggest that they are proficient of learning to kick with both feet. It has been further documented that the most effective goal scorers are those who are capable to shoot with both feet (Starosta, 1988). Therefore, bilateral symmetry in maximal kicking should form an important component in the progress of youth soccer players (Starosta,1988). A limited number of investigations have inspected the kinematic variances when kicking for maximum ball speed with the preferred and the non-preferred limbs (Dorge et al., 2002; McLean &Tumilty, 1993). McLean and Tumilty (1993) and Dorge et al. (2002) examined the bilateral kinematic variances when kicking with both the

dominant and non-dominant limbs. However, both of these inquiries were limited to the sagittal plane and inspected only a limited number of discrete kinematic variables. Maneuvering a ball to the proposed direction accurately is vital in soccer players. Hence, they attempt to advance the precision of their kick in everyday practices. It is very essential for soccer players to kick accurately not only with the preferred leg but also with the non-preferred leg. Because there are many conditions where players must use the non-dominant leg in actual games, high precision of the non-dominant leg kicks is very important. Nagasawa, Y et al (2011) reported that a common feature in underachieving junior youth soccer players is that they have a robust dependence on the use of the dominant leg in games. Mclean and Tumilty (1993) identified that the capability to kick a ball with both legs is vital for skilled soccer players.

It seems necessary to conduct a research that attempt to compare the kinematic differences of instep kick when kicking with dominant and non-dominant foot., thus improving the execution of efficiency of both the legs to kick the ball efficiently. Therefore, the present research was conducted to compare the kinematic variables of ball velocity, length of last step, knee angle of support leg and maximum knee flexion of support leg of both limbs from 6.1-meter distance performed by female players. The question addressed in this research was that whether there exist any significant differences between the kicking variables of dominant and non-dominant foot.

METHODS

Five interuniversity female football players of Punjabi university Patiala were randomly selected as subjects for the study. Anthropometric measurements, along with medical histories were collected from each individual. The anthropometric data (M±SD) of soccer players which includes; Age in years 25±1, height (cm) 164.05±4.06, body mass (kg) 52.8±3.70. The study was undertaken with the objective of understanding the kinematic deviations between preferred and non-preferred kicking foot of national level female soccer players. The study was followed under the heading of kinematic analysis of kicking differences when kicking with preferred and non-preferred kicking foot, in addition to this J T finnoff"s method for accuracy testing was also administered to test the kicking accuracy of football players. The participants were called to an outdoor setting which was set by research scholar at Punjabi university Patiala football ground. Video graphic method was used in this study to record the data on the female soccer players. A video camera (CASIO EX-FH) that recorded at the speed of 50 frames per second was used. The camera was put perpendicular to the plane of motion (sagittal plane) at a distance of 5 meters so that it could capture the kicking of the football player in full and also track the ball. The camera was put on a tripod to keep the camera stationary at a height of 1 meter above the ground. The camera was used with 1.0 zoom to record the data in HD (1080 pixels). The camera was set-up such that the field of view of the camera would record the successive parts of kicking ie. Approach, ball contact and follow through. The nature of the study was both descriptive and quantitative. This study used biomechanical method to understand the kinematic deviations and was pursued in lines with the scientific standards. The next part of the project was data collection. The research scholar was also assured help by many experts and fellow research scholars who helped in the total process of data collection. The data was analyzed using the software packages of silicon coach pro 8 and kinovea. The statistical package SPSS was used to calculate the descriptive and inferential statistical techniques. The study resulted in two significant differences in variables namely, ball velocity and maximum knee flexion in cocking phase. This study also sought to correlate various linear and angular variables to kicking accuracy however, after using Karl Pearson's coefficient of correlation no relationship was found among the selected variables in this study.

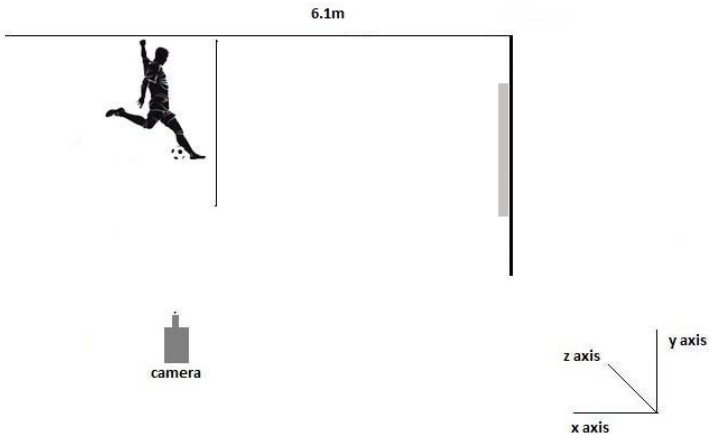
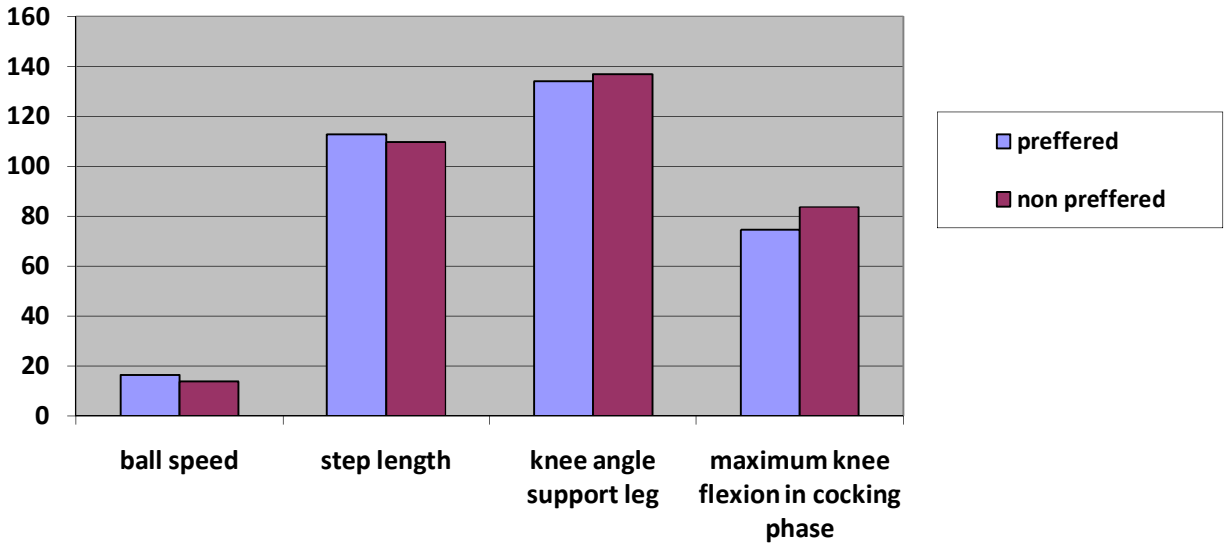


Figure 1: Plan view of the data collection set-up

RESULTS

variable	t-value	p-value	Significant at p<.05
Ball velocity	3.355	0.0007	Significant
Step length (SL)	0.7916	0.2162	Not significant
Knee angle in support leg (KASL)	-1.306	0.0988	Not significant
Maximum knee flexion in cocking phase	2.816	0.0035	significant



The mean and standard deviation (MEAN±SD) with regards to the variable ball velocity was 16.2808±3.282861 with preferred foot and 13.8324±1.591926 with the non-preferred foot. The t-value with regards to the ball velocity with preferred and non-preferred foot was 3.355 and p-value was 0.0007 and was statistically significant at 0.05 level of significance p<.05.

The mean and standard deviation (MEAN±SD) with regards to the variable step length (SL) were 112.684±11.67111 with the preferred foot and 109.552±15.97024 with the non-referred foot. The t-value with regard to the variable step length (SL) was 0.7916 and the p-value was 0.216 and was not statistically significant at 0.05 level of significance p>.05.

The mean and standard deviation (MEAN±SD) with regards to the variable Knee angle in support leg (KASL) were 134.08±8.990365 and 136.76±4.943683 with preferred and non-preferred kicking feet respective. The t-value with regard to variable (KASL) was -1.306 and the p- value was 0.0988 and was not statistically significant at 0.05 level of significance p>.05.

The mean and standard deviation (MEAN±SD) with regards to the variable maximum knee flexion in cocking phase (MKFCP) were 74.44±13.08014 and 83.52±9.416829 for the preferred and non-preferred kicking foot respectively. The t-value was 2.816 and p-value was 0.0035 with regards to the variable MKFCP and was statistically significant at 0.05 level of significance p<.05.

DISCUSSION OF FINDINGS

The results of the present study suggest that there is significant difference of variable ball velocity between dominant and non-dominant foot, this was due to discrepancy of angular velocity which is an important contributor to ball velocity. These findings are similar to the study of (Barfield et al.,2002)

The final step of the approach is recommended to be the largest for maximal kicking. This results in greater degree of pelvic retraction, thus in turn allowing for a greater range for pelvic protraction (Stoner & Ben-Sira, 1981).

The support leg is critical in hitting the ball. Literature suggests that the placement of the foot should be between 5-10 cm either side of the ball depending upon the preferred striking foot. (Lees & Nolan, 1998). According to this study the optimum angle for the knee joint during support phase for females should be 134 degrees.

Angular velocity of knee at ball contact was significantly different on preferred and non-preferred sides, and is similar to the findings from study of (Barfield et al.,2002). In an utmost effort activity, like instep kicking, athletes would want this variable to be maximum at ball contact so that the ball can be propelled with greater speed.

CONCLUSION

This study found significant differences with respect to variables namely ball velocity and knee angle in cocking phase when kicking with dominant and non-dominant kicking foot.

In conclusion this study highlights the 2D kinematic differences when kicking with the preferred and non-preferred kicking foot.

That reduced ball velocity and knee angle in cocking phase were observed between paired limbs highlights the potential performance detriments that may occur when kicking with the non-preferred foot. So additional bilateral training is recommended which can be undertaken to reduce the discrepancy and bolster overall performance.

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