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Biomechanical Comparison of Two Different Kicks in Soccer

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Abstract:

The role that sports biomechanics can play is becoming more widely understood in the sports community and the demand for service increasing, research in sports biomechanics will have to consider carefully. This arouses curiosity in scholar to biomechanically compare two types of kicks mainly used in soccer. The study may be utilized for determining technical faults of skills and making corrections, used for selecting training programs.

Key words: sports biomechanics, kicks in soccer, technical faults, training programmes

Introduction

All movements of material bodies, both of men and animals, are subjected, without exception, to the laws of mechanics, as every movement involves mechanical movement and the locomotion of part of mass in space and time. It is the only first task of sciences to recognize this. It is necessary to make this qualification, because movement is not only locomotion, but is also a change in quality in fields above the purely mechanical. When we talk about scientific application of techniques it

means to develop scientific basis of the techniques through skill analysis in the laboratory, or in the field.

In recent years, research in soccer has been developed also, but few investigations have been exclusively concerned with muscle activity to the soccer kick motion. Some investigations (clarys et.al. 1984) have reported that extensor muscles are likely to be active during the flexion movement and vice versa. The so called 'soccer paradox'. The instep kick is one of the most fundamental and frequently used skills in the game of soccer. As many players perform the instep kick, it is often performed approaching from a diagonal.

In performing kicking movement the dominant extremely functions as an open kinetic chain system. In this segmental link system the internal muscle torques act between the individual links, which in soccer kicking are thigh, shank and foot.

Purpose of the study was to compare kicking the ball with inside of the foot and kicking the ball with instep of the foot on selected biomechanical variables.

Methodology

The subjects selected for this study were four male football players of university level were selected. Sequential photographs, the 'elgon' were prepared to analyze the kicks. From the photographs, the 'elgon' were prepared by using segmentation method and various biomechanical variables were obtained. Selected biomechanical variables were angle at hip joint (right and left), height of center of gravity at movement of stance, movement of execution and movement of follow-through, total horizontal distance covered, distance covered in flight, total time taken and time taken during flight. All the kicks perform by right leg and left leg was always non-kicking leg. The two kicks selected in the study were compared with regard to selected biomechanical variables by using t-test.

Analysis of data and result of the study

The analysis of data and findings has been presented in following tables' i.e. table 1 to table 4.

Table 1. Mean and Difference between the Means of Selected Angular Kinematic Variables of Instep and Inside Kicks at the Movement of Stance

Variables	Kick	Means	DM	DM	t-ratio
Right Hip Joint	Instep Inside	179.75 199.00	19.75	9.81	2.01
Left Hip Joint	Instep Inside	117.25 134.5	17.25	9.06	1.90
Right Knee Joint	Instep Inside	123.75 88	35.75	6.60	5.42*
Left knee Joint	Instep Inside	139.75 144.75	5	7.28	0.69
Right Ankle Joint	Instep Inside	134.25 104.5	29.35	7.61	3.91*
Left Ankle Joint	Instep Inside	92.75 116	23.25	6.17	3.77*

*significant at .05 level of confidence
t.05 (9) = 2.26

Table 2. Mean and Difference between the Means of Selected Angular Kinematic Variables of Instep and Inside Kicks at the Movement of Execution

Variables	Kick	Means	DM	DM	t-ratio
Right Hip Joint	Instep Inside	151.25 130.25	21	9.50	2.21
Left Hip Joint	Instep Inside	143 130.25	12.75	8.11	1.57
Right Knee Joint	Instep Inside	140.25 128.25	12	8.10	1.48
Left knee Joint	Instep Inside	143.75 143.5	0.25	7.75	0.03
Right Ankle Joint	Instep Inside	114.5 97.5	17	6.98	2.43*
Left Ankle Joint	Instep Inside	89.75 92.5	2.75	5.8	0.48

*significant at .05 level of confidence
t.05 (9) = 2.26

Table 3 Mean and Difference between the Means of Selected Angular Kinematic Variables of Instep and Inside Kicks at the Movement of Follow-Through

Variables	Kick	Means	DM	DM	t-ratio
Right Hip Joint	Instep Inside	92.75 77	15.75	12.63	0.80
Left Hip Joint	Instep Inside	150.5 157.5	7	7.15	0.98
Right Knee Joint	Instep Inside	160 155	5	9.74	0.51
Left knee Joint	Instep Inside	158.5 147.75	10.75	4.23	2.54*
Right Ankle Joint	Instep Inside	122 106.5	15.5	6.79	2.28*
Left Ankle Joint	Instep Inside	86 84.75	1.25	7.01	0.18

*significant at .05 level of confidence
t.05 (9) = 2.26

Table 4. Mean and Difference Between the Means of Selected Linear Kinematic Variables of Instep and Inside Kicks

Variables	Kick	Means	DM	DM	t-ratio
Total Distance Covered (mts.)	Instep Inside	73.101 73.32	0.22	0.892	0.25
Distance Covered in Flight (mts.)	Instep Inside	64.2 65.43	1.22	0.654	1.87
Time Taken During Flight (mts.)	Instep Inside	3.29 3.38	0.09	0.23	0.39
Total Time Taken (secs)	Instep Inside	9.29 9.37	0.8	1.014	1.03
Height of C.G.at Stance (cms.)	Instep Inside	116.69 104.37	12.32	3.84	3.21*
Height of C.G.at Execution (cms.)	Instep Inside	109.46 113.86	44	5.37	0.82
Height of C.G.at Follow-through (cms.)	Instep Inside	118.50 122.57	4.07	4.44	0.92

*significant at .05 level of confidence
t.05 (9) = 2.26

Results show that certain angular kinematics variables and linear kinematics variables have significant difference between the kicks of soccer.

Conclusions

1. Some of angular kinematic variables like angle at right knee joint, right ankle joint, left ankle joint, at movement of stance has significant differences, whereas right ankle joint at the movement of execution has significant difference. At the movement of follow-through angles at left knee joint and right ankle joint exhibits significant differences.
2. Linear kinematic variables have no significant differences except in the case of height of center of gravity at movement of stance, which shows significant difference.

Recommendations

Based on the conclusion drawn in this study, the following recommendations have been made:

1 The results may be utilized for determining technical faults of skill in kicking and to correct the faults.
2 The results may be used for selecting training programme.
3 The study may be conducted by using cinematography and subject of other performance level, sex and bigger size of sample.
4 Similar studies may be conducted on other types of kicks in soccer as well as on other games and sports.

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