Analytical Relationship of Kinematical variables with the observed Performance of Push-Pass in Football

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ABSTRACT*: Sixteen female footballer (n=16) who represented Kendriya Vidhyalaya, Barwani, (Madhya Pradesh) in Subroto cup held at New Delhi from 1st to 15th September, 2017, were selected as the subject for the present study and there range of mean age, mean height and mean weight was 16.5 ±.84 years, 152.8 ± 4.60 cm and 49.7 ± 6.45 kg respectively. Videography was employed for the biomechanical kinematics analysis of Push-pass. Nikon – D 5200 camera was used for the present study. The video camera was mounted on the tripod stand at the height of 1.40 mts. from the ground. The video camera was placed perpendicularly at center in the line of Penalty spot to the sagittal plane at a distance of 9.42 mts. The frequency of the camera was 50 frames/second. The subjects performed the skill three times and the best trail was used for the analysis. The selected phases of the selected movements and the centre of gravity of different phases were located by Kinovea software. The selected angular kinematic variables were obtained at Initial phase, Hip extension phase, Knee extension and ball touch phase and Follow through phase. Angles of selected joints were measured by the help of Kinovea software at the nearest of degrees. The performance of each subject of Push-pass was collected on the basis of three judge's evaluation. The findings of table 2 clearly revealed that the Shoulder Joint (Knee extension and ball touch phase .854 and Follow through phase .517), Hip Joint (Hip extension phase .598) and Knee Joint (Hip extension phase .541) and other remaining variables in all phases were less than the tabulated value (r = 0.4973) at 0.05 level of significance. The findings of table 3 also showed that the variables like Center of gravity at Hip extension phase .818, Center of gravity at Knee extension and ball touch phase .512, and Total time of execution of the skill .741 found significant with the performance of the Push-pass in football, and other remaining variables in all phases were less than the tabulated value (r = 0.4973) at 0.05 level of significance.

***KEYWORDS*: Kinovea, Push-Pass, Kinematic etc.**

INTRODUCTION

Sports biomechanics is a quantitative based study and analysis of professional athletes and sports activities in general. It can simply be described as the physics of sports. In this subfield of biomechanics the laws of mechanics are applied in order to gain a greater understanding of athletic performance through mathematical modeling, computer simulation and measurement. Biomechanics is the study of the structure and function of biological systems by means of the methods of mechanics (the branch of physics involving analysis of the actions of forces). Within mechanics there are two sub-fields of study: statics, which is the study of systems that are in a state of constant motion either at rest (with no motion) or moving with a constant velocity; and dynamics, which is the study of systems in motion in which acceleration is present, which may involve kinematics (the study of the motion of bodies with respect to time, displacement, velocity, and speed of movement either in a straight line or in a rotary direction) and kinetics (the study of the forces associated with motion, including forces causing motion and forces resulting from motion (Wikipedia, 2018). Biomechanics is the study of the structure and function of biological systems by means of the methods of mechanics (Hatze, 1974).

The game of soccer is one of the most popular team sports 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 (Weineck, 1997). The "inside of the foot" or "push" pass represents the most basic pass in soccer. The youngest players are usually introduced to the inside of the foot pass first because it is the easiest to learn, it is effective over short distances, and it does not require much leg strength. Although it is a little awkward at first for young beginners, the push pass provides the highest level of control because the shape of the inside of the foot conforms to the shape of the ball. Once the inside of the foot pass has been mastered, coaches may progress to passing involving player movement and then to the "instep drive" kick, which allows for passing at greater distances. The push pass, however, still represents more than half the passes used in games, even at the highest levels (Coaching American soccer, 2018).

OBJECTIVE

To co-relate the kinematic variables with performance of Push- pass in football.

DELIMITATIONS

1. The study was further delimited to the Sixteen female footballer (n=16) who represented Kendriya Vidhyalaya, Barwani, (Madhya Pradesh) in Subroto cup held at New Delhi from 1st to 15th September, 2017.

2. The study was further delimited to the under 17 girls only.
3. The study is delimited to the following selected kinematic variables-:

A. Angular kinematic variables of Push-pass
   i. Angle at right shoulder joint.
   ii. Angle at right hip joint.
   iii. Angle at right knee joint

B. Linear kinematic variables of Push-pass

   i. Height of Center of gravity at Initial phase
   ii. Height of Center of gravity at Hip extension phase.
   iii. Height of Center of gravity at Knee extension and ball touch phase
   iv. Center of gravity at Follow through phase
   v. Time of execution (time taken during complete movements).

4. The study was delimited on the Pearson Product moment correlation statistical technique.

LIMITATIONS

1. Lack of Cinematography was the major limitation of the study.
2. Lack of proper sophisticated instruments was also considered as the limitations of the study.

SAMPLE

For the present study the purposive sampling technique was employed to select the sixteen female footballer (n=16) who represented Kendriya Vidhyalaya, Barwani, (Madhya Pradesh) in Subroto cup held at New Delhi from 1st to 15th September, 2017.

TOOL

Pearson Product moment correlation statistical technique was employed to find the relationship among the kinematic variables with the performance and level of significance was 0.05.

METHODOLOGY

PROCEDURE

Sixteen female footballer (n=16) who represented Kendriya Vidhyalaya, Barwani, (Madhya Pradesh) in Subroto cup held at New Delhi from 1st to 15th September, 2017.were selected as the subject for the present study and there range of mean age, mean height and mean weight was 16.5 ±.84 years, 152.8 ± 4.60 cm and 49.7 ± 6.45 kg respectively.

Videography was employed for the biomechanical kinematics analysis of Push-pass. Nikon – D 5200 camera was used for the present study. The video camera was mounted on the tripod stand at the height of 1.40 mts. from the ground. The video camera was placed perpendicularly at center in the line of Penalty spot to the sagittal plane at a distance of 9.42 mts. The frequency of the camera was 50 frames/second. The subjects performed the skill three times and the best trail was used for the analysis.

Figure no. 1 -
Photographic sequence of Push-pass

Selected kinematics variables (table 2 and table 3) and four selected phases (Figure 1) of whole skill i.e. of Initial phase, Hip extension phase, Knee extension and ball touch phase and Follow through phase were analysed. The selected phases of the selected movements and the centre of gravity of different phases were located by Kinovea software. The selected angular kinematic variables were obtained at Initial phase, Hip extension phase, Knee extension and ball touch phase and Follow through phase. Angles of selected joints were measured by the help of Kinovea software at the nearest of degrees. The performance of each subject of Push-pass was collected on the basis of three judge's evaluation. The average of three judges was considered as the final point obtained by each footballer. Further, to easy calculation it was reduced out of ten points.

Table 1:
Evaluating criteria of Push-pass

S.NO.	COMPONENTS	POINTS
1.	Body position during initial phase	10
2.	Body position during hip extension phase	10
3.	Body position during knee extension and ball touch phase	10
4.	Body position during follow through phase	10
5.	Overall Execution of whole movement	10
	Total	50

Pearson Product moment correlation statistical technique was employed by SPSS software (20.0) to find the relationship among the kinematic variables with the performance and level of significance was 0.05.

RESULTS AND DISSCUSSION

Table -2
Analytical Relationships of selected angular kinematic variables with the Push-pass observed performance

S.No.	Variables	Phase	Correlation
1.	**Shoulder Joint**	Initial phase	.263
		Hip extension phase	.001
		Knee extension and ball touch phase	.854*
		Follow through phase	.517*
2.	**Hip Joint**	Initial phase	.133
		Hip extension phase	.598*
		Knee extension and ball touch phase	.015
		Follow through phase	.429
3.	**Knee Joint**	Initial phase	.156
		Hip extension phase	.541*
		Knee extension and ball touch phase	.114
		Follow through phase	.272

*** Significant at r 0.05 (14) = 0.4973**

The findings of table 2 clearly revealed that the Shoulder Joint (Knee extension and ball touch phase .854 and Follow through phase .517), Hip Joint (Hip extension phase .598) and Knee Joint (Hip extension phase .541) and other remaining variables in all phases were less than the tabulated value (r = 0.4973) at 0.05 level of significance.

Table -3

Relationships of selected linear kinematic variables with the Push-Pass performance

S.No.	Phase	Correlation
1.	Center of gravity at Initial phase	.273
2.	Center of gravity at Hip extension phase	.818*
3.	Center of gravity at Knee extension and ball touch phase	.512*
4.	Center of gravity at Follow through phase	.438
5.	Total time of execution of the skill	.741*

*** Significant at r 0.05(14) = 0.4973**

The findings of table 3 also showed that the variables like Center of gravity at Hip extension phase .818, Center of gravity at Knee extension and ball touch phase .512, and Total time of execution of the skill .741 found significant with the performance of the Push-pass in football, and other remaining variables in all phases were less than the tabulated value (r = 0.4973) at 0.05 level of significance.

The main reason of insignificant results is, in sports the performance in any games and sports depending upon the multidimensional factors such as physical factors, physiological factors, psychological factors and so many other factors. Only due to the slight association in the selected kinematics variables the result shows that the performance of the athlete cannot vary directly, because in football, these linear and angular kinematic variables are associated with the techniques but the whole performance regarding the skills and techniques consist of the variety of dominating factors that influence the performance.

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