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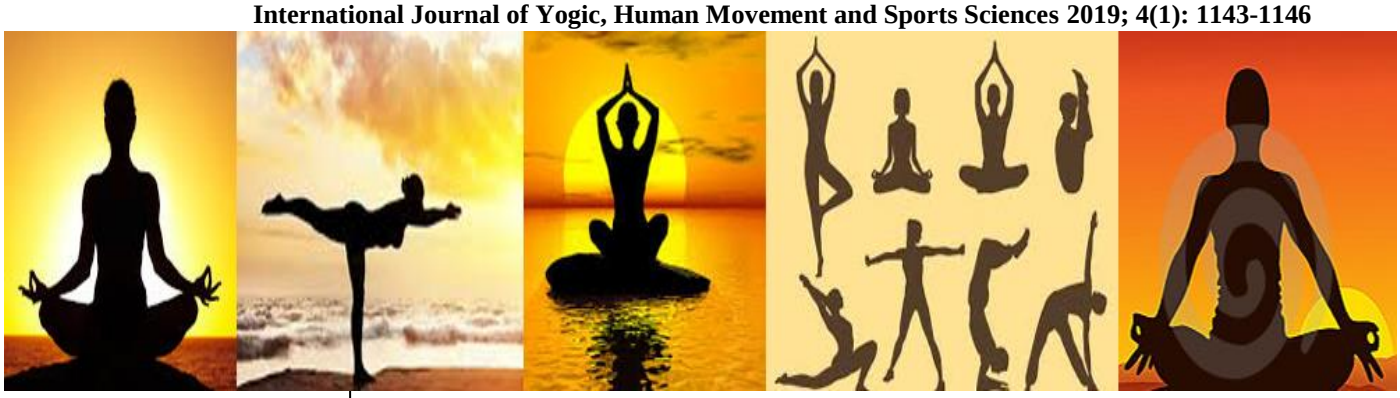

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Kinematical analysis of push pass in Hockey

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Abstract
The purpose of the present study was to investigate the relationships between the "Kinematical analyses of push pass in hockey". Total five female hockey players had been decided on as a sample who had represented at inter university level on the basis of performance in preceding competition. The study was delimited to the age of all subjects ranging 22 to 26 years. The selected kinematical variables such as Stance variables: Stance width (m) at the time of push pass, Ball-front foot distance (m) at the time of push pass, Push distance (m) at the time of push pass, Push time (s) at the time of push pass, Push speed {m/s) at the time of push pass. Performance variable: Accuracy (%) - the number of accurate trials (ten) divided by the total number of trials required, multiplied by 100%.The Kinematic Analysis of female hockey players mean, standard deviation and Karl Pearson's product moment coefficient correlation were employed with the help of statistical package of SPSS. The level of significance was set at 0.05. The outcome of the study shows that significant relationship with performance of performance of female hockey players.

Keywords: Kinematical, push pass in Hockey, Performance variable: Accuracy

Introduction
Research associated with field hockey has not kept pace with other Olympic sports aas primarily focused on injuries, biochemistry, sport injuries and psychology. Recent performance assessment investigate in field hockey has superior the understanding of movement patterns at the elite level (Lemmink, Elferink-Gemser & Visscher (2004). Other modern research has explored the effect of the basic rule changes applied to field hockey in current years concerning the enabling of players to 'self-pass' from free hits. The game of hockey is played between two teams consisting of eleven players over seventy minutes. There are several variations on formation but generally the positional roles within the team can be divide into forwards, midfield players and defenders. The modern game of field hockey is a speedy paced highly skilful game played over the world. Over the past period there have been many rule changes executed to make the game of hockey all the more stimulating. These rule changes have now changed the physiological necessities of the game. Hockey is a complicated game which requires a wide selection of skills. With any sport the higher the level of competition the quicker the game will be and demands on fitness increases (Dr. John & Parthiban (2012) [1].

Bio mechanics
Biomechanics is the science of movement of a living body, including how Muscles, bones, tendons and ligaments work together to produce movement. (Ramesh Rai. 1993)
Kinematic Kinematics is a science which deals with the description of motion. For example Distance, speed, velocity, acceleration, displacement. (Ramesh Rai. 1993)

Videography
Refers to the process of capturing moving images (e.g. Videotape, hard disk, or solid state storage). The term includes methods of electronic production. It is equivalent of cinematography, but with images recorded on electronic media instead of film stock. The word combine "video" from Greek and Latin, meaning "I see", "I capture" with the Greek terminal ending graphy, meaning "to write." Videography covers a lot of more fields than just shooting video with a camera. Including under the videography umbrella are digital animation,

gaming, web streaming, video blogging, still slideshows, spatial imaging, medical imaging and in general the production of most bitmap and vector based asset. Kinematics is a science which deals with the description of motion. For example Distance, speed, velocity, acceleration, displacement. Kinematics is the study and analysis of the functional motions of mechanisms. Kinematics has two branches for example linear kinematics and Angular kinematics. Linear Kinematics: It deals with the kinematics of translation, or linear motion. It is a science which deals with the description of motion anybody or object moving in a straight line or straight path. Linear Distance: The actual distance, covered by a body or an object is the distance. In other words it is the total distance covered by a body or an object from starting point to final point which is in motion called linear distance. Linear Displacement: The minimum distance between the initial position and the final position of a body in motion is called displacement. Linear Velocity: The average velocity of a body is defined as the rate at which displacement has occurred. In other words it is the rate of motion in specific direction is known as linear velocity. Linear Speed: The speed of moving body is the rate at which the distance is covered by the body or object or time taken to cover any distance by anybody or object which is in motion is known as speed (Lafontaine D (2007) [4].

Push pass

Push the ball when you need to make a quick pass over a short distance. Since the push pass is difficult to s protect against, quick pushes around the defense in the shooting circle will give your team additionally shooting chances. It is the quickest and easiest method of passing the ball to the partner. It is most significant skill or action that the stick is contact with the backside of the ball, when the stroke is made. Pushing is very vital skill, which helps significantly to play a good hockey in several situations. Pushing is utilized for giving any kind of passes, to restart the game, to take the penalty corners and penalty strokes and to score goals. Nobody could turn into a fine hockey player without utilize the skill, "pushing" efficiently in playing situation. In this way this skill also has to improve to the maximal for better effectiveness during the game as a player. Place the ball backside of your back foot. This will provide you more torque for extra power. The push is the finest way to pass the ball over a space of about 10m-15m.It's a fast and precise method for getting the ball to your team mate (Clarke, H. (1976) [3].

Stage One: Your hand must be separated around 30 cm with the left hand close to the top of the hockey stick and the correct hand further down. Keep your eyes on the ball and your feet should to be away from each other with knees bent. Stage Two: Ensure your back foot is generally in line with the ball. Keep your hockey stick in contact with the ball as you begin to move your weight from back to front foot. Stage Three: In follow through keeping your hockey stick makes contact with the ball for as long as possible, rising the speed of your hockey stick head as you close to your front foot. To achieve extra power and pace and follow through strongly with your stick - it should complete the process of pointing towards the direction of the pass.

Statement of the Problem

The problem entitle as "Kinematical analysis of push pass in hockey".

Selection of the subject

Total five female hockey players had been decided on as a sample who had represented at inter university level. The age of the samples was between 22 to 26 years

Selection of kinematical variables

Stance variables

1. Stance width (m) at the time of push pass.
2. Ball-front foot distance (m) at the time of push pass.
3. Push distance (m) at the time of push pass.

Performance variable

Accuracy (%)-the number of accurate trials (five) divided by the total number of trials required, multiplied by 100%.

Criterion Measure

The criterion measure for this study was the performance of the female hockey players. Total five attempts had been given to every subject. The performance of each push pass will be judged correctly measured and performance was recorded. The selected kinematical variables such as Stance variables: Stance width (m) at the time of push pass, Ball-front foot distance (m) at the time of push pass, Push distance (m) at the time of push pass, Performance variable: Accuracy (%) - the number of accurate trials (ten) divided by the total number of trials required, multiplied by 100%.

Filming Protocol

Motion capture method was used in this study. To record the video of the chosen five female hockey players, while they performing the push pass digital video camera (50 fps) was used by a professional photographer. After obtaining the recorded video, the video became analyzed through quintic coaching v-17 software approved by Human kinetics. First video was digitized through quintic coaching v-17 software. Motion capture technique/Digital videography became used to evaluation the kinematic variables of female hockey players. Digital video camera CASIO EX-FH 100 (50 fps) was used for videography of female hockey player's performance.

Administration of the Test

Total five female hockey players was selected as a sample who was represented at inter university level on the basis of overall performance. All the chosen subjects were asking to perform the push pass with their full capacity and correct technique. The players were well directed, informed and prepared for the study. Five chances have been given to every female hockey player. They were asked to perform the push pass in the natural way as they actually perform. It was ascertained that subjects possess reasonable level of technique. Players were video graphed with systematic filming technique as required. Motion capture method was used in this study. To record the video of the female hockey players, while them performing the push pass, digital video camera (50 fps) was used by a professional photographer. The overall performance of the subject was recorded with stroboscopic effect while they performing push pass. Digital Video camera was placed 5 meter away at the perpendicular to the plane of motion. Analysis of Film and Collection of Data Motion capture technique was used in this study. The films were analyzed by using standard "quintic coaching v-17 software" authorized by Human kinetics. Videos analysed through strobed photo sequence / stroboscopic effect, stick figure analysis, Quick images shots with the help of software for analysis of selected variables.

Reliability of the Data

To obtain variable measurements, standard and calibrated equipments like Digital Video Camera {CASIO EX-FH 100

(50 fps)}, measurement tape and specialized motion analyzing software (Quintic coaching v-17 software) approved by: Human Kinetic was used. All the equipment and software was supplied through standard agencies and companies and their accuracy was ensured by the experts and suppliers. All the measurements pertaining to the kinematical variables were taken by the researcher under the guidance of expert. Digital video camera {CASIO EX-FH 100 (50 fps)} was operated by expert professional videographer. So the data collected by using these instruments and software was considered reliable for the purpose of this study.

Statistical Procedure

With regard to purpose of the study Karl Pearson's product moment coefficient correlation statistical technique was calculated between selected kinematical variables with performance of female hockey players. In order to check the significance, level of significance will set at 0.05.

Table 1: Relationship between Stance widths in Hockey players with performance

Trials	Variables	Mean	Standard Deviation	Correlation (R) Values
50	Stance width	.999	.038	.840*
50	Performance	3.20	2.449	

r'0. 05 (48) = 0.273 *= Level of significance.05

Table & figure no. 1 shows that the mean value of Stance width of Hockey players was. 999, whereas the standard deviation (SD) of Stance width of Hockey players was.038 respectively. At the time of calculation of relationship between Stance widths with performance of Hockey players the r value was.840. The data does suggest that there is significant relationship between Stance widths of Hockey players with performance.

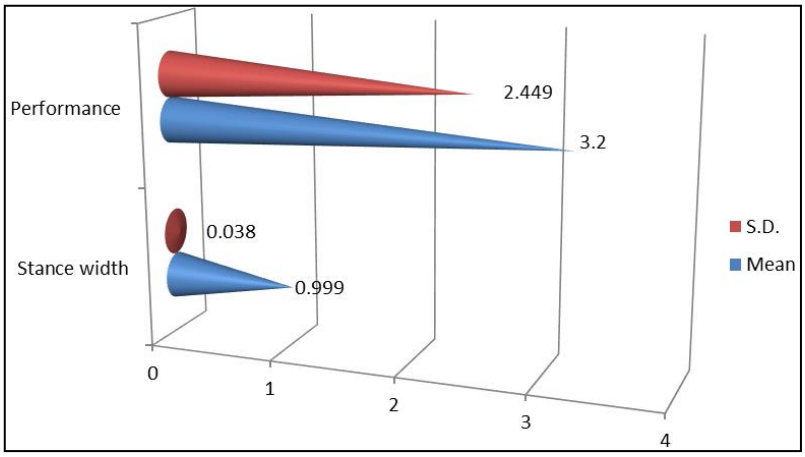

Fig 1: Shows mean and standard deviation values of Hockey players Stance width and performance

Table 2: Relationship between Ball front foot dist + ance in Hockey players with performance

Trials	Variables	Mean	Standard Deviation	Correlation (R) Values
50	Ball front foot distance	.506	.040	.859*
50	Performance	3.20	2.449	

'r'0.05 (48)= 0.273 *= Level of significance.05

Table & figure no.2 shows that the mean value of Ball front foot distance of Hockey players was.506, whereas the standard deviation (SD) of Ball front foot distance of Hockey players was.040 respectively. At the time of calculation of relationship between Ball front foot distance with performance of Hockey players the r value was.859. The data does suggest that there is significant relationship between Ball front foot distances of Hockey players with performance.

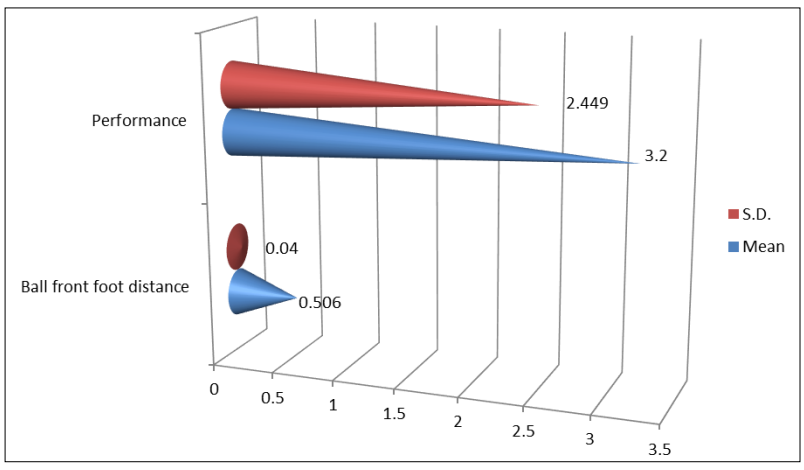

Fig 2: Shows mean and standard deviation values of Hockey players Ball front foot distance and performance

Table 3: Relationship between Push distances in Hockey players with performance

Trials	Variables	Mean	Standard Deviation	Correlation (R) Values
50	Push distance	.801	.043	.858*
50	Performance	3.20	2.449	

'r'0. 05 (48) = 0.273 *= Level of significance.05

Table & figure no. 3 shows that the mean value of Push distance of Hockey players was.801, whereas the standard deviation (SD) of Push distance of Hockey players was.043 respectively. At the time of calculation of relationship between Push distances with performance of Hockey players the r value was.858. The data does suggest that there is significant relationship between Push distances of Hockey players with performance.

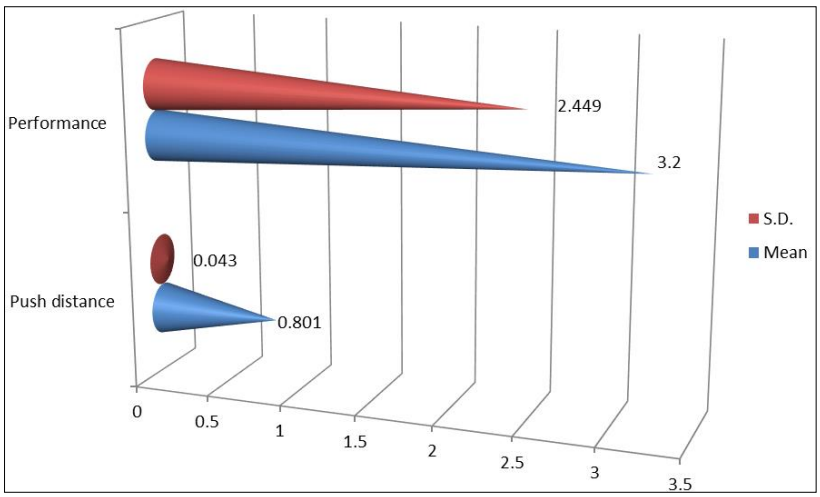

Fig 3: Shows mean and standard deviation values of Hockey players Push distance and performance

Conclusion

Based on the findings of this study, the following conclusions were drawn:

1. To conclude, it is evident that there was a significant relationship between stance width and Performance of female hockey players at the time of push pass.
2. To conclude, it is evident that there was a significant relationship between Ball-front foot distance (m) and Performance of female hockey players at the time of push pass.
3. To conclude, it is evident that there was a significant relationship between push distance (m) and Performance of female hockey players at the time of push pass.

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