REVIEW OF RESEARCH

KINANTHROPOMETRY AND PERFORMANCE OF FIELD HOCKEY PLAYERS IN PENALTY CORNER PUSH-IN

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ABSTRACT:

The aim of the present study was to analyze the kinanthropometric characteristics and push-in ball speed in field hockey. To achieve this, 73 male Hockey player who represented universities from the southern state of India (Tamil Nadu, Karnataka and Kerala) were selected. The subject's age ranged from 18-28 years and had at least four years of playing experience hockey. Written informed consent was obtained from players. The ethical clearance for this project was obtained from the Human Research Ethics Committee of the Bharathidasan University. The selected kinanthropometric variables, namely height, weight, arm length, leg length, humerus breadth, femur breadth, arm girth relax and calf girth were assessed by using a standard ISAK testing protocol. To obtain ball speed, a high speed Casio EX 10 camera operating at shutter speed of 1/8000, with a frame rate of 240 frames per second was used. The collected data were statistically analyzed by using descriptive statistics and stepwise linear regression. The result reveals that the university hockey players, the body weight, arm length, leg length and arm girth relax was the predominant variables for predicting penalty corner push-in performance for University level field hockey players.

KEYWORDS:
Kinanthropometry, Field Hockey, Penalty Corner, Push-in.

INTRODUCTION :

Field hockey is one of the famous game played in more than 127 countries. It is an intermittent endurance sport involving short sprinting as well as movement with and without ball (Manna et al. 2009). The success of the top teams depends on the conversion of the penalty corner. Penalty corner is awarded for a foul committed by the defending team in its own entire 23 meters area. Penalty corner execution can be separated into three progressive phases: the push-in, the trap and the strike. Kerr and Kevin (2006) opined that the whole penalty corner process takes about 1.9 seconds and 2.3 seconds respectively for male and female players of national standards. The push begins with a pusher standing in the back line with at least one foot outside the field of play. The left shoulder points towards the target and push the ball towards the trapper. In the trap-phase, another attacking player traps the ball out the circle and propels it into the circle for drag flick or strike towards the goal (Viswanath &Kalidasan 2012). In current scenario, the physical and physiological demands are increasing every day in high performance. Physical characteristics and body composition have been known to be fundamental to excellence in athletic performance (Mathur 1985), (Mandeep Singh 2010).Today, it has been generally acknowledged by the specialists that top performance in sports is achieved if an athlete possesses the basic anthropometric characteristics suitable for the specific event or skill. Therefore, the athletes in a particular sport must possess such typical characteristics which are of advantage to their performance. Kinanthropometry

is the study of human body size, shape and form and how those characteristics relate to human movement and sporting performance (Eston, 2009).There is a lack of published data on the kinanthropometric and penalty corner push-in performance of field hockey players. The purpose of the study was to identify the predominant factors in assessing the performance of the penalty corner push-in from the kinanthropometric parameters among university field hockey players.

METHODOLOGY

To explore the performance related aspects of this study, 73 male Hockey players were selected who represented various universities from the southern state of India (Tamil Nadu, Karnataka and Kerala).The subjects had past playing experience of at least four years in hockey. The age of the subject ranged from 18 – 28 years. Written informed consent was obtained from players. The ethical clearance for this project was obtained from the Human Research Ethics Committee of the Bharathidasan University. Using ISAK accredited methods, a profile of 9 measurements such as height, weight, arm length, leg length, humerus breadth, femur breadth, arm girth relax and calf girth was collected from each player. The selected kinanthropometrymeasurements were taken by trained and qualified level one anthropometrist of ISAK. The equipment used for taking measurement included Stadiometer, weighing scale, sliding calliper and anthropometric tape. The height and weight were measured with stadiometer and weighing scale respectively. The arm length was measured from acromiale to dactylion is made from the point of the shoulder to the tip of the middle finger. The linear distance between the most lateral aspect of the lateral humeral epicondyle and the most medial aspect of the medial humeral epicondyle, was measured with the small sliding calliper to measure elbow diameter. The knee diameter was measured between the most lateral aspect of the lateral femoral epicondyle and the most medial aspect of the medial femoral epicondyle. Arm girth was measured at the level of the Mid – acromialeradiale, the subject standing relaxed with the arms hanging by the sides, slightly abducted to allow the tape to be passed around the arm. To obtain ball speed, a high speed Casio EX 10 camera operating at shutter speed of 1/8000, with a frame rate of 240 frames per second was used. The camera was placed on a tripod at the height of 1.2 meter on the right angle i.e. transverse to the trajectory of the ball of the push in performance. Each player was recorded performing the push-in until three accurate trials, i.e. within 0.70 m each side of the trapper was performed. The accurate trial with greater ball speed was deemed as the best push-in trial for each player. The best push-in trial was analyzed through the Max Traq software. Descriptive statistics and Step wise argument methods of multiple regression was used in this study to find out the predictor variable that has the highest correlation with the criterion variables which were entered in the equation depending on the contribution of each predictor. Data were analyzed using SPSS (Statistical Package for Social Science) version 20.0. The level of significance was fixed at 0.05.

RESULTS AND DISCUSSION

The descriptive statistics – mean and standard deviation of kinanthropometric and ball speed of hockey players are presented in the table - I.

Table – I
Descriptive statistics of kinanthropometric characteristics and push-in ball speed of university hockey players

	Mean	Std. Deviation
Ball speed (m/s)	16.45	± 0.75
Height(mts)	1.72	± 0.05
Body Weight(kg)	73.24	± 7.80
Arm length(cm)	77.66	± 4.22
Leg length(cm)	97.62	± 6.27
Humerus breadth(cm)	6.92	± 0.32

Femur breadth(cm)	9.62	± 0.32
Arm girth relax(mm)	27.51	± 2.07
Calf girth(cm)	34.56	± 2.45
Skinfold(cm)	55.91	± 11.73

Stepwise multiple regression was computed to explore the prediction of dominant factors of hockey penalty corner ball speed from the predictor variables of University men hockey players.

Table II
Multiple linear Regression model to predict ball speed with accuracy in penalty corner push-in performance

Model	B	Std. Error	Beta
(Constant)	11.028	2.468	
Leg length	.050	.011	.418
Arm girth	-.820	.215	-.350
Arm length	.062	.016	.344
Body weight	.019	.009	.199

Table II shows a significant regression equation was found ($F(4,68)=13.063, p<.005$), within R^2 of 0.435. Field hockey players predicted penalty corner push-in ball speed is equal to 11.028 + 0.50 (Leg length) - 0.820 (Arm girth) +0.062 (Arm length) + 0.019 (Body Weight).

In this study, in general the arm length and leg length is directly proportional to the stance width which in turn increase the drag distance during execution of the skill. If the leg length and arm length increases, stance width and drag distance also increase, which in turn makes the speed of the ball also to increase for effective execution of the push-in (Viswanath &Kalidasan, 2014). Among the girth measurements, arm girth relax was found be the best predictor for penalty corner push-in performance. Beneath the skin is a layer of substance fat and the percentage of total body fat can be measured by taking the girth measurements. The average girth measures helps in developing strength as well as its associated factors which helps to maintain the optimum performance (Viswanath &Kalidasan, 2014).

It was registered that the pusher would execute the field hockey penalty corner push-in task with greater accuracy due to regular practice of the skill (Kerr & Ness, 2006). The findings of the present study had strong agreement with the findings of (Kerr & Ness, 2006) that 0.6 m accuracy allowance on either side of the trapper may have been too easy to obtain. Compared to previous research, the push-in ball speeds were faster than the push (10.6 m/s) but slower than the drag flick (21.9 m/s) (McLaughlin, 1997), the slap shot (25.3 m/s) and the hit (38.6 m/s). The faster ball speeds for the hit and the slap shot were expected because they incorporated a back swing before ball contact to generate additional speed transfer from the stick to the ball. The push and drag flick skills, however, do not involve a back swing for speed contributions.

CONCLUSION

The kinanthropometric variables, namely arm length, leg length, arm girth relax and weight were the common predominant variables for predicting the performance variable of university hockey players.

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