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## Impact of stance width on field hockey goalkeeping performance in penalty stroke

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### Abstract

The purpose of the study was to find out the impact of stance width on goalkeeping performance in penalty stroke in field hockey. To achieve the purpose of this study, ten Inter-Collegiate goalkeepers were selected as subjects from Chennai and age group was ranged from 19 to 25 years. The stance width and knee angle in the penalty stroke position were selected as independent variables. The overall penalty stroke performance of the goalkeeper was measured using the 10 point scale which consists of five penalty strokes. Each goalkeeper was given five trials only. The successful trials of each goalkeeper were digitized and analysed by taking the mean values. The goalkeepers preferred stance width and the knee angle also was measured by using KINOVEA software. Canon EOS 600D and SONY HDR-XR550E camera was positioned on a camera tripod 1.50m off the ground 6.40 m directly in front of the goalkeeper and 5.00m directly perpendicular to the goalkeeper. The collected data were statistically analysed by using Pearson product moment correlation and the level of significance was fixed at 0.05 level. It was concluded that the stance width had a significant relationship with goalkeeping performance in penalty stroke position in field hockey.

**Keywords:** Penalty stroke, goalkeeping, stance width

### Introduction

A game of field hockey is won by outscoring the opposition. The goalkeeper forms the last line of defence for a team and has task is to intercept shots that are made from within a 14.6m radius from the goal. An excellent goalkeeper can influence a game decisively to his team's advantage, when his calmness and ability to communicate themselves to the rest of the defence. His reliability gives not only his defence, but also his forwards, confidence in themselves and trust in him, qualities which can inspire the whole team to an outstanding performance and, at the same time, cripple the opposition. If on the other hand, the last line of defence is weak and suffers from nervousness and unsureness, his influence on his team's performance is always negative, even if he does not let in a goal during the game. For instance, the forwards are then afraid to mount an attack with numerical superiority and all too easily fallback upon nervous defence (Wein, 1973) [3].

Goalkeepers were not considered the glamorous men in earlier days but now with recent revolution in the development of the game things have changed and there is a general recognition of importance of goalkeeper. A good goalkeeping performance not only frustrates opponents in their attempt to score goals but also spread an air of confidence to fellow defenders. The goal keeper should endeavor to play calmly with concentration and to act with determination before and during the game. To build him up both physically and psychologically, the goalkeeper in training should frequently play in other positions also both as a defender and as an attacker (Whitaker, 1986) [2].

Goalkeeping is an exciting job, one that can result in dramatic saves which keep a team in a game. Some of the basic skills the goalkeeper must develop are mobility, quick reflexes and agility to clear rebounds and to utilize the sliding tackle to challenge an attacker who has broken clear of other opponents. It is also essential for the goalkeeper to direct the defence. But his primary duty is to save goals. He must never forget where the goal posts are and he has to work hard to improve his defense mechanism at penalty-corners and strokes (Cadman, 1985) [4]. Ball and Giblin (2009) [1] analysed the minimizing movement time is essential for a

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field hockey goalkeeper and stance width is considered important to agility. On a group basis, a stance width of 1.1 m was optimal for minimizing movement time for high and low saves and for right and left saves. On an individual basis, 1.1 m was the optimal stance for eight of ten subjects. Only two subjects performed optimally at their preferred stance width. Where shots to the corner of the goals are likely, goalkeepers should adopt a wide stance.

The penalty stroke is predominantly awarded when a foul has prevented a certain goal from being scored or for a deliberate infringement by a defender in the penalty circle. After the implementation of shootout penalty stroke was rarely the situation happens at any time of match and shootout situations. But sometimes a deliberate violation happened in shoot out time the penalty stroke will be awarded. So in that situation to avoid scoring goal from the opponent, it was easy to handle through this study may give full confidence to save the goal in proper way.

There are few studies examining goalkeeping technique and none exist in field hockey. In soccer, technique differences have been identified between goalkeepers of different skill levels (Suzuki et al., 1987) [6] and between saves to the dominant and non-dominant sides (Sprat ford et al., 2007) [5]. These studies reported that a more direct path towards the save point was evident in more elite performers (Suzuki, et al., 1987) [6] and on the dominant compared to the non-dominant side (Sprat ford et al., 2007) [5]. In spite of the importance of stance width in numerous sports, it is perhaps surprising that there are only a few studies focusing on this feature of sport skills. The aim of this study was to examine the association of stance width and knee angle with goalkeeping performance.

**Methodology**

Ten inter-Collegiate level male field hockey goalkeepers were selected for the study. The age of subjects ranged from 19 to 25 years. The scores of the subject in penalty stroke were used as the criterion in the study. Subjects were instructed to react

as fast as possible to the signal and to use their normal save movement when completing each trial. Each subject wore their full goalkeeping gear as used in games (pads, kickers, helmet, gloves protective equipment and stick) and performed simulated saves. The performance of the goalkeepers was captured by video. Each goalkeeper was given five trials only. For each save, 2 points were awarded and the average rating of five penalty strokes on the overall goalkeeping performance was considered as the final score of subjects. The successful trials of each goalkeeper were digitized and analyzed. From this penalty stroke position, each goalkeeper's stance width was measured from the distance between outer edges of the both the foot included the goalkeepers preferred stance width was measured by using KINOVEA software. Canon EOS 600D camera was positioned on a camera tripod 1.50m off the ground 6.40 m directly in front of the goalkeeper and SONY HDR-XR550E camera was positioned on a camera tripod 1.50m off the ground 5.00m directly perpendicular of the goalkeeper. The Collected data were analyzed through Pearson product moment correlation. The level of significance was fixed at 0.05.



**Fig 1:** Measurement of Stance Width using KINOVEA software

**Results and Discussion**

**Table 1:** Descriptive statistics of the selected variables

S. No.	Variables	N	Minimum	Maximum	Mean	Std. Deviation (±)
Dependent variable						
1.	Goalkeeping Performance (Points)	10	4	10	6.8	1.93
Independent variables						
2.	Stance Width (Meters)	10	0.56	0.87	0.68	0.20
3.	Height (Centimetres)		173.86	181.29	177.02	2.48

Table – I shows that the mean value of goalkeeping performance, stance width and height was 6.8 points, 0.68 meters and 177.02 centimetres with standard deviation of ±1.93 seconds, ±0.20 meters, ±2.48 centimetres respectively. The minimum values of goalkeeping

performance, stance width and height was 4 points, 0.56 meters degrees and 173.86 centimetres and maximum values were 10 points, 0.87 meters and 181.29 centimetres respectively.

**Table 2:** Showing the correlation analysis of selected variables

Variables	Height	Stance Width	Goalkeeping Performance	Critical “r” Value
Height	#	0.295	0.021	0.632
Stance Width		#	0.869*	
Goalkeeping Performance			#	

\*Significant at table ‘r’ value with DF 8= 0.632 at 0.05 level of confidence

It was inferred from the Table –II that the goalkeeping performance was significantly correlated with stance width (0.869) at the 0.05 level of 0.632.

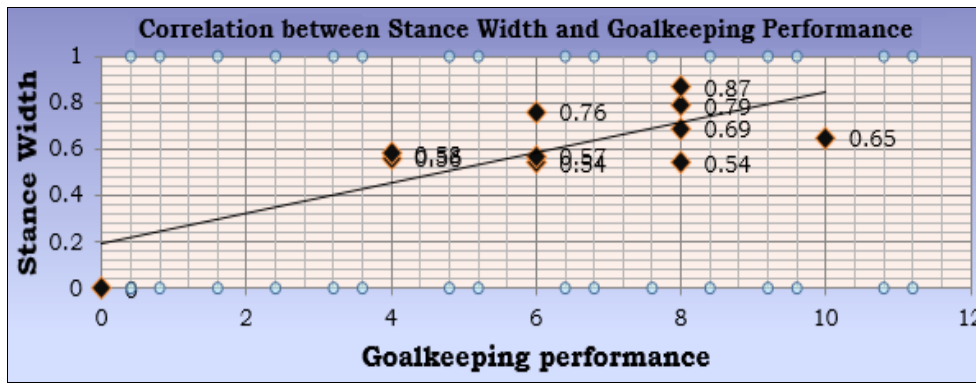


Fig 2: Scatter Plot of Goalkeeping performance and Stance Width



Fig 3: Scatter Plot of Goalkeeping performance and Height

Stance width was did not correlate with the height. This was an interesting finding that a longer legged goalkeeper might have a stance width that was wider than a shorter legged subject. There was no association between height between stance width.

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Table 3: Showing 't' test analysis of correlation value

	Stance Width	Height
'r' Value	0.869	0.021
Number of Subjects	10	10
't' Value	4.967*	0.059

\*Significant at 0.05 level of confidence. Table't' Value with DF 8=2.306

From the table III, it was found that the t' value of stance width 4.967 which was higher than the table value of 2.306. Hence, there is sufficient evidence to conclude that there was a significant correlation between stance width and goalkeeping performance. It was also found that the't' value of height 0.059 which was lesser than the table value of 2.306. Hence, there is sufficient evidence to conclude that there was no significant correlation between height and goalkeeping performance.

**Conclusion**

It was concluded that the stance width had a significant relationship with goalkeeping performance. The stance width was important for the goalkeepers to react quickly to save the goals in penalty stroke. Hence, it was recommended to coaches and goalkeepers adopting (0.72m to 1.00m) stance width ideal to save the goals.

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