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NOTATIONAL ANALYSIS ON TACTICAL PASSING SKILLS USED BY COLLEGIATE PLAYERS IN AN INDOOR HOCKEY MASUM TOURNAMENT

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ABSTRACT

The study aimed to determine the relationship of frequency for wall, diagonal and square passing with the performance for men and women team. Eighteen teams (man = 11; woman = 7) involved in this study. The Pearson correlation coefficient was used to examine the relationship between frequency of use wall pass, diagonal pass and square pass with team performance. Results of the study showed a significant relationship between the frequency of the use of passes to the achievement of the team in both categories. The significant value of wall pass, diagonal pass and square pass for men and women teams is ($p < 0.05$). Positive relationship indicated team that use more wall, diagonal and square passing was a successful team in tournament. The findings for this study could be used by trainers and individuals who involved in the player development and coaches education.

Keywords: indoor hockey; passing skills; wall pass; diagonal pass; square pass.

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1. INTRODUCTION

The area of notation analysis in sport science has evolved considerably in recent decades. Notation analysis aims to record important measures describing performance during match play or practice that equally useful to coaches and players. Indoor hockey have known and competed at international level but still lack a study for the field hockey and indoor hockey conducted to date [1]. Many researchers choose only the technical aspects, strategies and injury as their area of interest [1-4]. The notational analysis has been defined as a method that is valid and reliable that can be used to assess the performance of the team in any sport [5]. The notation is also focused on the general resistance, tactical guidance, and technical indicators [6]. This type of analysis is used to study the technical aspects of the performance of a team like football, rugby, volleyball and tennis [7]. Still lacking this type of study conducted for indoor hockey [1].

Although indoor hockey adapted from hockey field, there are many significant differences between the two sports. Rules of the game of indoor hockey has been renovated and refurbished to suit the sport [8]. The rules that different between field hockey and indoor hockey are technique of passes. In field hockey, a player is allowed to pass the ball use variety of ways such as hitting, pushing and lifting the ball. However, in indoor hockey passes is only possible by using pushing skills only. Hitting and lifting the ball is not allowed at all during the game [9]. Studies related to indoor hockey has been published focusing on the demand pulse rate between indoor hockey and field hockey [1]. The other previous study conducted on the expected penalty corner in the elite women's indoor hockey [3]. Results of this study showed 72 (22.6%) of the total 319 penalty corner has provide the goal scoring. Researchers also conclude most of goals scored from the penalty corner are direct to the right of the goalkeeper. Attacking team confidence interval is 2.27 times higher than the right of the goalkeeper as opposed to the left. In addition, if the goalkeeper had blocked the attacker in front of the line 'D' possibility attacking team fails to capture is 2.19 times higher than when the goalkeeper remains on the goal line. In a recent study has reviewed the performance indicators specific position that difference between a winning team and not successful team in the elite women's indoor hockey [10]. Studies done is to create a special position profiling of

the six major players competing in elite women's team and also the profiling to identify specific positions that would distinguish between a team that is successful or not. The results show that the team that not successful in the early rounds make mistakes on passes higher against teams that qualified for the next round. Right defense team that qualified to the next round also showed higher successful passes versus an unsuccessful team. The right attacker on the unsuccessful teams in the preliminary round showed lack in making the intercept during the game. Based on the results of this study, the coach needs to implement a match tactical strategy and also improve the player skills to provide team to face the competition.

The notational analysis is important as performance indicators related to the performance of the team is good or bad and also identifies a good or bad performance of the team members [6]. The method used to obtain performance information is by using simple hand notation or technology computer based notation [11]. Others sport such as tennis have many research that related with the notational analysis that valuable to use as guidance for the coaches on this field. Some notational analysis study conducted to examine the effect of gender of the tennis player on the surface of court [12]. Results showed that both variables gender and the surface of tennis court have a significant influence in all competitions under review. Findings such as these have helped advance the sport of tennis where the tennis players need not only focused on strategy games and their strengths or weaknesses, but the playing surface can also be used as a strategy. The study of match statistics and performance indicators in the sport of professional tennis has attracted the attention of many researchers [13-14]. Studies have been conducted to examine the serve in professional men tennis and the findings reveal that male professionals obtain one ace for every eight good serves [13]. Servicing in tennis concludes that each player needs to not only understand their own serving ability, but also the chance of winning the point when the serve goes into the court [15].

Skill and strategy of indoor hockey game that has many differences with the field hockey requires further research to improve the quality of the sport. One of the limitations with previous study related to indoor hockey that lacking in variable correlating performance such as skills of performance and success of the team. The frequencies of use of the wall pass, diagonal pass and square pass and its relationship with the teams will provide a greater

understanding of pattern of play in terms of strategy and tactics. The purpose of this study is to examine the relationship of frequency for wall, diagonal and square passing with the performance for men and women team at the Indoor hockey tournament.

2. METHODOLOGY

This current research is quantitative study with adapting ex post facto design to carry on the study. The data collection were undertaken in 2013 during Malaysia Sport Council Event (MASUM) held in Indoor Hockey stadium, Universiti Pendidikan Sultan Idris, Perak. The performance indicators in this study were focusing on passing techniques namely, wall passing, diagonal passing, and square passing. The total of passing execution of each team was recorded for further analysis.

2.1. Participants

A total of 11 male indoor hockey's teams and seven woman in door hockey's teams involved in this study. The team is representing their Universiti for MASUM competition. The age range of the player is 21 to 30 years old and full-time collegiate students. The permission of video recording was obtaining prior the data collection.

2.2. Instruments

The instruments used to record the match are Samsung NX1000 with 20.3 megapixel, camera video JVC types with 22 megapixel and tripod. Both types of video cameras capable of zooming as far as 34 times optimal zoom. Others instrument needed are manual forms and stationery for evaluation.

2.3. Procedure

Two examiners were selected and trained to assist the process of recording video. To determine the reliability, two-phase analysis of intra-rater and inter-rater has done. For intra-rater analysis, the researchers conducted an analysis of the same video twice in intervals of four weeks. The inter-rater assessment involves two people chosen at random and researchers also conducted an analysis of the two video games that are randomly selected. The evaluators of inter-rater analysis have been described with the criteria of particular skills. The successful passes only counted when a player passing the ball with the particular passes and

receive by other member of his team

2.4. Statistical Analysis

The statistical analysis used to achieve the objective of the current study is measurement of agreement, Cohen's Kappa to identify the reliability of the indicators [16-17] and Pearson correlation to determine relationship between the indicators and performance of the team.

3. RESULTS AND DISCUSSION

Table 1 shows the results of intra-rater analysis performed using statistical analysis of Cohen's Kappa. In the table showing the measure of agreement for the men's team is 0.57, which is at a moderate level in the interpretation of Cohen's Kappa. For the women's team also shows the measure of agreement between the valuations is 1, which is almost perfect and no error by interpretation Cohen's Kappa. This analysis proved to intra rater error is very small and has high reliability.

Table 1. The intra-rater scores passing of men and women team in intervals of four weeks

Category			Value
Men	Measure of Agreement	Kappa	0.57
	N of Valid Cases		3
Women	Measure of Agreement	Kappa	1
	N of Valid Cases		3

Table 2 shows the results of the analysis of inter-rater for the men and women teams. Intra class coefficient analysis results in table showing the findings of a single measure for men category is 0.89 and women is 0.84, which was good for the interpretation of the P and W [18]. These findings have proved that there is reliability in the results and analysis of this study.

Table 2. The inter-rater scores passing of men and women team

Category			95% Confidence Interval		F Test with True Value 0			
		Intra Class Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2	Sig
Men	Single Measures	0.89[a]	0.318	0.997	25.571	2	4	0.005
Women	Single Measures	0.84[a]	0.154	0.995	16.457	2	4	0.012

Table 3 shows the whole mean frequency of use of the wall pass, diagonal pass, and square pass of the men's and women teams. The results showed mean frequency of passes team with the highest use of the wall pass is the UiTM: 23 team, followed by the UniMAP; 21, the third highest team is UPSI; 20, followed by the UPNM; 19, UM; 18, Utem; 17, UniSZA; 16, USM; 14 and USIM; 13. The UPM team and the UMK; nine are the lowest team uses the wall passing skills. The highest team use diagonal passes were UM team; 23, followed by the UiTM; 22 while UPSI and UniMAP showed the same mean result; 18 also with the team UniSZA and UPM; 17 while the USM and UPNM; 12, followed by UTEM; 11 and lastly team USIM and UMK; 4. The mean frequency of the square pass showed the highest team use this type of pass is team UniSZA; 15, followed by the UM and USM; 12, teams UPSI and UiTM: 11, UniMAP; 10, UTEM; 8, UPNM; 7, UPM; 6 and the lowest team USIM and UMK; 4. As for the women's team recorded a mean frequency of use of high wall pass is the team that won the overall champion team UPSI with a record; 22. Followed by a team UPM; 18 while USM; 16, next followed is team Utem; 15, UiTM and UPNM; 14 and UM; 12. Mean frequency for diagonal pass showed the highest is UPSI team; 23, followed by the UPM; 16, USM; 14, UPNM; 13, UM; 11, UTEM; 8 and the lowest team is team UiTM; 5. Whereas the mean frequency of square pass, the team that had the highest mean is UPSI team; 21 while the UPM and UPNM; 10, followed by the USM; 8, UiTM and UM; 4 and UTeM; 3.

Table 3. Mean overall frequency of wall pass, diagonal pass and square pass on men and women teams

Ranking	Men	Frequency of Passes			Women	Frequency of Passes		
		Wall	Diagonal	Square		Wall	Diagonal	Square
1	UPSI	20	18	11	UPSI	22	23	21
2	UM	18	23	12	UPM	18	16	10
3	UiTM	23	22	11	USM	16	14	8
4	USM	14	12	12	UTeM	15	8	3
5	UniSZA	16	17	15	UPNM	14	13	10
6	UPM	9	17	6	UiTM	14	5	4
7	UTeM	17	11	8	UM	12	11	4
8	UniMAP	21	18	10				
9	UPNM	19	12	7				
10	USIM	13	10	4				
11	UMK	9	10	4				

Table 4 shows the output generated by using the Pearson correlation coefficient for the relationship between the frequency of use of the conducting wall, diagonal and square with the team performance. Statistical analysis showed that there was a significant relationship between the frequencies of use wall pass with men team performance ($r = 0.83$, $n = 11$, $p < 0.05$). The results for diagonal pass ($r = 0.92$, $n = 11$, $p < 0.05$) and square ($r = 0.84$, $n = 11$, $p < 0.05$) also showed significant results towards the achievement of the team performance. As for the women's team, Pearson correlation analysis showed a significant relationship between frequency of use wall pass with women team performance ($r = 0.94$, $n = 7$, $p < 0.05$). The results also showed a significant relationship between diagonal pass ($r = 0.92$, $n = 7$, $p < 0.05$) and square ($r = 0.80$, $n = 7$, $p < 0.05$). A positive relationship shows the team that frequently using the wall pass, diagonal pass and square pass was found to have a better performance than the less.

Table 4. The relationship between the frequency of wall pass, diagonal pass and square pass with the achievement on men and women team

		Men				Women			
		Wall	**Diagonal**	**Square**	**Result**	**Wall**	**Diagonal**	**Square**	**Result**
Wall	Pearson Correlation	1	0.90	0.85	0.83**	1	0.95	0.89	0.94**
	Sig. (2-tailed)		0.000	0.001	0.002		0.001	0.007	0.002
	N	11	11	11	11	7	7	7	7
Diagonal	Pearson Correlation	0.90	1	0.85*	0.92**	0.95	1	0.96	0.92**
	Sig. (2-tailed)	0.000		0.001	0.000	0.001		0.001	0.003
	N	11	11	11	11	7	7	7	7
Square	Pearson Correlation	0.85	0.85*	1	0.84**	0.89	0.96	1	0.80**
	Sig. (2-tailed)	0.001	0.001		0.001	0.007	0.001		0.031
	N	11	11	11	11	7	7	7	7

**p < 0.05

4. DISCUSSION

The intra-rater reliability testing showed a rater was repeatable in notating all of the selected variables. The assessment for inter-rater reliability confirmed that the coding of the wall pass, diagonal pass and square pass are repeatable from one rater to another. These findings have proved that there is reliability in the results and analysis of this study. The team delivered a low wall, diagonal and square as a whole in the men group stage, but qualified to enter the next round is team UPM because the players are highly skilled players. They prefer to use skills such as dribbling opponents without use passing skills that often. For teams that use less

wall pass, diagonal pass and square pass that does not qualify for the next round for men category are team UMK, USIM and UTeM. It is because the players less skilled and less experienced in this sport. Experienced teams of players basically have high chances to become a champion [19]. The team also made many mistakes while making a pass to teammates such as improper passing, slow makes a pass and the pass made mostly intercepted by an opponent. Coaches played main role to find out the weaknesses of the team and enhance the team's performance by increasing the number of effective passes to create more opportunities on successful attack [10].

Other factors such as dribbling skills and score skills also need to be mastered by the players and the team to achieve success. In indoor hockey, wall pass skills, diagonal and square should be trained to develop athlete and indirectly help launch the attack patterns point in the match [9]. The most attacks using wall pass by UPSI's team lead opponents foul and give the chances for a penalty corner. Penalty corner had more chances to score [2]. These skills are seen as a strategy for their team in looking for opportunities to score.

The results of the study showed there is a significant relationship between the three types of passes with the team achievement for the both categories; wall, diagonal and square ($p < 0.05$). This means that the team success show the highest number of frequency of pass use. It establishes a relationship between the uses of the three passing skills for men and women team affect the achievement to be success. This finding indicates that these skills can be one of the factors that helped the team to succeed.

Frequency of use wall pass, diagonal and square high or low is not a major factor to the team if a player skilled in the use of the three passing skills, although the frequency of the use of pass is not made these skills help to create a score if it is done effectively during the game situations. The overall findings found the men and women who are successful in this tournament using the skills of the wall pass, diagonal and square as the team's offensive strategy in every game. When the teams is using the skills of the wall pass, diagonal and square this effectively, it helps the team to succeed. Output for the total score passes with the men's team and women support this statement by showing a significant correlation ($p < 0.01$). These findings demonstrate the skills of passing would help the team to achieve victory. A

previous study stressed that a pass and intercepted in indoor hockey is an important role to contribute to the success [10]. This is evidenced in the quarterfinal matches until the finals of both categories indicate that all the teams using wall passes, diagonal and square which higher than the opponent won the match.

5. CONCLUSION

This study serves as a useful starting point to appreciate the benefits of employing specifics passing skills such as wall pass, diagonal and square to achieve great success in indoor hockey. However, the men's team was found to have a variety of skills and not just focus on the particular passing skills as the factors that influence success. This finding shows that a successful and effective pass is proven to help the team win. For the women's relatively limited mastery of other skills, they use the wall pass diagonal pass and square pass as a strategy for success [10]. However, it can be concluded that the skills wall pass, diagonal and square is needed for each player in every team to master. These skills really helped the team to increase of chances for goal scoring. Each team will need to master the skills of wall pass, diagonal and square to create an effective pass in a game situation. Each passes can assist in building of an attacking ploy if conducted effectively. Coaches can use this method of training to encourage effective strategies for a good performance in indoor hockey. Further studies related to other skills found in indoor hockey such as dribble skills, flick, short corner as well as conducting analysis using larger sample groups are also recommended.

6. PRACTICAL IMPLICATION

The indoor hockey’s coaches and athletes are encouraged to use plan their tactical and technical during the competition. The best passing technique and highest chances to score the goal may frequently apply in the game. However, the technique of passing should be trained to obtain the accuracy in passing and should include in training program.

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