Analysis of Spiking Technique towards Point Distribution Succession in Sepak Takraw League (STL) Champions Cup 2021

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Abstract:

Killing or spiking is one of the tactical moves in Sepak Takraw that can help to decide the outcome of a match. This study aimed to explore the relationship between various elements of Sepak Takraw, including spiking technique, point succession, spiking zone, and point area. In this study, the researchers also sought to determine whether the variables, zone of spiking and point succession are related to the point area. The sample consisted of 19 matches from the 2021 STL Champions Cup, with 315 spiking attempts recorded. The data were collected through notational analysis and analyzed using statistical methods of Crosstabs and Chi-Square tests (with a significance level of $p < 0.05$), through SPSS version 25. The findings showed no significant connection between the spiking technique and the point succession ($p = 0.831$), or between the spiking technique and the spiking zone ($p = 0.730$) and between the area of point and the point succession ($p = 0.253$). However, there was a significant correlation between the spiking technique and the point area ($p = 0.001$), as well as between the point area and the spiking zone ($p = 0.016$). These results indicate that proper spiking technique can significantly impact the outcome of Sepak Takraw match and further research is needed to investigate the role of other tactical elements, such as serving, blocking, and rally play.

Keywords: Sepak takraw; Spiking technique; Notational analysis; Performance analysis

1. Introduction

Sepak takraw, or kick volleyball, is a regional game played in Southeast Asia. Although sepak takraw resembles volleyball, it utilizes a rattan ball and players are only permitted to utilize their feet and head to make contact with the ball. A combination of football and volleyball, sepak takraw is a mainstream sport in Malaysia, Thailand, Cambodia, Laos, Philippines, and Indonesia. Since the 90s, Malaysia was among the top contender against Thailand [1]. Sepak takraw is a professional sport that consists of three separate playing positions: spiker, tekong and feeder. The feeder and server are specifically confined to the ball being collected and transferred, while the striker carries out explosive hops to block and spike the ball. Spiking requires a somersault-twisting and spinning of the body to execute a strong mid-air leg sweep at the ball and is frequently continuously practiced during a long rally [2]. The sepak takraw spike is an offensive skill in which players kick a takraw ball with acrobatic movements. Three spike techniques, the roll spike (RS), sunback spike (SS) and half-roll spike (HRS), are commonly used [3]. Other research related with kicks and sepak takraw has sought to identify differences in kicking or killing techniques between roll spike and sunback spikes [4].

Performance analysis is the method of measuring performance in a sport to gain an interpretation of actions that will guide decision-making, maximize performance, and help coaches and players in their road to achieving optimum

outcomes [5]. Hence, performance analysis has become an essential tool for coaches, athletes, sports organizations, and academic researchers. Collecting and interpreting performance data enables coaches to improve their training programmes and help athletes to make better decision for tactical [5]. This will include situational reviews, a study of movement, visual and predictive databases, as well as modelling and demonstrations of coach and player results. A previous study of sepak takraw examined 22 performance indicators for the analysis of the players' performance [6]. Another study shows that the machine learning model is capable of classifying sepak takraw kicks and this can be applied in training to ensure players can optimize their use of correct skills and techniques [7]. Furthermore, the type of movements in sepak takraw is also crucial for energy expenditure. Analysis on movement expenditure indicated that different player positions require different energy consumption [8]. In sepak takraw, the spiking technique is one of the main determinants of a sepak takraw team's offensive performance, as the killing technique is associated with a positive correlation of winning matches. In fact, there are differences in technique for spiking in sepak takraw that associated with point succession.

In Malaysia, few researchers have conducted performance analysis for sepak takraw, and there is a lack of research specifically on spiking. The question arise would be what the indicators for characteristic of the analysis of spiking technique toward point distribution succession among sepak is takraw teams. Therefore, this study aims to analyze point distribution succession among sepak takraw team based on certain indicators such as the effectiveness between sunback spike, half roll spike, roll spike and tapping that lead to point distribution succession.

2. Methodology

This study involves quantitative research to analyze the spiking technique towards point distribution succession among sepak takraw teams. This study used observational design to correlate the types of spiking technique, which are sunback spike, roll spike, half roll spike and tapping; the dependent variables were point distribution succession in the Sepak Taraw League (STL) Champions Cup 2021. Professional athletes who were involved and participated in the Sepak Takraw (STL) Champions Cup 2021 were given precedence in the video content. The match footage was evaluated by watching videos on YouTube of 19 games played by eight teams. The matches were examined through video on a computer monitor positioned at sitting eye level, using notational analysis. The hall's surroundings dictated camera position and elevation, and the space in the hall was tiny. The distance from the sideline to the court was around 10 meters, with a height of roughly 5 meters. In this study, three hundred and fifteen recorded films from the match concentrating on the spiking and killing were chosen. The data was taken of the spiking techniques from each game in the Sepak Takraw League (STL) Champions Cup 2021.

After doing the observation, the data was analyzed using hand notational systems, frequency table, and sequential system. All the performance indicators such as sunback, roll spike, half roll, and tapping have been exported into Microsoft Excel as statistical analysis. Intra-observer reliability analysis was used to examine the data's reliability in this study. The data was chosen from all 19 matches and 315 sepak takraw spike conversions by the experts. Finally, after analyzing the intra-observer reliability, the percentage error was determined. Each performance indicator's data was determined by using Chi- Square Test by looking at the Pearson chi-square. All the data analyses have been carried out by using the SPSS version 25.0.

3. Results

The results from Table 1 shows descriptive analysis of performance indicators. Meanwhile, the results from Table 2 shows cross-tabulation of type of spiking technique with point of succession, zone of spiking and area of point. In the analysis, this study also presents the results of association type of spiking technique with point of succession, zone of spiking and area of point.

The Chi-Square test was used to evaluate the correlation between the variables. This analysis evaluated the association of four types of spiking with other variables which are zone of spiking, area of point and point of succession. The statistically significant correlation employed Pearson chi-square at $p < 0.05$. The association between type of spiking technique and point succession showed there is no significant association, $X^2 (1, N = 315) = 0.143, p = 0.705$. As for the association between type of spiking technique and zone of spiking, the results showed there is also no significant correlation, $X^2 (3, N = 315) = 1.297, p = 0.73$. Meanwhile, the association between type of spiking technique and the area of point showed there is significant correlation, $X^2 (9, N = 315) = 39.08, p < 0.001$. Lastly, the association between area of point and zone of spiking also showed there is significant correlation, $X^2 (3, N = 315) = 10.336, p < 0.05$.

Table 1. Descriptive analysis of performance indicators

Performance indicators	Frequency	Percentage (%)
Type of Spiking		
Sunback Spike	156	49.5
Roll Spike	86	27.3
Half Roll Spike	36	11.4
Tapping	37	11.7
Total	315	100
Point succession		
Successful	281	89.2
Unsuccessful	34	10.8
Total	315	100
Zone of spiking		
Left zone	157	49.8
Right zone	158	50.2
Total	315	100
Area of point		
Bottom left	89	26.0
Bottom right	82	28.3
Top left	69	21.9
Top right	75	23.8
Total	315	100

Table 2. Cross-tabulation of type of spiking with point of succession, zone of spiking and area of point

Performance indicators	Type of Spiking			
	Sunback Spike (n)	Roll Spike (n)	Halfroll Spike (n)	Tapping (n)
Point of Succession				
Successful	144	71	30	36
Unsuccessful	12	15	6	1
Zone of spiking				
Left zone	82	40	16	19
Right zone	74	46	20	18
Area of point				
Bottom left	34	19	10	19
Bottom right	44	19	8	18
Top left	36	26	7	0
Top right	42	22	11	0

4. Discussion

The most common type of point distributes in Sepak Takraw League (STL) Champions Cup (STL) 2021 the sunback spike, followed by the roll spike, half roll spike and tapping. Based on previous research, the sunback spike is the most commonly used technique in any tournament, even in big tournaments. The sunback spike is followed by the roll spike, half roll, and tapping because using the sunback spike technique can give a killer a variety of option to put or place the ball in and easily to distribute a point compared to roll spike technique [9]. Although there is no significant correlation between type of spiking and point succession, all the area of point were monopolized by the successful spike. We observed that from 315 attempts, 281 points of chances were successfully created by the players. From those 281 goals, the highest number of points was at the right bottom with 80 points. In a previous study, the winning team has more a successful spiking rate and point succession compared to the losing team [10]. Most of the point of distribution succession was collected in the bottom court area because there is a lot of space opened by the opponent compared to the top of the court since mostly players will cover the top area of the court and they tend to leave the bottom area of the court uncontrolled. The players neglected the bottom area of the court because they assumed that the probability of the ball being blocked is greater, but it seems they misjudged, as the facts show that there is a higher or greater distribution of points in the bottom area of the court, especially in the right bottom area of the court. The coaches can use this finding to prepare their players properly for future games.

Meanwhile, the best place or area of a feeder or spiking is to deliver the second ball or feed the ball to the killer when the ball is in the middle of their respective courts [1]. This is because when the ball is at the center or nearer to the feeder, it will allow the feeder easier access to deliver the ball towards the killer either for the sunback spike ways or roll spike ways. In the present study, the data that has been collected showed that the zone of spiking in Sepak Takraw League (STL) Champions Cup 2021, from a total of 158 (50.2%) sunback spike have recorded 74 attempts followed by roll spike with 46 attempts, half roll spike with 20 attempts and tapping with 18 attempts. The left zone has recorded 157 attempts, 82 attempts from the sunback spike, and 40 from roll spike, 16 from half roll spike and 19 from tapping. These results occurred due to the skills of the player.

As for the relationship between type of spiking and area of point, the most area of point that the players targeted was at the right bottom with 89 points, followed by the left bottom which managed to record 82 points along with the right top, 75 points, and left top with 69 points. This study observed that the bottom area was the most targeted area that the players spiked. Previous research stated that in sepak takraw spiking, the best area had the highest rate of successful spiking by the players [1]. Through the development of sepak takraw performance analysis, sepak takraw games have been analyzed using various methods. This shows that other researcher found the most targeted area of points was at the bottom area which is near to the net. The area that will give bigger opportunities and a greater probability to a killer to distribute a point compared to the top area of the court because if a player does a spike further from the net, it will make it easier for the opponent to defend and break the ball as they will be able to anticipate the direction of the ball as it comes towards them. Most of the time, the opponents will try to block and there was only one opponent going to block while the other two will be ready at the top area, which is further away from the net, thereby limiting the percentage of getting points at the top area. The players knew about this situation and took advantage to create a point.

Lastly, the expected significant correlation between type of spiking technique and zone of spiking in which the players spike will influence the area that will be targeted. In the previous study of volleyball, to increase the probability of winning an attack from an opponent, the team had to pass the ball more accurately and setters set in fast tempo at the right position in the court [11]. This evidence supports the result that there was a relationship between the area of point and zone of spiking. The mechanisms for how this happen are biomechanical and technical factors. The biomechanical aspects affect the ball's direction as the proper technique will put it on the right path. When the players make a spike from the left zone with good technique, the ball will go directly to the targeted area. This technique implies a very high-speed ball to create a point and win the match. Coaches can use this relation to prepare players for future games or tournaments.

5. Conclusion

This study examined the indicators and provided significant information to the players and coaches on gameplay and technical aspects of sepak takraw. The relationships between the variables such as the type of spiking technique and zone of spike, type of spiking technique and area of point, and area of point and zone of spike will benefit the players and coaches for their future reference. Players must have real strength, coordination, speed, and outstanding abilities to execute with rapidity to convert into a spiking point. The sunback spike was shown to be the most often utilized spiking technique, followed by the roll spike, half roll spike, and tapping. The right zone was the most used spiking zone for the players, followed by the left zone. Finally, the most targeted point region was the bottom left of the court, followed by the bottom right, top right, and top left.

Not available.

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