Tactical Performance Analysis of Malaysian Youth Karate Exponents

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Abstract: The aim of this study was to analyse the tactical performance of youth karate exponents during the Malaysia Games, 2018. A total of 104 kumite matches, consisted of 52 men and 52 women were recorded during the games and analysed the frequency of attacking and defending using Longomatch® software. Non parametric Kruskal Wallis statistical analysis was used to compare the effectiveness of attacking and defensive by gender and performance of successful and unsuccessful athletes. The findings of this study showed that the male athletes were more effective in attacking than females. However, no differences by gender in the effectiveness of defending. This study also found that successful exponents were more effective in attacking for male and defending for both gender compared to unsuccessful athletes.

Keywords: Karate; performance analysis; tactical moves; youth exponents; kumite

1. INTRODUCTION

Karate has evolved from traditional Japanese martial arts to a modern combat sport. The sport will be contested for the first time at the Olympics in 2020, and the two events to be contested are kata and kumite [1]. However, this study only focused on kumite athletes because the event involved sparring with another opponent to score points [2] while the kata category involved only a synchronised demonstration of karate moves and the awarding of points are subjective. Kumite is a sparring event which involves both technical and tactical moves. A tactical move consists of attacking, counter attack and defending [3] In the kumite competition, two exponents would contest against each other by punching and kicking to score points [4]. Thus, to be a successful kumite exponent, he or she must make quick decisions on making appropriate attacking and defensive moves in response to the opponent’s actions [5]. Performance analysis is one of the most frequently used methods for analysing performance. Through performance analysis, coaches and athletes can analyse not only his or her own performance as well as the opponents’ and develop effective tactics as preparation for future competition [6]. Performance analysis is different with other sports science disciplines. It can objectively analyses an athlete performance. For example, the frequency and effectiveness of a karate exponent’s attacking and defending moves. Other sports science sub-disciplines such as biomechanics only analyses technical movements to improve performance but not at the tactical and decision making aspects. An analysis of performance indicators is beneficial to kumite exponents as a clear indication of certain actions in sparring could provide indication or cues on how to react in counter attack or defend against the observed opponents, subsequently making effective attacking moves [7].
According to Tabben Conte, Haddad and Chamari, [8] the effectiveness of attacking and defending are two important aspects that athletes should be master in order to succeed in combat sports. Several studies on performance analysis in combat sports have found that successful athlete more use a strategy attacking comparing unsuccessful. Previous research on kickboxing athletes found successful athletes more often using attacking such as hooking punch, double punch and blocking techniques attacks compare to unsuccessful athletes [9]. Conversely, Laird dan McLeod’s [7] analyses on karate exponents found that attacking with reverse punch to the body was the most commonly used technique by 43.3% for all athletes and 89.7% were used by the winners in matches. Similar studies on taekwondo gyoroggi matches found that successful athletes executed kicks to the head more often than unsuccessful athletes and they were more efficient in both techniques and tactics [10, 11]. However, Kassim, Suwarganda and Nor’s [12] study on male taekwondo athlete’s tactics during the Malaysia Games (SUKMA) in 2012 found no significant differences between successful and unsuccessful exponents. Therefore, successful and unsuccessful combat sport athletes very much depended on the tactical strategies used.

Several studies have showed that there were differences in the tactics used between men and women exponents in combat sports, as shown in performance analysis studies on taekwondo [12], judo [13], and mixed martial art [6]. Gender specific performance analysis can be used to enhance physical and tactical performance, Training programmes should be tailored according to gender apart from skill level. At a present, there is a paucity of literature on the tactical performance analysis between genders, especially in the kumite event. The main objective of this study was to analyse the tactical performance among the karate exponents in the 2018 Malaysia Games by gender and performance (successful and unsuccessful) through performance analysis. Successful athletes were those who qualified for the quarterfinal and above matches while unsuccessful athletes were those who lost in the preliminary rounds and did not qualify for the quarterfinals onwards.

2. RESEARCH METHODS

Participants

This study involved 52 males (M=19.05 years of age, SD=1.19) and 52 females (M=19.6 years of age, SD= 1.09) who represented their respective states in the kumite event during 2018 Malaysia Games (SUKMA).

Instrument and Data Collection

To analyse the performance of the athletes in the kumite event, a total of 104 matches were recorded using video camera model (DCR PC 108E, CCD 1000,000 pixels, SSC 1/4000 per s, Tokyo, Japan). The recordings were then analysed using LongoMatch 0.20.1. software (Copyright ©2014-2015 Andoni Morales Alastruey Fluendo).

Procedure and video analysis

The data was taken during SUKMA 2018 competition starting from quarter final one to final match. Two video cameras model (DCR PC 108E, CCD 1000,000 pixels, SSC 1/4000 per s, Tokyo, Japan) were placed 5 m away from the mat matches with camera tripod height is 1.5 m and recording 4 minutes for male and 3 minutes for female each match. In order to guarantee validity, each camera was responsible for one match area helped by a research assistant. To avoid any potential confounding factors because of the proficiency level of athletes, only successful (male, n =26; female, n= 26) and unsuccessful (male, n=27, female,
n=27) athlete were considered in this study. Successful athletes are defined as those who won in the quarterfinals or finals while the unsuccessful athletes are those who lost in the quarterfinals and finals.

The notational analysis template for karate replicated Tabben, et al.’s study [8], which has been validated was used to analyse all matches. A total of 104 matches were coded according to tactical strategy of attacking, counter attacking and defending. An action delivered first using upper or lower body by an athlete was considered as attack. An direct response after the end of opponent was define as counterattack attack while blocking the attacks from the opponent was defined as defensive tactic.

The reliability of the data was determined by inter rater method (Agreement reliability was compared between independent evaluator and main researcher). Randomly selected 30% of total recordings were analysed. Kappa Cohen coefficients was used to analyse the reliability of the coding data [4]. The results of r values between the researcher and an independent evaluator for the attack moves, r = 0.95, the strike, r = 0.96 and the counter attack, r = 0.96. Kappa values were considered as following: poor, 0.0 to <0.20; fair, 0.20 to <0.40; moderate, 0.40 to <0.60; substantial, 0.60 to <0.80, and almost perfect, 0.80 to 1.00 [8]. Cohen’s Kappa between the two observations applied to the frequencies of tactic used was rated as substantial and almost perfect and the reliability of data was accepted for further analyses. This study analysed the effectiveness of attacking and defending according to gender and performance. The formulae for calculating the variables followed Ashker’s [4] study.

- **Effectiveness of attacking**\(\frac{n_1}{N_1}\)

The tactical analysis of effectiveness in attack by an exponent is calculated based on the total frequencies of successful attacks and counter-attacks (\(n_1\)) and divided by the total number of attacks and counter-attacks (\(N_1\))

- **Effectiveness of defending** \(\frac{n}{N}\)

The tactical analysis of effectiveness in defense by an exponent is calculated based on the total frequencies of successful blocks (\(n\)) and divided by the total number of blocks (\(N\)).

### 3. RESULTS AND DISCUSSION

**Table 1: Comparison of tactical analysis between athletes gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Effectiveness attacking ((M_{rank}))</th>
<th>Effectiveness defensive ((M_{rank}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (n=53)</td>
<td>62.4</td>
<td>48.1</td>
</tr>
<tr>
<td>Female (n=53)</td>
<td>42.6</td>
<td>56.9</td>
</tr>
</tbody>
</table>

Statistical analyses were performed using SPSS version 23.0. Table 1 shows a comparison of tactical analysis between male and female athlete. The result from Kruskal-Wallis test
showed there was significant difference in the effectiveness of attacking ($\chi^2 = 11.24, p = 0.01 (<0.05), df = 1$) between male (Mrank = 62.4) and female (Mrank = 42.6) exponents. The male exponents were more effective in attacking than their female counterpart. However, there was no significant difference in defending ($\chi^2 = 3.37, p = 0.61 (P>.05), df = 1$) between male (Mrank = 48.1) and female (Mrank = 56.9).

Table 2: Comparison of tactical on male athletes’ performance

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Successful (Mrank)</th>
<th>Unsuccessful (Mrank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=26)</td>
<td>(n=27)</td>
<td></td>
</tr>
<tr>
<td>Attacking</td>
<td>32.3</td>
<td>21.8</td>
</tr>
<tr>
<td>Defensive</td>
<td>32.8</td>
<td>21.3</td>
</tr>
</tbody>
</table>

Table 2 shows a comparison of tactical analysis between male athletes based on their performance. Comparison between successful and unsuccessful exponents showed there was significant difference ($\chi^2 = 6.11, p = < 0.01, df = 1$) between successful male exponents in the effectiveness of attacking. Successful male exponents (Mrank = 32.3) were more effective in attacking than unsuccessful male exponents (Mrank = 21.8). There was also a significant difference in defending tactics between successful and unsuccessful male exponents. Successful male (Mrank = 32.8) were more effective in defending compared to unsuccessful male exponents (Mrank = 21.3).

Table 3: Comparison of tactical and performance between female athletes’ performance

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Successful (Mrank)</th>
<th>Unsuccessful (Mrank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=26)</td>
<td>(n=27)</td>
<td></td>
</tr>
<tr>
<td>Attacking</td>
<td>29.4</td>
<td>26.4</td>
</tr>
<tr>
<td>Defensive</td>
<td>35.1</td>
<td>18.5</td>
</tr>
</tbody>
</table>

Table 3 shows a comparison of tactical and performance between female athletes performance. There was no significant difference ($\chi^2 = 1.42, p = 0.23, df = 1$) in the effectiveness of attacking between successful (Mrank = 29.4) and unsuccessful (Mrank = 26.4). However, there was a significant difference ($\chi^2 = 20.1, p = 0.01, df = 1$) for female in defending. Successful female exponents (Mrank = 35.1) were more effective in defending than their unsuccessful exponents (Mrank = 18.5).

This study aimed to analyse the performance of Malaysia Games youth karate exponents in the *kumite* event in terms of effectiveness of their attacking and defending moves according to gender and performance. The male exponents were significantly more effective in their attacking moves and scored more points than the female exponents. It could be explained by
physiological differences such as reaction time, in which males having a faster reaction time than females [14]. There was no significant difference between male and female karate exponents in defending because it is suggested that defending tactics as a natural body mechanism and mastered by every combat sport athlete when they were attacked by opponents and instinctive for human regardless of women and men [15]. This study showed that successful exponents having a better effectiveness in attacking and defending than their unsuccessful counterpart. This may be due to the using of variety combinations in tactics and movement techniques by successful athlete such as attacking, counter attacking and defending tactics. In addition, they used different combinations of punching and kicking techniques than unsuccessful athletes who were less effective in attacking, counter attacking and defending ([4, 7, 14].

4. Conclusion

In conclusion, this study showed that male karate exponents were more effective in attacking than the female exponents. However no differences by gender in the effectiveness of defending. This study also found that the successful karate exponents in the 2018 Malaysia Games (SUKMA) showed better effectiveness in attacking for male and defending for both gender compare to unsuccessful athlete. The performance analysis on Malaysian youth karate exponents provide insight on their performance during matches, thus specific training such as more sparring sessions are required in order to improve their performance in matches. Separate training programmes according to gender should be considered. A limitation of this study was it was conducted on youth athletes. Therefore, future studies could examine the senior athletes and comparisons to examine if there were differences in the use of skill techniques according to age and experience.

5. Acknowledgement

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6. References


