

Technical and tactical characteristic of Japanese high level women kendo players: comparative analysis

Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Manuscript Preparation
- E Funds Collection

Mitsuru Nakamura^{1ABCD}, Yukiko Takami^{2BCD}, Masaki Nakano^{3B}, Kiyoshi Ito^{4D}, Naoya Maekawa^{1C}, Masahiro Tamura^{5E}

¹ Graduate School of Health and Sports Science, Juntendo University, Chiba, Japan

² Seiwa University, Chiba, Japan

³ School of Health and Sports Science, Juntendo University, Chiba, Japan

⁴ Fuji University, Iwate, Japan

⁵ Teikyo University of Science, Tokyo, Japan

Source of support: Departmental sources

Received: 17 October 2013; **Accepted:** 20 March 2014; **Published online:** 10 April 2014

ICID: 1098251

Abstract

Background & Study Aim: Female kendo practitioners' technical and tactical abilities have steadily improved since the 10th World Kendo Championship held in 1997, when a dedicated women's competition class was created. However, exercise methodologies and injury prevention techniques have not evolved in tandem. The current study is meant to provide kendo practitioners, coaches, and managers with information essential to tailoring their exercise and injury prevention programs to female kendo practitioners. The aim of the study is to assess whether women differ from men in terms of technical and tactical aspects of competition outcomes.

Material & Methods: Sixty matches from the 50th All Japan Women's Kendo Championship and 60 men's matches from the 45th All Japan Men's Kendo Championship were analyzed using DVDs. Specifically, the following aspects were analyzed: technique categories, spatial distance, counter attack, datotsu-bui (target points), body and shinai (bamboo sword) movement, and ratio of points awarded based on the total number of attacks. These data were analyzed by three kendo experts who hold 7th, 5th, 4th dan.

Results: Point scoring attacks were comparatively fewer in women's competitions than in men's. Female competitors also attacked in closer spatial distance relative to their male counterparts. Finally, women attacked primarily by stepping forward in a defensive stance while waving the shinai side to side in close proximity to the opponent's body.

Conclusions: Women's tactics differed markedly from that of men's. It is recommended that female kendo practitioners employ an exercise regimen that accounts for the fundamental differences between the male and female physique.

Key words: combat sport, tactical actions, physiological characteristics, sexual distinction, spatial distance

Author's address: Mitsuru Nakamura, 1-1 Hiragagakuendai Inzai-city, Chiba, Japan; e-mail: mtnakamu@juntendo.ac.jp

INTRODUCTION

Men, Kote – Strike position of the head (Men) or the right wrist (Kote) of a player [1]

Tactics – In sports, it is a means of acting out patterns by a player or group to play reasonably and rationally in each situation in a game [2]

Japanese elementary school aged children undergo tests which measure both their physical strength and athletic ability. These test results indicate negligible differences between males and females in terms of physical traits during primary school years. However, after adolescence, differences in both physical strength and athletic ability become apparent. These differences have been studied and documented numerous times by researchers in various sports [3,4]. These kinds of studies provide valuable data upon which to build female-focused programs aimed at not only improving competitive ability, but also creating preventative injury strategies tailored to women [5].

Kendo is a sport in which two opponents attempt to strike each other with the *shinai* (bamboo sword) in four target areas: *men* (head), *kote* (hands), *dou* (trunk), and *tsuki* (throat). Body contact during both offensive and defensive play is permitted. Generally, the competitors maintain two meters of distance between each other. Agility and stamina are required traits of kendo practitioners, as high speed maneuvering and the element of surprise are fundamental to successful employment of the techniques that are required to win matches.

Kendo is a member of *budo*, and has its roots in ancient Japan. It has gained worldwide acceptance, and is played by people ranging from infant to elderly in age. The first kendo world Championship was held in 1970. However, a women's category did not exist at this time. Due to the increased popularity of the sport amongst females, a women's category was created in the 10th World Kendo Championship held in 1997, twenty seven years after the first world kendo championship was held.

The technical and tactical skill level of female kendo practitioners has been rapidly improving since the addition of the women's category to the world kendo championship. However, since kendo's inception, its competitors have been primarily males. Therefore, studies have focused on technical characteristics of male competitions, with relatively few manuals or research papers written addressing the female dimension of the sport.

This lack of material extends to both social aspects of kendo and analysis of female kendo competitions [6, 7]. Furthermore, information concerning competitive techniques and exercise methodology that acknowledge the physiological differences between

males and females cannot be confirmed. Because differences between the sexes are apparent in both physical strength and athletic abilities, consideration should be afforded to strength improvement exercises and competitive strategies as they relate specifically to the female competitors. Introduction of methods that take into account the physiological differences between males and females could lead to advancement of women's kendo as a sport. The aim of the study is to assess whether women differ from men in terms of technical and tactical aspects of competition outcomes.

MATERIAL AND METHODS

1. Subjects

Matches from 50th All Japan Women's Kendo Championship were analyzed. All participants qualified in regional competitions. Among these 64 participants, 12 members had previously participated in any of the 12th, 13th, 14th, or 15th World Women's Kendo Championships. This high participation rate by the competitors in the world championships ensured a skill level comparable to that of competitors in the World Kendo Championships.

Two DVDs recorded at each competition were used. Match selection criteria were as follows. Both competitors stood in *chudan-no-kamae* (an upright posture and held the *shinai* at midlevel to their body cavity, with their right foot slightly forward in lateral relation to the left foot). Of the sixty three total matches in the 50th All Japan Women's Competition, three did not qualify based on the criteria, so a total of 60 matches were analyzed. For comparative analysis, 60 matches from the 45th All Japan Kendo Championship were analyzed [8]. Seventeen of 64 competitors who took part in this Championship had previously taken part in the World Kendo Championship. This high participation rate by the competitors in the world championships ensured a skill level comparable to that of competitors in the World Kendo Championships and provides equivalent data in terms of competition skill level of the participants.

2. Procedure

Comparisons between male and female kendo players were made based on observation of technical and tactical dimensions. Categories outlining technical and tactical types and the development of attacking are shown in Figure 1. All techniques explained in Figure 1 are defined by kendo teaching guidelines and technical manuals, and are specified below [9-11].

Technique classifications:

Offensive techniques: Striking an opponent with the *shinai* before the opponent initiates an attack.

Counter techniques: Striking an opponent with the *shinai* after rendering the opponent's attacks ineffective.

Maai (Spatial distance between the opponents):

Offensive technique: Distance between the opponents when one of them initiates an attack.

Counter technique: Distance between opponents when one of them initiates a counter attack.

Issoku-itto-no-maai (Fundamental spatial distance):

Distance at which a player can strike the opponent by taking one step forward and evade attack by taking one step backwards.

Toi-maai (Further spatial distance): Distance at which both players are out of striking range of each other's *shinai*.

Chikai-maai (Closer Spatial Distance): Distance at which both players are within striking range of each other's *shinai*.

Sesshoku-no-maai (Contact Distance): When the players' bodies are in contact and the top of one of the player's *shinai* is within striking range of the opponent's body.

Shinai movement: Movement based on the movement of the *shinai* in general and the top of the *shinai* in particular.

Up: The top of the *shinai* is raised over the opponent's head.

Down: The top of the *shinai* is below the opponent's navel.

Left: The top of the *shinai* is over the right half of the opponent's body.

Right: The top of the *shinai* is over the left half of the opponent's body.

Front: The top of the *shinai* is pointed at the opponent's face with both arms outstretched.

No movement: The *shinai* is held still.

Body movement: A player's body movements in relation to the opponent: Front, back, left, right, and no movement.

Counter attacks: Movements of the *shinai*: *Nuki* (Drawing out), *Kaesbi* (Striking back), *Suriage* (Deflecting up), and *Uchiotosi* (Dropping down).

Scoring: Strikes by the players were classified according to whether they were awarded points from the judges.

3. Statistical Analysis

Data gathered from the video analysis were entered into an Excel (Microsoft Corporation, Redmond, WA, USA) spreadsheet. Chi-square tests were used to compare the frequency of the analysis variables between the two contests. $P < 0.05$ was considered statistically significant. Three analysts participated in the study. They hold 7th *dan*, 5th *dan*, and 4th *dan*.

RESULTS

Both 60 men's and 60 women's matches were analyzed. Of these, 20 women's matches (30%) ended within regulation time and 29 men's matches (48%) ended within regulation time. Total contest time for

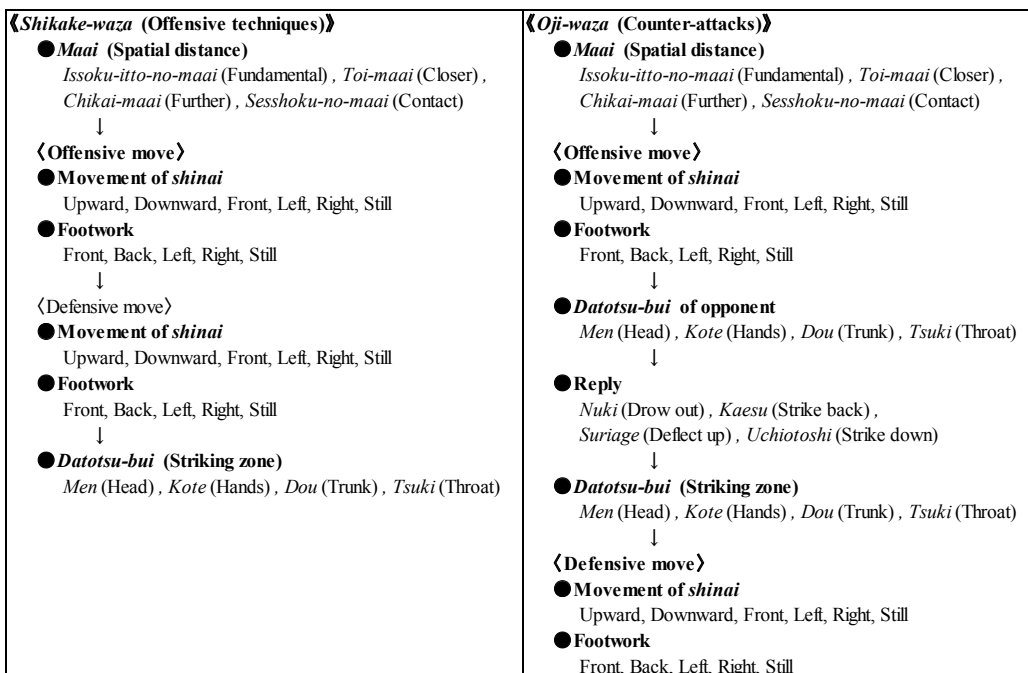


Figure 1. Categorizations of technical and tactical types and the attack development

the women's matches was 655 minutes and 39 seconds (10 minutes and 56 seconds per contest) and 453 minutes and 8 seconds (7 minutes and 33 seconds per contest) for men.

Table 1 contains the technical and tactical variables analyzed for both men and women: 2,639 attacks, 69 of which were scored, occurred in women's matches, while 1,823 attacks, 75 of which were scored, occurred in men's matches. There were significant differences between females and males in the following categories: technique classifications, target points, and spatial distances both in offensive and counter attacks. ($P < 0.001$, respectively).

In technique classifications, use of offensive techniques was significantly higher for females in comparison to males. Attempts to strike the *men* were higher in women's competitions than men's, while frequency of *kote* and *tsuki* strikes was lower than in men's competitions. Regarding spatial distance, use of close distance attacks, both offensive and counter,

were highest in women's competitions, measured at 49% and 67% respectively. On the other hand, fundamental spatial distance attacks in both offensive and counter techniques were highest in men's competitions, measured at 53% and 63%, respectively.

Figure 2 contains data analysis regarding the *shinai* and body movements of player's attack initiation. There were significant differences between men and women with regards to the *shinai* and body movements variables analyzed ($P < 0.001$, respectively). Specifically, right direction *shinai* movements were higher for women in comparison to men, while the frequency of no movement of the *shinai* was lower for women than that of men. Women's forward and backward body movement was higher than that of men.

Figure 3 illustrates the frequency of *shinai* and body movements during defense. The analysis discovered significant differences between females and males in regards to those variables analyzed ($P < 0.001$, respectively). Comparatively, women initiated statistically

Table 1. The comparison of the technical characteristics

	50th Women's				45th Men's			
	N	%	Awarded Points	Not Awarded Points	N	%	Awarded Points	Not Awarded Points
Total	2639		69	2570	1823		75	1748
Technical Patterns								
Offensive attack	2413	91,44 *	57	2356	1561	85,63	50	1506
Counter attack	226	8,56	12	214	262	14,37	20	242
Datotsu-bu Target Points								
Men(Head)	1719	65,14 *	53	1679	1017	55,79	45	972
Kote(Hands)	663	25,12	9	654	601	32,97 *	15	586
Dou(Trunk)	187	7,09	6	181	108	5,92	12	96
Tsuki(Throat)	60	2,27	1	59	97	5,32 *	3	94
Spatial Distance								
Offensive attack	2413		57	2356	1561		55	1506
Fundamental	627	25,98	27	600	832	53,30 *	35	797
Closer	1176	48,74 *	21	1155	494	31,65	8	486
Further	0	0,00	0	0	33	2,11	1	32
Contact	610	25,28	9	601	202	12,94	11	191
Counterattack	226		12	214	262		55	1506
Fundamental	67	29,65	7	60	165	62,98 *	20	145
Closer	151	66,81 *	5	146	81	30,92	0	81
Further	0	0,00	0	0	9	3,44	0	9
Contact	8	3,54	0	8	7	2,67	0	7

* $P < 0.001$

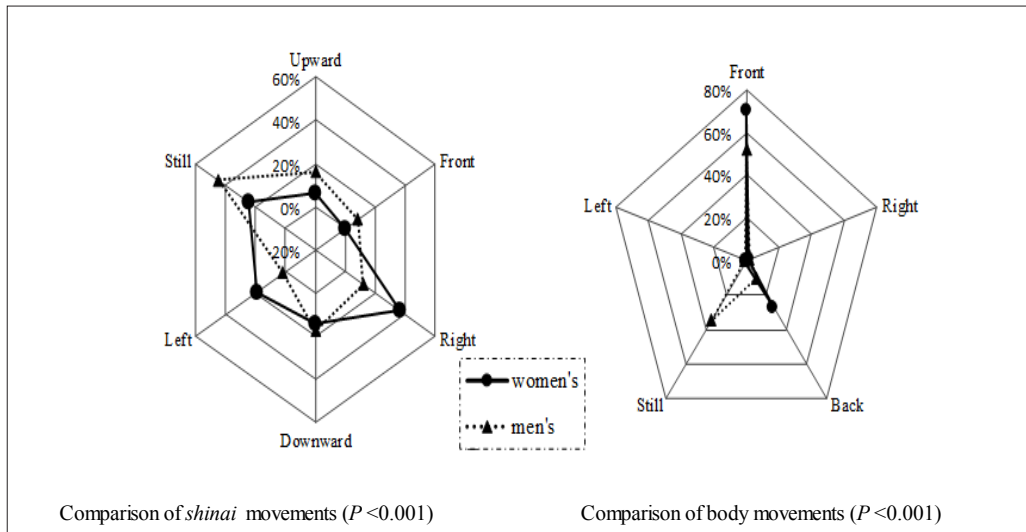


Figure 2. Shinai and body movements at attack initiation.

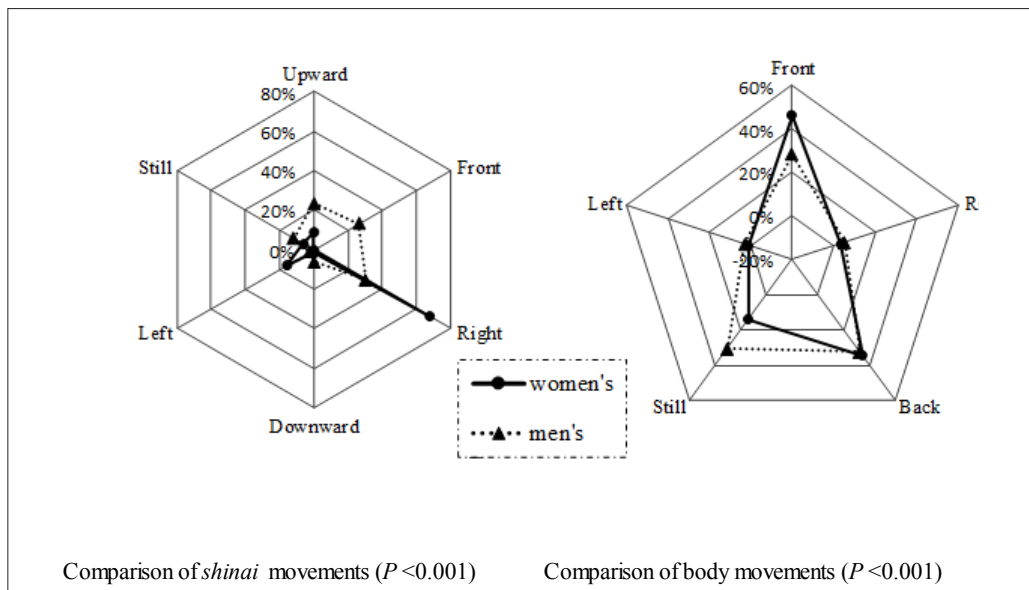


Figure 3. Shinai and body movements during defensive maneuvers.

fewer forward movements of the *shinai* than did men. Right *shinai* movement was significantly higher for women than for men. No body movement was significantly lower for women while forward frequency movements were higher for women than for men.

Figure 4 illustrates the pattern frequency both the *shinai* and body movement for men and women when the players initiate an attack. Striking while stepping forward and moving the *shinai* towards the right was highest amongst women while no body and *shinai* movement was highest amongst men. Additionally, the number of different strike patterns employed by women was less than that of men.

Figure 5 illustrates pattern frequency of body movements and *shinai* in defensive situations. Amongst women, the pattern of stepping forward while moving the *shinai* to the right was highest, while no stepping while moving the *shinai* to the right was highest amongst men. Additionally, the number of defensive patterns employed by women was less than that of men.

Figure 6 illustrates counter attack pattern frequency. The *kote-kaeshi-men* pattern was the most used, and two of the five counterattacks were initiated after the opponent attempted a *men* strike. Conversely, men employed the *kote-suriage-kote*

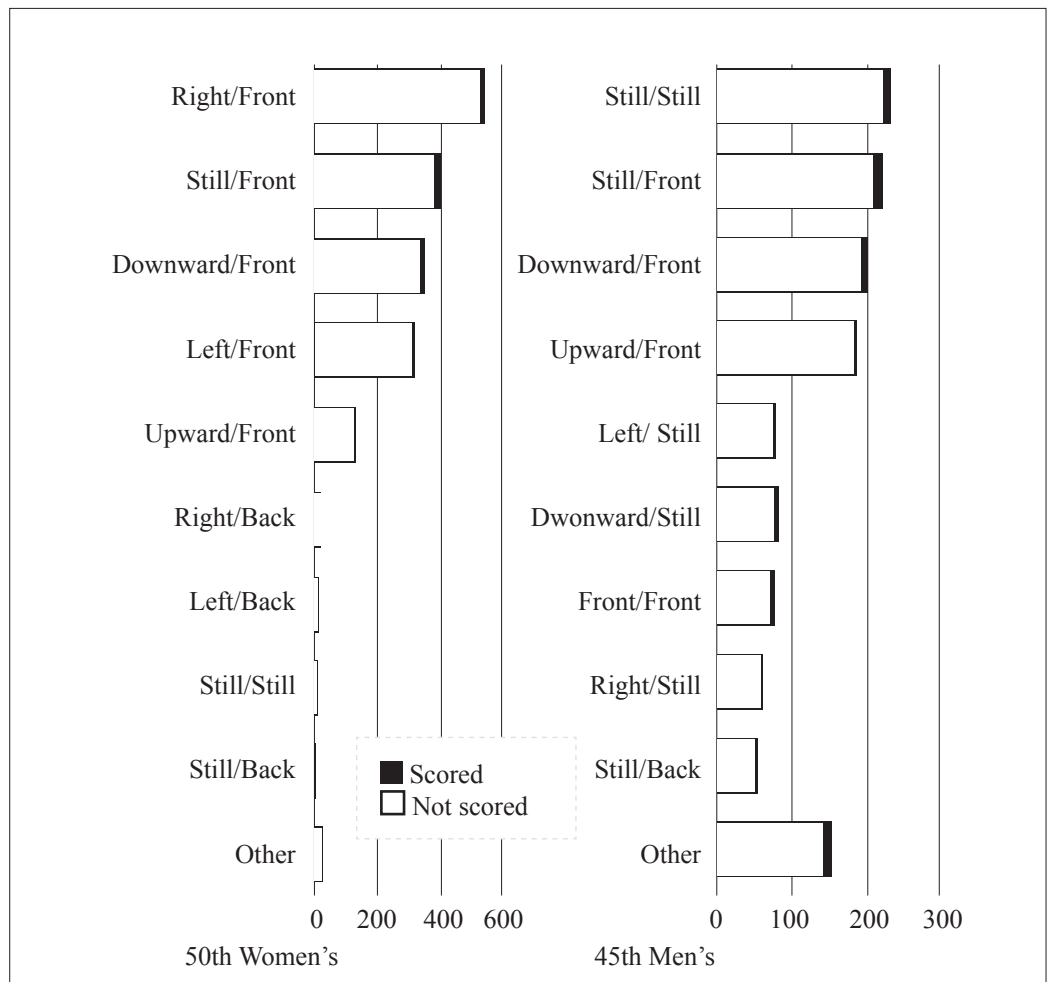


Figure 4. The comparison of shinai and body movement patterns at attack initiation

most frequently, and all the top five counterattacks were initiated after the opponent attempted a *kote* strike.

DISCUSSION

Some kendo experts contend that the time required to achieve *ippon* and average match times are too long in men's tournaments. [12-14] On average, techniques attempted in women's matches were the same as in men's on a per minute basis; however, the frequency of overtime matches and the average contest time was longer than that for men's matches. In addition, the frequency of point scoring techniques for women was very low (2.61%). Due to lack of data from previous studies, time required in gaining *ippon* and average contest time could not be confirmed. However, due to the data presented, it is assumed that the time for achieving *ippon* and the average women's competition time are longer than in men's competitions.

In kendo competitions, spatial distance between the two competitors plays a fundamental role in the match's outcome [10]. Of the distances analyzed, the fundamental spatial difference is the most important in terms of offensive, defensive, and counterattack techniques in exercise [9, 10]. Female competitors engaged each other in close spatial distance and with body contact in 73% of the time, while men maintained either fundamental spatial distance or farther spatial distance 57% of the time.

Traditional kendo manuals prescribe that both women and men strike from the fundamental spatial distance. Females and males have approximately the same muscle power in the cross sectional area, and muscle contraction speed is also approximately the same [15,16]. Physique differences and comparatively more muscle mass in males results in both strength and speed differences. In regards to speed, women, on average, were 10% slower than men in competitions [17]. Because women step forward at a lower speed than men, an attack initiated

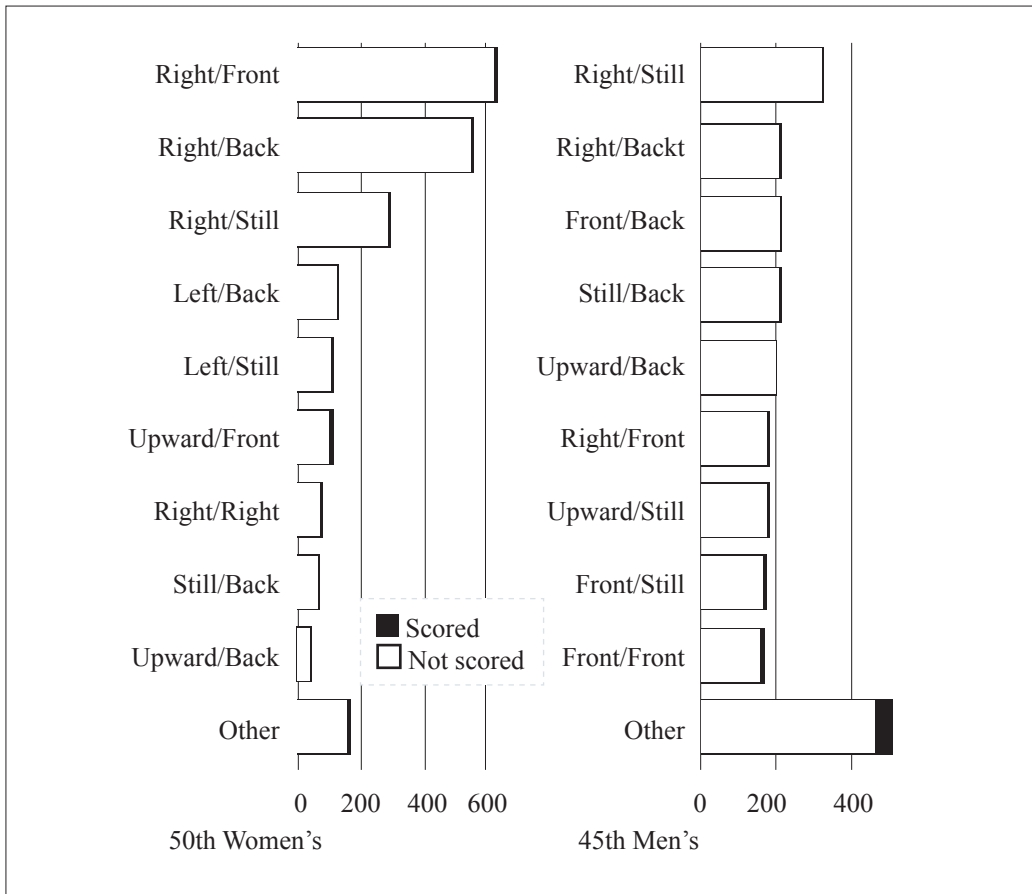


Figure 5. The comparison of shinai and body movement patterns during defensive maneuvers

in the fundamental spatial distance would result in the opponent easily counterattacking due to the difference in the speed distance ratio. Thus, the close distance at which women kendo practitioners compete is a result of comparatively less speed and muscle mass than of men.

Kendo players attempt to score points through striking one of four *datotsu-bui* (target points): *men*, *kote*, *dou*, *tsuki*. The attempt is successful if contact is made with *kendou-gu* (protectors for kendo) with the *shinai* while maintaining the posture and mentality as prescribed by *zanshin* [18]. Simply striking *datotsu-bui* with the *shinai* does not guarantee points—players must execute an accurate strike while exhibiting the proper mentality within the fundamental spatial distance and at the correct speed to score *ippon*. Women players tend to engage each other in the close spatial distance, resulting in the inability to achieve the speed necessary to carry out point scoring attacks.

According to previous studies, men players often use *kote* and *tsuki* to thwart the opponent's defense and

set the stage for an effective attack [18]. In women's contests analyzed, there were few *kote* and *tsuki* that would allow them to check their opponents' attacks. This is due to the close spatial distance fighting because the risk of an opponent initiating a counter attack is high.

Fundamental spatial distance is a primary focus of most instructors teaching the dynamics necessary for a point scoring attack using the *shinai*. However, it is recommended that instructors incorporate instruction that accounts for the differences between men and women's physique and muscle mass into their programs and develop new exercise methods in light of these observations.

Male kendo practitioners were observed using the techniques of stepping forward or no stepping while moving the *shinai* within their opponent's bodily area pre-attack. According to a previous study, this is effective in thwarting the opponent's chances of counterattacks [8]. Moving the top of the *shinai*

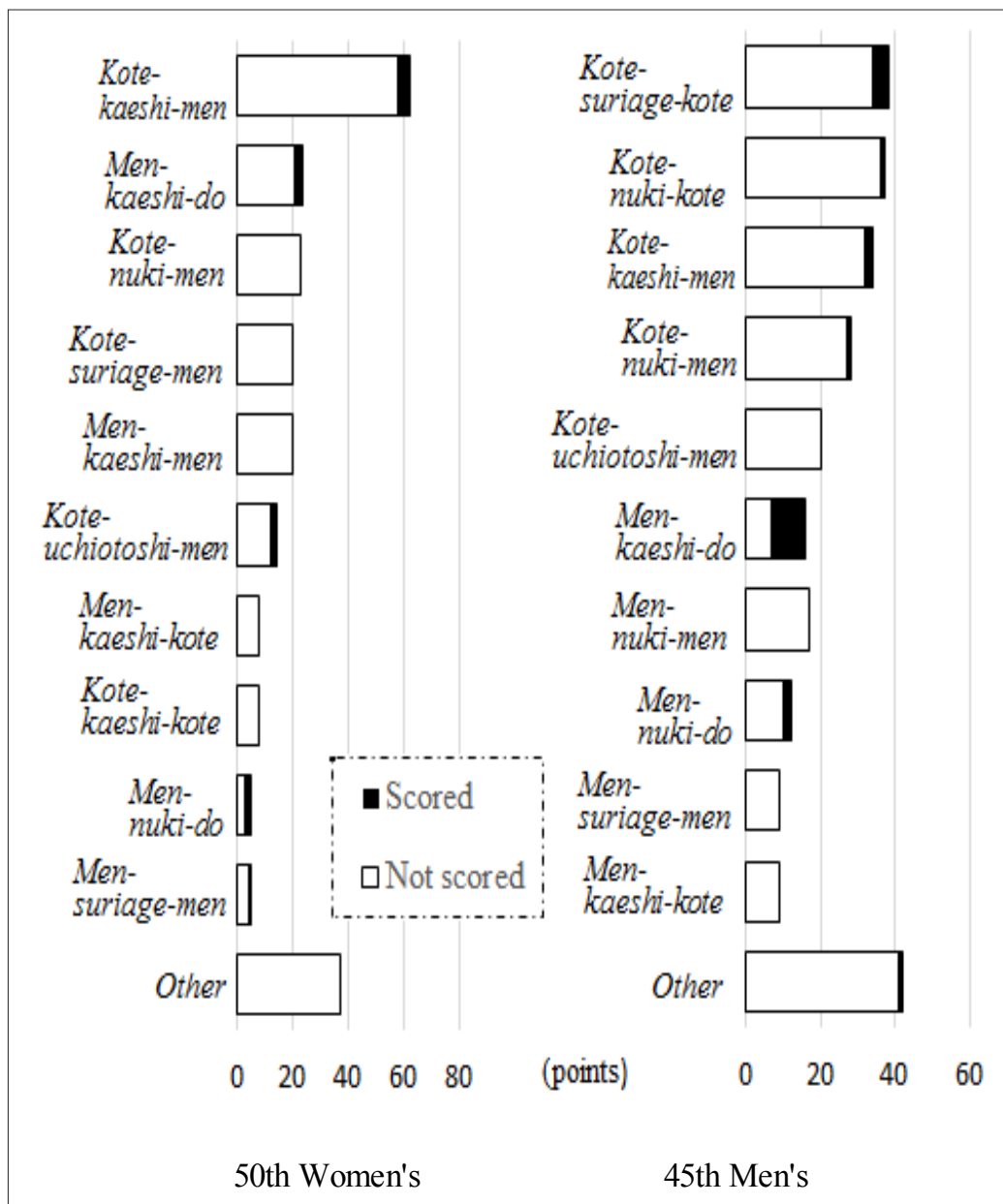


Figure 6. The comparison of technical styles in counterattacks

forward is effective in controlling the opponent's bodily or *shinai* movement. However, women usually struck repeatedly while stepping forward and moving the top of the *shinai* to the right or the left of the opponent's body, moving the *shinai* over the body cavity area. This technique is generally considered defensive in nature, and is a result of women striking after fending off an attack and protecting the *datotsu-bui*. The high frequency of close spatial distance fighting accounts for this.

According to a previous study, male kendo practitioners primarily used the techniques of stepping

backwards or no body movement while moving the *shinai* to their right as a defensive gesture. Raising the top of the *shinai* forward to control the opponents was used frequently [6]. Female kendo practitioners, however, utilized stepping forward or backward while moving the *shinai* right or left to hide *datotsu-bui* as a defense. Due to women engaging one another at close spatial distance, they were unable to control their opponent's movements with their *shinai*. Furthermore, they often employ defensive movements in their attacks during competition. These points illustrate the marked difference between man and women's attacking patterns.

CONCLUSION

In women's competitions, counter attacks were most frequently initiated after the opponent attempted a *kote* strike. *Men* strikes accounted for the second most frequent counter attack technique. Striking at the opponent's *kote* soon after luring the opponent to draw out their *shinai* with the intention of attacking to their own *kote*, defined as *kote-nuki-kote*, was used. This necessitates a certain amount of distance to be successfully performed, and was rarely used in women's contests but used often in men's contests.

The applied analysis of technical and tactical aspects of men and women's kendo is similar to, but not exactly like, the methods used in the analysis of judo [19-21]. It enables profiling the development of individual tactical and technical masters of kendo in the same manner as is done of world's leading judokas [22]. In kendo, unlike judo, there are no weight categories. This does not mean that anthropological methods used to develop profiles of morphological judo men and women [23,24] cannot be used in kendo. Such comprehensive profiling of kendo practitioners based on of tactical-technical and morphological criteria may be useful both in terms of cognitive and application (selection for training and prophylaxis of health).

Contests times were longer for women competitions than that of men's due to less number of point scoring attacks.

Close spatial distance techniques were used more frequently than fundamental spatial distance techniques. It is hypothesized that this is a result of the female physique and muscle mass.

Female kendo practitioners stepped forward in a defensive posture while moving the *shinai* to the left and right. The female physique and muscle mass affects the technical and tactical strategy of female competitors. Female kendo practitioners tend to compete in closer spatial distance than men. In general, women's competitive strategy is different than that of men's. Instructors need to reconsider training and coaching methods that account for the physiological differences between males and females.

CONFLICT OF INTEREST

The authors declare that they have no financial or personal relationships with any people or organizations that could influence this paper's content in any form.

REFERENCES

- Yotani K, Tamaki H, Kirimoto H et al. Response time and muscle activation patterns of the upper limbs during different strikes in kendo. *Arch Budo* 2013; 2: 101-107
- Honda S. An examination of a tactical learning model in kendo for introduction courses where kendo armour rental is not available. *Arch Budo* 2010; 6(3): 149-157
- Theoxaropoulos A, Tsitskaris G, Garefis A Types of passing and their effectiveness in female basketball. *Woman and Sport* 2002; 1(1): 59-68
- Osugi T, Demura S, Satoh S. Factorial structure of technical domain related to competitive swimming performances and gender and competitive ability differences of the composing factors. *Japanese Society of Education and Health Science* 2007; 52(4): 203-211 [in Japanese]
- Janse DE, Jonge XA, Thompson MW et al. Exercise performance over the menstrual cycle in temperate and hot, humid conditions. *Med Sci Sports Exercise* 2012; 44(11): 2190-2198
- Maeda S, Yagisawa M. Analytical study of *yuko-datotsu* in kendo. *Research Journal of Budo* 1986; 19(2): 77-78 [in Japanese]
- Otsuka M. *Encyclopedia to understanding kendo*. Tokyo: Tokyodoshuppan 2009: 112-113 [in Japanese]
- Nakamura M, Suganami M, Hirose N. Game contents analysis in kendo-Targeting the 45th all-Japan kendo championship. *Research Journal of Budo* 1999; 31(3): 26-34 [in Japanese]
- Tsuboi S, Satou N. *Kendo course of modern*. vol 2. Tokyo: Hyakusenshobo 1971: 59-104 [in Japanese]
- All Japan Kendo Federation: *Childhood Years Kendo Teaching Guideline*. Tokyo: All Japan Kendo Federation 1985: 80-83 [in Japanese]
- All Japan Kendo Federation: *Kendo Teaching Guideline*. Tokyo: All Japan Kendo Federation 2008: 73-147 [in Japanese]
- Takumiya K. All Japan kendo championship game analysis. *Research Journal of Budo* 1974; 7(1): 66-67 [in Japanese]
- Utsunomiya S, Ootsuka T. Studies on the game defined as the change skills of modern kendo. *Research Journal of Budo* 1986; 19(2): 79-80 [in Japanese]
- Nakamura M, Iwakiri K, Suganami M et al. Changes of techniques in kendo from the viewpoint of game analysis. *Research Journal of Budo* 2001; 34(1): 35-42 [in Japanese]
- Saltin B, Henriksson J, Nygaard E et al. Fiber types and metabolic potentials of skeletal muscles in sedentary man and endurance runners. *Ann NY Acad Sci* 1977; 301: 3-29
- Maughan RJ, Watson JS, Weir J. Strength and cross-sectional area of human skeletal muscle. *J Physiol* 1983; 338: 37-49
- Sakurai S. Gender differences that appear in physical fitness and motor ability. *Journal of Health, Physical Education and Recreation* 2009; 59(9): 587-593 [in Japanese]
- All Japan Kendo Federation: *The Regulations of Kendo Shiai and Shinpan*. Tokyo: All Japan Kendo Federation; 2008: 6-7 [in Japanese]
- Franchini E, Sterkowicz S, Meira CM et al. Technical variation in a sample of high judo players. *Perceptual and Motor Skills* 2008; 106: 859-69
- Boguszewski D. Fight dynamics of the double Olympic Champion in judo (1988, 1992). *J Hum Kinet* 2006; 16: 97-106
- Adam M, Smaruj M. The indices of technical-tactical preparation of the World's Judo Champions in Tokyo 2010 as an assessment criterion for individual training. *Arch Budo Sci Martial Art Extreme Sport* 2013; 9: 33-39.
- Adam M. A profile of Paweł Nastula's individual technical-tactical preparation. *Arch Budo Sci Martial Art Extreme Sport* 2013; 9: 69-75
- Jagiello W, Kalina RM, Korobielnikow G. Morphological diversification of female judo athletes. *Arch Budo* 2007; 3(3): 27-34
- Jagiello W. Differentiation of the body build in judo competitors of the men's Polish national team. *Arch Budo* 2013; 2: 117-125

Cite this article as: Nakamura M, Takami Y, Nakano M, et al. Technical and tactical characteristic of Japanese high level women kendo players: comparative analysis. *Arch Budo* 2014; 10: 91-99