

Alterations in Kumite Techniques and the Effects on Score Rates following the 2013 International Judo Federation Rule Revision

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- B Data Collection
- C Statistical Analysis
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Abstract

Background & Study Aim: Significant changes in kumite tactics could be expected following the 2013 International Judo Federation rule revision, which mandated that competitors initiate sparring immediately at match outset. The research contained in this paper focused on the specific areas of kumite that were likely to be affected by this rule revision.

Material & Methods: In total, 396 men's contests were selected from All Japan Judo Federation DVDs. Throws resulting in scores were identified and the preceding kumite was analyzed. Chi-square tests were performed to determine variations in the number of scored throws between the 2012 and 2013 contests based on predetermined criteria and comparisons of kumite efficacy were made using the resulting score ratios.

Results: Re-gripping resulted in a higher score rate in aiyotsu, kenkayotsu and the total of both stances. ($P=0.022$, $P=0.033$, $P=0.002$; respectively). The score rate increased when both hands were used for throwing in the aiyotsu stance and the total of both stances ($P=0.017$, $P=0.002$; respectively). The score rate increased in cases where the competitor grabbed their opponents in places other than the collar or sleeve with both hands or in a place other than the collar or sleeve with one hand and the collar or sleeve with the other hand when the competitors sparred in the kenkayotsu stance and in the total of both stances combined ($P=0.007$, $P=0.010$, respectively).

Conclusions: Re-gripping the opponent and targeting locations other than the collar and sleeves for grabbing might facilitate scoring. This should be considered by trainers and competitors when preparing for competitions.

Key words: combat sports, martial arts, competition analysis, referee rules, gripping tactics, technique effectiveness, coaching methods

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Kumite – a judo standing technique performed by grabbing the opponent's jacket or body part(s) with one or both hands before initiating an attack [22].

Aiyotsu – competitors stand facing one another, both with the same foot (right or left) extended forward and gripping one another symmetrically. This results in the competitors being relatively close to each other. *Aiyotsu* is further classified as right (left) natural posture versus right (left) natural posture.

Kenkayotsu – Competitors stand facing one another with the opposite foot extended forward and gripping one another asymmetrically. This creates more open space between the competitors compared to *aiyotsu*. *Kenkayotsu* is further classified as right natural posture versus left natural posture.

INTRODUCTION

Judo, literally meaning the way of gentleness, is a combat sport that demands both physical prowess and great mental discipline. Judo is commonly described as a fighting art, spiritual discipline, a system of physical education, and a recreational activity [1].

Judo's official rules have been revised by the International Judo Federation (IJF) several times in the last decade; specifically in 2006, 2009, 2010, 2013 and 2014 [2, 3]. According to the IJF, the rules have been revised to make judo more dynamic and pursuant of judo's traditional goal of achieving *ippon* [4] and at making judo more entertaining [5].

This paper focuses on the effects of the 2013 rule revision on *kumite* using the rate of scored throws as a metric to assess the efficacy of the competitors' tactics. The 2013 revision prohibits competitors from attacking or defending below the belt using arms or hands, penalizing such actions with a *bansoku-make*, or disqualification. Breaking the opponent's grip using both hands, failure to immediately engage the opponent, and delaying match progression through evasive techniques is also discouraged, and results in a *shido*, or minor violation [2].

We considered that one possible outcome of the 2013 rule revision would be an increase in grabbing attempts, with competitors using both hands to grab the opponent's sleeves and collar. We also hypothesized that there would be an increase in competitors immediately attempting to throw their opponent at match outset.

Kumite is a fundamental part of judo. Because of this, it has been the subject of numerous studies. Tactical maneuvers aimed at gaining an advantage in *kumite* significantly enhance a competitor's likelihood of winning [6]. Differences in *kumite* tactics between men and women were identified in a study of 15 matches from the 60kg category and 15 matches from the 48 kg category in the 1997 World Judo Championship. It was reported that women use both hands significantly more when attacking than men [7]. Murayama et al. [8] conducted a case study on the women's 57 kg category 2001 World Judo Championship and found that competitors who used both hands to grab their opponent's sleeves scored significantly more points than those who didn't. Gutiérrez-Sánchez et al. [9] found that handgrip strength of the different podium placement winners was statistically different in women but not in men

among the 102 judokas (31 women and 71 men) in the 15 to 19 age class competing in the 2008 Junior Championship. Tsuruta et al. [10] found that grabs using either a single hand or both hands were performed in the same amount of time by analyzing the 2012 London Olympic judo men's category. Kajmovic et al. [11] developed a new method of categorizing *kumite* tactics that assists in determining its effect on competition outcomes. They created three broad *kumite* technique classifications: same grip configuration (right and right grip, left and left grip), opposite grip configuration (right vs left grip) and sleeve ends configuration (sleeve grips). Men were found to use the same grip configuration style significantly more than other configurations, while women used the opposite grip configuration significantly more, as seen in matches from the 2008 European Cadets Judo Championship [11]. Maekawa et al. [12, 13] created a rating scale enabling coaches and managers to determine skill level sans performance in competitions. They did this by querying top level Japanese university judo coaches on factors used in selection for participation in competitions. Two of the twelve factors identified as selection criteria were the athlete's assertiveness in applying *kumite* and how well the competitor performed during *kumite* while practicing [12, 13].

Furthermore, analysis of rule revision effects on technical and tactical preparation and match outcomes has been conducted numerous times in recent years, as have the effects of rule revisions on *kumite* [14-19].

Following the 2009 IJF rule revision, research found a significant increase in the number of times that competitors grabbed the collar and sleeves when attacking their opponent [20]. After the 2010 IJF rule revision that restricted competitors from grabbing one another below the belt, a statistically significant increase in the use of *kata-guruma* (throwing the opponent by levering them over the shoulder) was found, as well as a statistically significant increase in the frequency of using *sukui-nage* to counter cross-guard grabbing [21]. A comparative analysis on *kumite* performed before a scored throw showed a significant increase in attack efficacy when a competitor re-gripped their opponent three times prior throwing them, implying that reestablishing a grip on the opponent was more effective than attempting to throw the opponent after only one or two grasps [22].

The numerous studies on *kumite* until now indicate that its mastery is fundamental to being a successful judo competitor and supports our decision to

undertake the analysis discussed in this paper. We specifically wanted to understand how the 2013 ruling affected competitors' implementation of *kumite*. The research focused on these specific aspects of *kumite*: re-gripping tactics, use of one or both hands to grasp the opponent when initiating a throw, and grabbing targets used when throwing. The *kumite* was analyzed as it was used throughout the matches with the objective of discovering the relationship between *kumite* tactics used and their effect on scores. This was done by analyzing the men's category of 2012 and 2013 world class contests. Through this study, we endeavored to identify *kumite* methods that facilitated successful outcomes in terms of scoring.

MATERIAL AND METHODS

Subjects

In total, 386 men's contests from the Grand Slam Tokyo 2012 and the Grand Slam Paris 2013 were analyzed and validated using All Japan Judo Federation Reinforcement Committee Science and Research Department DVDs. Specifically, 154 matches from the Grand Slam Tokyo competition and 232 matches from the Grand Slam Paris competition were chosen. Because the 2012 Grand Slam Tokyo competition did not use preliminary matches, the 2013 Grand Slam Paris preliminary matches were excluded from the study. Furthermore, one match from the 2013 competition was not recorded perfectly, and so was excluded from the study. Contests occurring two months apart were chosen in order to minimize the possibility that variables outside the scope of this study would affect the results. The 2013 competition was held one month after the 2013 rule revision.

Analysts

Three analysts took part in this research. One of the analysts was "6th dan", and the other two analysts are "7th dan". Dan is a ranking system indicating skill level. In judo, there are examinations for the ranks from the first-dan to the tenth dan, with the tenth dan being the highest [22]. Each analyst has at least 40 years of experience in judo practice, and they are all currently active in judo instruction. All data relating to competitors' use of *kumite* were confirmed unanimously by all three analysts as part of the validation process.

Procedure

Videos of 396 scored (*yuko*, *waza-ari*, *ippon*) throws and the preceding *kumite* were analyzed: 144 scored techniques from the 2012 contest and 252 scored techniques from the 2013 contest.

The stance that competitors took while engaged in *kumite* at the competition's outset was recorded as being either *aiyotsu* or *kenkayotsu*, referring to previous studies of Yano et al. [23] and Sogabe et al. [24].

Re-gripping attempts were then documented. *Kumite* preceding a scored throw was considered to include a re-gripping attempt if the competitor released their opponent with either hand and grabbed their opponent again with the same hand without a break in sparring. Thus, *kumite* that included more than two instances of a competitor grabbing their opponent in a continuous sequence was categorized as a re-grip. *Kumite* in which grasping occurred less than three times in a continuous motion was considered to be *kumite* with no re-gripping.

Use of one or both hands in the *kumite* preceding a scored throw was documented, as was the stance of the competitors in terms of *aiyotsu* or *kenkayotsu*. Those instances of *kumite* in which only one hand was used were eliminated from further analysis. Finally, gripping targets of both hands were identified. The gripping target categories appear as follows: collar and sleeve (CS grip), collar and collar (CC grip), sleeve and sleeve (SS grip), others and collar (OC grip), other and sleeve (OS grip) and other and other (OO grip).

All data were coded using both the revision of tactical analysis sheet for throwing techniques developed by Hirose et al. [7] and the *kumite* parts table developed by Wakawama et al. [25] using MS Excel software.

Statistical Analysis

Chi-square tests were used to determine differences in the ratio of scored throws between 2012 and 2013 contests with regards to the variables selected for the study. The statistical significance level was set at $P < 0.05$ for all analyses. Statistical Package for Social Science (SPSS) for Windows 21.0 was used to compute the statistics [26].

RESULTS

Scoring rates significantly increased when competitors re-gripped their opponents in *aiyotsu*, *kenkayotsu*, and the total of both stances ($P=0.022$, $P=0.033$, $P=0.002$; respectively) (Table1).

Analysis revealed that scored throws in which the competitor used both hands significantly increased in the *aiyotsu* stance and the total of both stances after the 2013 rule revision ($P=0.017$, $P=0.002$;

respectively). The rate of scoring also increased in *kenkayotsu*. However, this increase was not significant (Table2).

In the *kumite* preceding the scored throw, the score rate of the OC grip, OS grip, and the OO grip significantly increased in *kenkayotsu* and the total of the two stances after the 2013 rule revision (P=0.007, P=0.010, respectively). Score rates of the OC grip, OS grip, and OO grip also increased in *aiyotsu*; however, this increase was not significant (Table3).

Table 1. Score rate classified according to re-gripping behavior

	No re-gripping		Re-gripping	
	N	%	χ^2	P-Value
Total			9.696	0.002**
2012	144	74.31	25.69	
2013	252	58.73	41.27	
Aiyotsu			5.209	0.022*
2012	77	71.43	28.57	
2013	135	55.56	44.44	
Kenkayotsu			4.530	0.033*
2012	67	77.61	22.39	
2013	117	62.39	37.61	

*P<0.05 **P<0.01

Table 2. Score rate categorized according to whether the competitor used one or both hands

	Single hand grip		Two hand grip	
	N	%	χ^2	P-Value
Total			9.335	0.002**
2012	144	18.75	81.25	
2013	252	8.33	91.67	
Aiyotsu			5.670	0.017*
2012	77	18.18	81.82	
2013	135	7.41	92.59	
Kenkayotsu			3.757	0.053, n.s
2012	67	19.40	80.60	
2013	117	9.40	90.60	

*P<0.05 **P<0.01

Table 3. Score rate of gripping targets preceding scored throws

	Collar and Sleeves †		Other areas, C&S ‡	
	N	%	χ^2	P-Value
Total			6.705	0.010*
2012	117	51.28	48.72	
2013	231	36.80	63.20	
Aiyotsu			1.067	0.302, n.s
2012	63	41.27	58.73	
2013	125	33.60	66.40	
Kenkayotsu			7.188	0.007**
2012	54	62.96	37.04	
2013	106	40.57	59.43	

*P<0.05 **P<0.01

† CS,CC,SS grips that did not include targets in the other category

‡ OC,OS,OO grips that included at least one location in the other category

DISCUSSION

Regardless of the *kumite* stance being *aiyotsu* or *kenkayotsu*, re-gripping resulted in a significant increase in the score ratio, while *kumite* in which there was no attempt to re-grip resulted in a significant decrease in the score ratio. The new regulations encourage competitors to grip the opponent's judo jacket above the belt quickly and aggressively while concurrently carrying out defensive techniques over a smaller area due to the 2013 rule which bans competitors from grabbing their opponents below the belt. This rule change gives competitors enough time to attempt re-gripping, while their opponents could concentrate their attention on defensive techniques against attacks targeting the upper torso. Thus, re-gripping sets the stage for successful throwing and scoring. It also aids in surprising opponents by increasing the variety of possible grasp combinations. The study revealed that after establishing the initial grip, competitors often re-gripped then threw their opponents and scored. Before the rule revision, competitors relied on a standard set of actions to initiate a throw. After the rule revision, competitors developed strategies to include re-gripping as a way to facilitate catching their opponent off guard. Hirosaki et al [27] state that lesser used combinations of *kumite* are most effective when combined with *ashi-waza* (foot techniques): *ouchi-gari*, *osoto-gari*, *deashi-harai*, *kouchi-gari*, *uchi-mata*, and *kosoto-gari* among the Japanese competitors. Hirosaki's findings support our conclusion that

applications of *kumite* which use re-gripping resulted in an increase in score ratios.

Two variables were considered when analyzing the *kumite* that immediately preceded scoring attempts. First, it was noted if one hand or both hands were used. Second, the places on the opponent's body that were grabbed during *kumite* were documented and classified as collar, sleeve, or someplace other than the collar or sleeve. The following observations were made.

Scoring attempts after *kumite* performed with only one hand resulted in a significant decrease in the score ratio and a corresponding increase in the score ratio for those attempts following *kumite* performed with both hands in the *aiyotsu* stance and the total of both stances combined. In 2009, Ishikawa reported a significant decline in competitors' use of both hands during *kumite* from 1995 to 2005 using data from the World Judo Championships [28]. During this period, rule revisions were introduced with the objective of increasing the use of both hands during *kumite*. For example, in 1998, the IJF created a rule prohibiting evasive techniques meant to delay match progression and in 1999 the thickness of the judo jacket, particularly the collar, was thinned down so that competitors could more easily grip their opponents [29]. We inferred that the 2013 rule revision had a greater impact on judo, and specifically *kumite*, than any other rule changes that have been implemented in the last decade. The significant increase in the scoring rate of throws performed after *kumite* using both hands supports this.

Analysis of the target areas for grabbing during *kumite* yielded the following observations. The score ratio of throws following *kumite* in which the competitor performed an OC, OS, or OO grip while in the *kenkayotsu* stance significantly increased. Matsumoto noted that the collar and sleeves are natural targets for grabbing during *kumite* because grabbing the opponent in these areas allows one to break their opponent's balance and effectively control their opponent's arm movements [30]. We concluded that competitors began to choose targets other than the collar and sleeves because they found these targets to also be effective in allowing them to gain an advantage over their competitor.

Yano et al. [23] clarified that *aiyotsu* produced a higher rate of scoring *ippon* than *kenkayotsu* in the men's category of the 1988 Kodokan Judo Cup in Japan. The reason for this is that the wider space between the competitors in the *kenkayotsu* stance makes it more difficult to perform techniques leading to a score. Based on the observations from our study, competitors are attempting to score more often in the *kenkayotsu* stance by grabbing their opponents in places other than the traditional targets, introducing the element of surprise in their attacks.

Competitors succeeded in creating new *kumite* styles without compromising their technical accuracy and effectiveness by choosing not only collar and sleeve grips after the rule revision, but also targets in the other category. This means that coaching methods and manuals should include information about *kumite* which employs grips targeted at not only the collar and sleeves but other locations as well.

We confirmed that re-gripping resulted in a higher score ratio after the rule revision; however we didn't investigate the patterns of gripping orders. Additionally, while we could clarify that grabbing the opponent in places other than the collar or sleeves prior to a scoring attempt became more effective after the 2013 rule revision, we did not identify the particular target areas that were chosen. We will explore these topics in later research.

CONCLUSION

In conclusion, the 2013 rule revision greatly changed the use of *kumite* in world class judo contests. The use of re-gripping in competitions was found to enhance scoring for competitors. Furthermore, we could confirm an evolution in the use of *kumite* to include an increase in competitors grabbing their competitors in places other than the collar and sleeves. Coaches should consider these points when developing their *kumite* strategies and coaching plans.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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