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Dariusz Boguszewski
Medical University of Warsaw, Poland, dboguszewski@wum.edu.pl

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Abstract

Background: The objective of this work was to define and determine the effectiveness of defensive actions applied in judo fighting. **Material/Methods:** The study was based on video and DVD recordings of fights during Polish Championship finals in the years 2005-2008. Actions of female and male contestants participating in the total of 56 fights were analyzed (to an accuracy of 10-second periods of time). All actions: attacks, counter-attacks and defense without counter-attack were recorded and their effectiveness, preparatory actions, breaks and referees' decisions were analyzed. Altogether 69 fights of female and male contestants were subject to analysis. According to the author's classification of defensive actions, 12 types of defense without counter-attack were defined as follows: (1) hand block, (2) hip block, (3) maneuvering around, (4) twist onto belly, (5) hand and hip block, (6) hand block and maneuvering around, (7) stepping aside, (8) separation from grasp, (9) leaving the mat, (10) leg entanglement, (11) bridge, (12) return to tachi-waza (escape from ne-waza). **Results:** The types of defense most often applied according to the study – hand block and twist onto belly – were the least effective (86% and 66% accordingly). Ashi-waza i sutemi-waza were throws most often applied as counter-attack. Sutemi-waza (44%) throws were most effectively applied. Leg and hand throws were the most frequent and most effective counterattack throws. O-goshi throw appeared to be counter-effective most often – not less than every fourth one was successfully counter-attacked. **Conclusions:** High effectiveness of counter-attacks (29%) should be the tip for coaches and contestants to carry out professional trainings, which follows (and not the other way round as it used to be) the rules set forth by professor Jigoro Kano (among others: “give up in order to win”). Moreover, trainings of defensive skills should be modified since defense actions most often applied by Judoka players (hand block and twist onto belly) proved to be the least effective.

Keywords

judo, combat sports, technical-tactical training, defensive actions

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A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

Dariusz Boguszewski

Medical University of Warsaw, Poland

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Ashi-waza i sutemi-waza were throws most often applied as counter-attack. Sutemi-waza (44%) throws were most effectively applied.

Leg and hand throws were the most frequent and most effective counter-attack throws. O-goshi throw appeared to be counter-effective most often – not less than every fourth one was successfully counter-attacked.

Conclusions: High effectiveness of counter-attacks (29%) should be the tip for coaches and contestants to carry out professional trainings, which follows (and not the other way round as it used to be) the rules set forth by professor Jigoro Kano (among others: "give up in order to win"). Moreover, trainings of defensive skills should be modified since defense actions most often applied by Judoka players (hand block and twist onto belly) proved to be the least effective.

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Address for correspondence:

dr Dariusz Boguszewski

Zakład Rehabilitacji Oddziału Fizjoterapii II WL Warszawskiego Uniwersytetu Medycznego, ul. Solec 57, 00-424, Warszawa

Phone: +4822 622 80 05, e-mail: dboguszewski@wum.edu.pl

Introduction

Compared to other individual sport disciplines, contestants' effectiveness in martial arts is determined to a large extent by opponent's counter-actions. Therefore, these are not only physical and mental conditions that matter but also an ability to adjust appropriate techniques and tactics of fighting to a specific opponent. Moreover, as it was proved by numerous scientific research, judo contestants of the highest level of sport mastery do not differ from each other regarding motoricity [1,2], body built and composition [3,4], or mental conditions [5,6]. What differs most is their technical and tactical skills. Gaining them is possible through many-year trainings and participation in thousands of fights during tournaments and sparrings. However, it is not always offensive actions of contestants that make them win. In medal fights during the most important international tournaments penalties constitute even more than 50% of all points awarded [7]. The effectiveness of offensive actions, on the other hand, is relatively minor and hardly ever exceeds 25% [7,8,9].

The objective of this study is to define and determine effectiveness of defensive actions applied in judo fighting. Moreover, it tries to compare defensive actions of female and male judo players.

Material and methods

The study was based on video and DVD recordings of fights during Polish championship finals in the years 2005-2008. The material for the study was not chosen at random – gold medal fights were subject to analysis, with the assumption that the best contestants participated in them. Actions of female and male contestants participating in the total amount of 56 fights were analyzed (to an accuracy of 10-second-periods of time). The total time of all fights was 219 minutes 10 seconds, i.e. 1315 sequences.

According to the method of dynamics measurement in Kalina's fight [10] all actions in each 10-second-fragment of fight were recorded (on record sheets): attacks and counter-attacks (throws, holdings, strangleholds and joint locks), defense without counter-attack – with their effectiveness determined as well as preparatory actions, breaks and referees' decisions. Types of defense were defined and their effectiveness was determined as the ratio of the number of effective actions to the number of watched actions of the given category.

Recording fights by means of a video or DVD technique gives the possibility to stop the picture and replay specific sequences of fighting, which is an additional advantage of the secondary observation.

The total of 69 female and male contestants, representing 25 sport clubs – most of them from AZS-AWFIS Gdańsk (n=11), Czarni Bytom (n=9) and Gwardia Warszawa (n=7), were subject to analysis. Five contestants participated in gold medal fights in Polish judo championships 2005-2008 four times, eight of them – three times, and twelve contestants – twice. An Olympic medalist and medalists in world championships (n=4) and European championships (n=9) were among them. The average age of the contestants was 24.09.

According to the author's classification of defensive actions, 12 types of defense without counter-attack were defined. The analysis and presentation were based on the Kodokan Judo division into throwing techniques (nage-waza) performed in the vertical position, throws with fall, so called sacrifice throwing techniques (sutemi-waza) and grappling techniques (katame-waza), performed in the horizontal position. Within the group of throws presentation refers to the following groups: te-waza (hand throwing techniques), goshi-waza (hip throwing techniques), ashi-waza (foot and leg throwing techniques), sutemi-waza (sacrifice techniques). Japanese terminology commonly used in judo has been applied.

Based on the observation records, 12 types of defense without counter-attack were defined (following the order according to motoricity criterion):

1. *Hand block* – to push attacking opponent away is the most often used type of defense. When both opponents are bound in mutual grapple, the most natural response in the situation of danger is to block the throw with hands. The first defensive reaction is also similar (before holding, joint locks or strangleholds) in a horizontal position.
2. *Hip block* – defense against hip or hand throws – rotary of the soei-nage type, where the attacker manages to get through the “bar” or when both opponents are not bound with a grasp. Static stretching in a hip joint.
3. *Maneuvering around* – type of defense against rotary hand throws (e.g. soei-nage) and hip throws involving throw-wise maneuvering around the opponent. Performed particularly in lower weight classes with a higher speed of fighting – advancing opponent’s rotation before back or hip throw.
4. *Twist onto belly* – rotation around one’s body axis. When one of the contestants has been attacked by surprise or has no grasp control over the opponent, nor has she/he reacted with hands and legs, twist onto belly is the last chance to prevent from falling on one’s back (before contacting tatami). According to judo regulations, no points are admitted for throwing the opponent onto the belly; however, throwing on the back is given the highest score – ippon, which means the end of fight before time is over. *Twist onto belly* is also a type of defense against pinning a hold when fighting in a horizontal position. This type of defense is also applied as an anticipation of the opponent’s move, usually in the final phase of the throw or passing to hold.
5. *Hand and hip block* – combination of hand block and hip block, hand blocking with simultaneous static stretching in a hip joint.
6. *Hand block and maneuvering around* – combination of hand block with escape around the opponent. Most often applied by judo players preferring a defensive style of fighting, waiting for offensive actions of the opponent or at the end of fight by judo players with a positive score.
7. *Stepping aside* – escape with a leg in danger of throw. Defense against throws involving opponent’s leg or legs grasps (kuchiki-taoshi, kata-otoshi, te-guruma, morote-gari), which are very popular nowadays. However, such actions involve high speed of the defending judoka.
8. *Separation from grasp* – depriving the opponent of his/her body self-control. It is an effective defense technique in danger of throwing or holding. However, it involves considerable strength of the defending judoka. In order to get points for the throw, the attacker has to gain full control over the opponent. By separation from the grasp he/she loses the control.
9. *Leaving the mat* – leaving the fight area. During dynamic actions performed at the edge of the mat, in both vertical and horizontal positions, the most effective technique of defense is *leaving the mat* by the defending player. In that case he/she can’t be reprimanded with a shido penalty. Escape outside the mat is punished only in the event when it has not resulted from the opponent’s actions.
10. *Leg entanglement* – is a defense against holding. When one of judokas controls two parts of the opponent’s body and immobilizes him/her on the back, referee announces pinning (osae-komi). One of the defense techniques is entanglement of the attacker’s leg or legs, since referee stops pinning when the defending judoka gets control over some part of the opponent’s body.
11. *Bridge* – defense against holding, attempt to turn onto belly (with possible lifting of the opponent) by “bridge” (or a “half-bridge”).

12. *Return to tachi-waza* – escape from ne-waza. Defense against ne-waza actions (holding, strangle holds and joint locks). The referee is obliged to stop action when one of the contestants rises to vertical position.

Leg entanglement, bridge and return to tachi-waza are used only in fighting in the horizontal position (ne-waza).

For each category of actions arithmetic mean including standard deviation, the number of effective actions, the number of actions taken and the effectiveness of particular techniques (a ratio of effective actions to actions taken) were calculated. Differences between particular techniques as well as with regard to sex of the contestants have been calculated on the basis of the t-Student test.

Results

The most frequent defense techniques (applied by both women and men) were: *hand block* (on average 4.04 per fight), *twist onto belly* (2.50), *hip block* (2.32) and *maneuvering around* (1.55). Nevertheless, *leaving the mat*, *hand block* and *maneuvering around*, *separation from grasp* and *return to tachi-waza* were most effectively applied (100% effectiveness). Beside the above mentioned techniques, the following techniques were 100%-effective: *stepping aside* as well as *hand and hip block* in the group of women, and *maneuvering around* and *leg entanglement* in the group of men (Fig. 1). The least effective appeared to be *twist onto belly* (66%) and *hand block* (85%), that is techniques most often applied. As regards the frequency and effectiveness of particular defense techniques applied by women and men from a statistic point of view there are no significant differences.

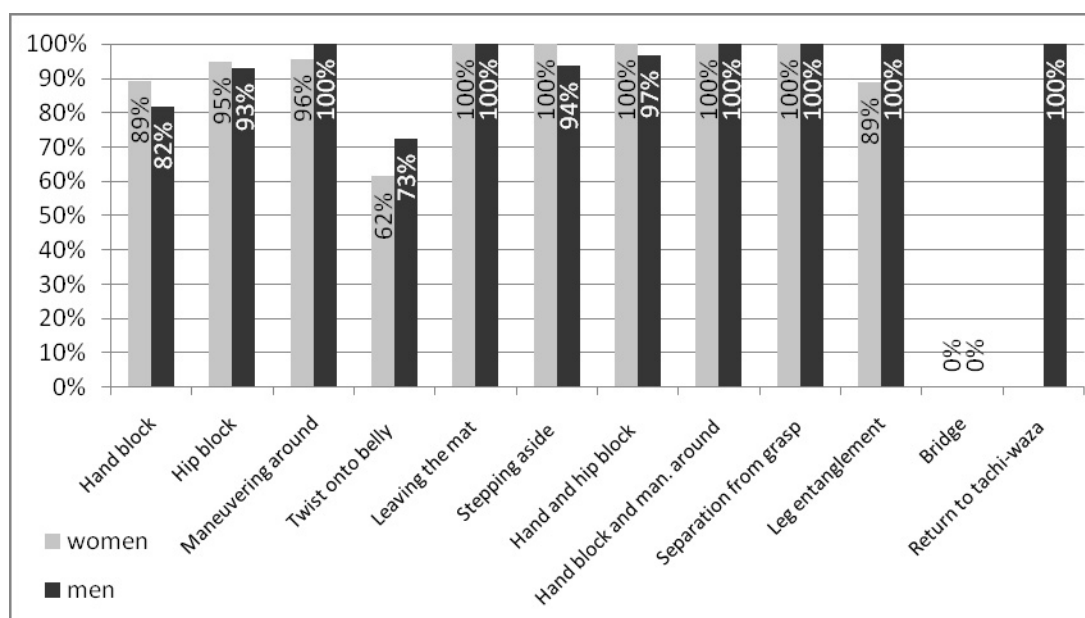


Fig.1. The effectiveness of defense techniques

A response in form of counter-attack, i.e. an action that could result in getting points, occurs more seldom. Hardly 5.82% of offensive actions are responded by the opponent's counter-attack. However, the effectiveness of counter-attacks (their effectiveness is measured not by preventing the opponent from gaining points as in a passive defense, but by getting points) is quite high – in

the analyzed fights it was 29%. Leg throws – ashi-waza were techniques most often applied by female contestants (0.36 per fight) and among them – de-ashi-barai. In the group of men sacrifice throws – sutemi-waza were dominant (0.29 per fight) where tani-otoshi was the most often tried technique. Hip throws were the most effective (50% of effectiveness) in the group of women and sacrifice throws in the group of men (Fig. 2). Summing up, sutemi-waza was the most effective (44%) (both in the group of women and men). Significant differences in the frequency and effectiveness of counter-attacks between women and men were not recorded.

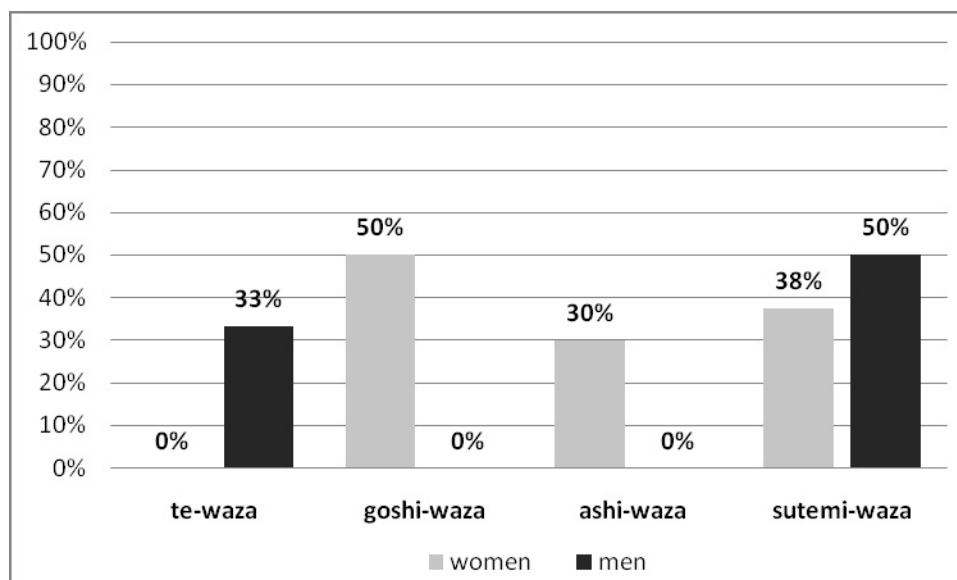


Fig. 2. The effectiveness of counter-throws

According to the conventional division into categories: lightweight (48, 52 and 57 kg for women and 60, 66 and 73 kg for men), middleweight (63 and 70 kg for women and 81 and 90 kg for men) and heavyweight (78 and +78 kg for women and 100 and +100 kg for men) the most effective counter-attacks were performed by female contestants in heavyweight categories (66% effectiveness) and male judokas in middleweight categories (50%).

Throws most often countered by female contestants of the Polish judo championship finals were foot and leg throws (11%), and among them – ko-soto-gari i de-ashi-barai. Most effectively countered throws belonged to the te-waza group of throwing techniques (3%) – especially te-guruma and soei-nage. Apart from them, sode-tsuri-komi-goshi throws (from the goshi-waza group) and uchi-mata throws (from the ashi-waza group) most often appeared to be counter-effective. In the Polish judo championship finals male contestants most often responded to attacks from the ashi-waza group with counter-throws (13%) – mainly ko-soto-gari and o-soto-gari. Foot and leg throws (2%) and hand throws (2%) were most effectively countered. However, it is worth stressing that foot and leg throws were the least frequently applied by the contestants. Summing up, o-goshi throws (from the goshi-waza group) were most effectively countered - not less than every fourth throw was counter-effective.

Discussion

According to experienced judo coaches, the level of technical and tactical training is the key factor having influence on the sport result [11]. In comparison to competitors better motoricity was even

proved not to be an absolute condition for winning in a direct fight – in relation to both children – young novices of martial arts and male adults – students of military colleges [12].

All in all, the effectiveness of judo contestants used to be determined on the basis of the analysis of offensive throws and grasps applied in fights [13,14,15,16,17]. The contestants' effectiveness used to be referred to as the number of performed throws and grasps (within a narrow aspect of understanding of fight techniques), the number of gained points, the number of won fights, etc. Attempts to analyze fighting techniques within a wider meaning, taking into consideration not only offensive but also preparatory and defensive actions, were relatively rare. What seems to decide about the effectiveness of an offensive action is its preparation – adequate grip, feints misleading the opponent, the right moment etc. [18,19,20]. Defensive actions also play an important role, since during the fight judoka's actions are determined to a large extent by the opponent's counter-actions. The best players in judo fighting usually have 100%-effective defense and they get points not after offensive actions but after penalties imposed on their opponents [7,21,22]. Therefore, continuation of the study on defensive actions in judo as well as introducing exercises improving defense techniques to a special training program for highly qualified judo players seem to be even more justified.

Conclusions

1. As defensive techniques most frequent applied by judokas (hand block and twist onto belly) are at the same time the least effective, elimination of habits that lead to risky situations in fighting seems to be absolutely justified.
2. The high effectiveness of counter-attacks (29%) should be a tip for coaches and judo players, to make professional training follow (and not the other way round as it used to be) judo rules set forth by professor Jigoro Kano (among others "give up in order to win").
3. Significant differences between women and men in the frequency and effectiveness of applied defensive actions were not found. Both female and male groups should undergo similar defensive skills trainings.

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