Defensive actions of world top judoists

by

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The objective of this work was to define and determine the effectiveness of defensive actions applied in judo fighting. The study was based on recordings of final fights from Olympic Games, World Championships and World Cup (2005-2008). Actions of female and male contestants participating in total of 56 fights were analyzed (to an accuracy of 10-second-periods of time). All actions, including attacks, counter-attacks and defense without counter-attack, were recorded and their effectiveness, preparatory actions, breaks and the referees’ decisions were evaluated. Altogether fights of 95 contestants were subjected 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 abdomen, (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). Types of defense most often applied according to the study – hand block and twist onto abdomen – were the least effective (93% and 70% respectively). Ashi-waza and te-waza were throws most often applied as counter-attack. However, sutemi-waza throws were most effectively (50%) applied. Highly effective counter-attacks (28%) should serve as a clue for coaches and athletes at the competitive level. The rules set forth by professor Jigoro Kano (among others: “give up in order to win”) may not be adequate for today’s competition.

Key words: judo, combat sports, defensive actions, technical skills

Introduction

The effectiveness of the training process is evaluated by the results achieved during championship competitions. Sports success is influenced by motor, mental, technical and tactical preparation. As numerous scientific articles have proven, judo contestants competing at the highest level of sports championship do not differ much from one another regarding the level of motor fitness (Little, 1991; Sterkowicz et al., 2000; Degoutte et al., 2003; Krstulovic et al., 2006), body build and body composition (Claessens et al., 1987; Sertic et al., 2006), or mental traits (Callister et al., 1991; Filaire et al., 2001). The most differentiating factors concern technical and tactical abilities. Their acquisition is the effect of many years of training, as well as numerous fights during tournaments and practice. It was proven that surpassing opponents with motor fitness is
not the key factor in determining victory in unarmed combats (Kalina et al., 2005).

The analysis of fight tactics was primarily concerned with the frequency of using particular attacks (throws, holdings) (Matsumoto et al., 1978; Adam, 2007; Sterkowicz et al., 2007; Carratala Deval et al., 2010). More rarely, the subject of analysis concerned preparatory actions (Poluhin et al., 2006; Schaliacho, 2007). Endeavors to perform detailed classifications of defensive actions of judokas were, however, not undertaken. It should be emphasized that defensive effectiveness in a judo fight is of considerably higher importance than attack effectiveness (Kalina et al., 2004; Boguszewski, 2006, 2010). Therefore, increased interest of theoreticians and coaches in the discussion seems to be fully justified.

The purpose of the research was to define and determine the effectiveness of defense actions most commonly used in judo fights by the best athletes in the world.

**Material and Methods**

The research utilized the methods of direct, secondary and multiple observations. The research was conducted on the basis of video and DVD recordings, which enabled detailed analysis of every action performed by the judokas; thereby qualifying the various attacks and defensive strategies. Video or DVD recording gives technical possibilities for freezing an image and repeating certain parts of a fight, often in slow motion.

According to the dynamics measurement method in Kalina (2000), all actions in each 10-second-fragment of the fight were recorded (on observation sheets): attacks and counter-attacks (throws, holdings, strangleholds and joint locks), defense without counter-attack – with their effectiveness and preparatory actions determined, breaks and referees’ decisions. Types of defenses were defined and their effectiveness was determined as the ratio of the number of effective actions to the number of observed actions of a given category.

The research material was based on recordings from final fights from the Olympic Games in 2008, World Championships in 2005 and World Cup tournaments held in Warsaw in the years 2005-2008. As a result, the actions of these athletes in 56 fights were analyzed (to an accuracy of 10-second periods). The total time of fights was 197 minutes and 23 seconds, which corresponds to 1194 sequences.

The study analyzed fights from 95 female and male elite judoists. One female judoist participated in three gold medal fights at the World Championships and 15 competitors fought in the finals twice. The fights of contestants from 31 countries were analyzed. The majority of contestants were from Japan (n=14), France (n=9), Russia (n=8) and China (n=7). The average age was 25.34 ± SD.
According to the author’s classification of defensive actions, 12 types of defenses without counter-attack were defined. The analysis and presentation were based on the Kodokan Judo division in throwing techniques (nage-waza) performed in the vertical posture, throws with a fall - so called sacrifice throwing techniques (sutemi-waza), and grappling techniques (katame-waza), performed in the horizontal posture. 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 (IJF, 2003).

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

1. **Hand block** – to push attacking opponent away is the most often used type of defense. When both opponents are bound with mutual grapple, the most natural response in the situation of danger is to block the throw with hands. First defensive reaction is also similar (before holding, joint locks or strangleholds) in a horizontal posture.

2. **Hip block** – defense against hip or hand throws – rotation 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 abdomen** – rotation on one’s body axis. When one of the contestants has been attacked by surprise or has no grasp control over the opponent, and has also not reacted with hands or legs, then twisting onto the abdomen is the last opportunity to prevent from falling on one’s back (before contacting tatami). According to judo regulations, no points are admitted for throwing opponent onto the belly, however falling on the back is given the highest score – ippon - which denotes the end of fight before time is over. **Twist onto belly** is also a type of defense against a pinning hold when fighting in a horizontal posture. 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, where hand blocking is performed 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 defensive style of fighting, waiting for offensive actions of the opponent, or at the end of fight by judo players with a leading score.

8. Stepping aside – escape with a leg in danger of throw. Defense against throws involving opponent’s leg or leg grasps (kuchiki-taoshi, kata-otoshi, te-guruma, morote-gari), which are very popular nowadays (Boguszewski, 2010; Carratala Deval, et al., 2010). However, such actions involve large speed of the defending judoka.

9. Separation from grasp – depriving opponents of self body 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 the opponent loses the control.

10. Leaving the mat – leaving the fight area. During dynamic actions performed at the edge of the mat, in both vertical and horizontal posture, the most effective technique of defense is leaving the mat by the defending player. This technique effectively avoids reprimanded with a shido penalty. Escape outside the mat is penalized only in the event that it did not result from the opponent’s actions.

11. Leg entanglement – is a defense against holding. When one of the judokas controls two parts of the opponent’s body and is immobilized on the back, the referee announces pinning (osae-komi). One of the defense techniques is entanglement of the attacker’s leg or legs, for the referee stops the attempted pinning when the defending judoka gets control over some part of the opponent’s body.

12. Bridge – defense against holding, with an attempt to turn onto the belly (with possible lifting of the opponent) by “bridge” (or a half-bridge”).

13. Return to tachi-waza – escape from ne-waza. Defense against ne-waza maneuvers (holding, strangle holds and joint locks). Referee is obliged to stop action when one of the contestants rises to a vertical posture.

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

For each category of actions, arithmetic mean, including standard deviation, number of effective actions, number of actions taken and 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, were calculated by the t-Student test.
**Results**

Defensive effectiveness, understood as a relation of successful actions to undertaken actions, was 89% in the analyzed work. Higher relations occurred in fights of female contestants (91%) compared to fights of male contestants (87%). The most commonly used means of defense were: a hand block (average 5.14 per fight among women and 4.64 per fight among men), twist onto belly (accordingly 2.67 and 3.00) and maneuvering around (accordingly 1.53 and 0.53) (Figure 1). On the other hand, the least effective defensive techniques were: hand block, twist onto belly, maneuvering around and hip block (Figure 2). The frequency and effectiveness of using particular means of defense were similar in the group of women and men – statistically significant differences were not stated (adequately: \( p=0.140 \) and \( p=0.171 \), respectively). Women used maneuvering around more frequently and more effectively, and men preferred hip blocks.

**Figure 1**

*Frequency of defensive actions (average per fight)*
Using the standard judoka weight categories for light weight divisions (48, 52 and 57 kg for women and 60, 66, 73 kg for men), middle weight categories (63 and 70 kg for women and 81 and 90 kg for men) and heavy weight categories (78 kg or higher for women and 100 kg or higher for men), it has been established that the judokas of light categories executed defensive actions most effectively (93% of effectiveness in women and 91% in men). The least effective use of defensive actions was with the heavy weight categories (87% of effectiveness in women and 77% in men). The reaction to opponent attack is most often passive defense (without counterattack) – in the analyzed cases, this occurred 95% of the time. A response to 5% of the attacks was counterattack. The effectiveness of counter-throws (expressed by the quotient of successful actions, which are such actions where judges award points for undertaken

The effectiveness of defensive actions was directly proportional to the importance of the contest. The most effective defense techniques were featured by Olympic Games finalists (92%), while the least effective defense technique were seen by the finalists of the World Cup (83%). The contestants battling for the Olympic championship used successfully (100%) all particular means of defense, apart from twist onto belly (85%) and hand block (89%).
actions) was relatively high (27.13%). The effectiveness of throws in the same, analyzed fights was 8.42%. Differences in this range were statistically important (p<0.001). The most effective counter-attacks (among male judoists) were executed by throws from the sutemi-waza group (sacrifice throws), including the sumi-gaeshi. They were, however, the most rarely used means of defensive strategies (6.25% of the total counterattacks). The most often used were hand throws – te-waza (50% of the total counter-throws), among which the te-guruma dominated. Nearly every third action from the te-waza group was successful (31.25% effective). The least effectively used were goshi throws (Figure 3). Counterattack attempts were more often undertaken by women than men. In the group of women, the effectiveness of this type of action was also higher (p=0.07). The most often counter

|       | women | men |
|-------|-------|-----|
| te-waza | 27%   | 0%  |
| goshi-waza | 25%   | 0%  |
| ashi-waza | 0%    | 0%  |
| sutemi-waza | 40%   | 50% |

**Figure 3**

*Effectiveness of counterattacks*

throws by contestants in the analyzed fights were foot and leg throws by the ashi-waza group. Among them, the least secure were ko-soto-gake and ko-soto-gari (from the ashi-waza group) and tani-otoshi (from the sutemi-waza group) and te-guruma (from the te-waza group). The most effective counter throws were sacrifice throws, as seen in the sutemi-waza group. All of their countering attempts were successful (Figure 4 and 5). Counter-effectiveness was most often seen in the tani-otoshi throws (from the sutemi-waza group), sasae-tsuri-ashi and ko-soto-gari (from the ashi-waza group), kata-guruma (from the te-waza group) and harai-goshi (from the goshi-waza group).
Figure 4
Countered throws and effectively countered throws (among female judoists)

Figure 5
Countered throws and effectively countered throws (among male judoists)
The least effective (0% effectiveness) were attempts to counter kuchiki-taoshi throws (from the te-waza group) and de-ashi-barai (from the ashi-waza group). Slight differences (but not statistically significant, p=0.351) were noted for groups of women and men. The most often counter throws by female contestants were hip throws (Figure 4), while male contestants, most commonly used foot and leg throws (Figure 5).

**Discussion**

In a judo fight, nearly every action from an opponent is met by a counter-reaction by the opposing competitor (attack-defense, attack-counterattack-defense). Considerable differences in the effectiveness of attacks, counterattacks and defense prove that at high levels of sports competition, points are earned, generally, by only one competitor at a time. Usually, the contestant who gains advantage first (as a result of one’s actions or points accrued as a consequence of penalties imposed on the opponent) wins by effectively defending himself, increasing the advantage or outright winning the fight by ippon (Boguszewski, 2006, 2010; Boguszewski & Boguszewska, 2006). This is connected not only with exceptional technical preparation and the ability to react to complex actions of the opponent, but also the development of the mental sphere – motivation, ability to overcome difficult situations with boldness, ability to creatively solve motion assignments, ability to adapt own actions to the current fight situation.

The analysis of sports actions in a judo fight most often concerned the means of attack used – throws and holdings. Indeed, effective criteria were determined differently, where the sum of points totaled by a contestant or the average point total for a given throw or hold (Carratala Deval, et al., 2010; Adam et al., 2011) were assessed; however, both measures express the merit of the analyzed phenomena. In spite of practical application, the most interesting seem to be the results presenting the effectiveness related to undertaken actions from the same category of events, or, in this case, the same group of techniques, such as a particular throw or hold (Boguszewski, 2010).

The investigators of a judo fight are aware of the role of preparatory activities. They have analyzed actions aiming at performing an effective throw, sought ways of analyzing fight tactics (Boguszewski, 2006; Poluhin, 2007), wrote about extorting penalties for opponents as an alternative way of acquiring points (Boguszewski, 2010; Carratala Deval, et al., 2010). Several Russian researchers, performed detailed classifications of preparatory activities conducted by judokas in a fight (Poluhin et al., 2006, 2007). All discussed actions aimed at enabling a successful attack in the most beneficial time and moment of the fight.

Attempts at detailed classification of defensive actions by judokas were not made (not based upon counter-attacking). Defining and classifying means of defense may, thus, serve for increasing
effectiveness of the technical and tactical training. It should be emphasized that the level of technical and tactical training, in the opinion of experienced judo coaches, is the key factor influencing sports results (Sterkowicz et al., 2007), and defensive effectiveness in a judo fight is considerably more effective than attack effectiveness (Boguszewski, 2006).

Research has proven that sports activities by female and male contestants do not differ much (Boguszewski & Boguszewska, 2006; Boguszewski, 2010), despite obvious differences in their body built or physiological factors (Laskowski, 2009). Moreover, judo is especially a self-defense system. Having a utilitarian aspect, defensive actions of a woman and a man should be equally fast and efficient (Bukowiecka et al., 2006). Developing defensive skills is one of the most important part of technical training. Every combat sports training should include ethical, philosophical and theoretical values. It should also be directed at maintaining physical fitness and consolidation of self-defense skills (Harasymowicz, 2007). Judo is not only an Olympic sport, but an martial art and a way of life (Shishida, 2010).

Conclusions

1. The usual means of defense used by judokas (hand block and twist onto belly) are not considered the most effective. It seems justifiable to eliminate motion habits leading to risky situations during fights.

2. High effectiveness of counterattacks (28%) should be a hint for coaches and athletes to make specialized training close to judo principles defined by Professor Jigoro Kano (e.g., “withdraw to win”).

3. High counter-effectiveness of sacrifice throws proves only the apparent security of these actions.

4.
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