

Relation of indicators of technical and tactical training to demerits of kickboxers fighting in K1 formula

Authors' Contribution:

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

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Abstract

Background and Study Aim:

Breaking rules in combat sports can finally result in getting lower score that has an impact on the outcome of a bout. Currently there are no papers dealing with demerits in kickboxing. The objective of the paper was knowledge about demerits of the regulations occurred during amateur kickboxing bouts in K1 formula.

Material and Methods:

Thirty one bouts were videotaped and 31 kickboxers were evaluated. Based on computed indicators (activeness, efficiency and effectiveness of the attack) the relation between the number of demerits and the indicators of technical and tactical training was searched.

Results:

The most common demerit was forbidden holds of the rival (it concerned 13 (41.9%) competitors and it was 31.7% of all demerits). Competitors made on average 1.32 demerits. The effectiveness of the attack was on average 46.63 points, activeness of the attack was on average 91.61 points, efficiency of the attack was on average 60.16 points.

Conclusions:

The largest group of competitors had 2 demerits in a bout. The largest number of demerits in a bout was 3. Forbidden holding was the most common demerit of kickboxers in K1 formula. Effectiveness, activeness and efficiency of the attack were on a high level and were not connected to the number of demerits in a bout.

Key words:

activeness • competitors' offenses • effectiveness • efficiency • fair play

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Technique – *noun* a way of performing an action [21].

Tactics – *plural noun* the art of finding and implementing means to achieve immediate or short-term aims [21].

Efficiency – *noun* **1.** the ability to make a physical movement with a minimum of unnecessary effort **2.** a comparison of the effective or useful output to the total input in any system [21].

Disqualification – *noun* the state of being disqualified from competition [21].

Muay Thai – *noun* a martial art that is a form of kickboxing, practiced in Thailand and across Southeast Asia [21]

INTRODUCTION

A kickboxing bout in K1 formula quite often causes a fighter to lose control over his physical possibilities. An important role during a bout is played by referees who monitor the course of the fight. Breaking sports regulations becomes more common in modern sports. Competitors often lose the match due to not complying with the rules. In combat sports such behaviour finally results in getting lower score that has an impact on the outcome of a bout. Assessment of the most often committed demerits will allow coaches to warn their competitors against actions which are negatively received by referees. This should protect the competitors against the loss of possible points or against disqualification.

Behaviour of this type does not have to be intentional, in most cases they are caused by lack of strength, disorientation or excessive stress. According to current regulations of World Association of Kickboxing Organizations a bout in K1 formula has many restrictions: elbow punches, head pulling during knee kicks, long-lasting clinches and kicking below thigh are forbidden. Currently there are no papers dealing with demerits and penalties in kickboxing. Existing analyses of a kickboxing bout are dealing with physiological indicators [1-4] or psychological aspects of success and proper motivation to achieving one's goals [5, 6]. Motarca [7] described fair play rules and enforcing regulations in order to improve sports ethics. Assessment of demerits and penalties was analysed in judo bouts. The analyses resulted in determining the influence of penalties on the efficiency of the competitors [8-10]. The analysis of the regulations of a kickboxing match is referred to the impact of new regulations on the general image of a sports fight [11]. Similar analyses were done for taekwondo and karate [12, 13]. However there are no comprehensive listings showing specific breaking the regulations by kickboxers fighting in the most popular formula of this sport which currently is K1.

The objective of the paper was knowledge about demerits of the regulations occurred during amateur kickboxing bouts in K1 formula.

MATERIAL AND METHODS

Thirty one bouts were videotaped and 31 kickboxers were evaluated. All bouts took place

during the Polish Championship in K1 formula, which is the most important kickboxing event in Poland. The bouts regulations were based on the rules of WAKO (World Association of Kickboxing Organizations). All demerits of the fighters noticed by referees were specified. Additionally indicators of technical and tactical training (i.e. activeness of the attack, efficiency of the attack and effectiveness of the attack) of each competitor were computed. The indicators (in points score) were computed with the use of formulas specified in literature [14] and modified to the fight of kickboxing in K1 formula.

1. Efficiency of the attack (Sa)

$$S_a = \frac{n}{N}$$

n – number of effective attacks (every effective attack in K1 formula scores 1 pt.)

N – number of bouts

2. Effectiveness of the attack (Ea)

$$E_a = \frac{\text{number of effective attacks}}{\text{number of all attacks}} \times 100$$

* An effective attack is a technical action that is awarded a point

* An attack is any attempt of an offensive action

3. Activeness of the attack (Aa)

$$A_a = \frac{\text{number of all attacks}}{\text{number of all bouts}}$$

Statistical analysis

Based on computed indicators the relation between the number of demerits and the indicators of technical and tactical training was searched. To analyse the relations Pearson's linear correlation test and Spearman's rank correlation test were used. The level of significance was chosen at $p < 0.05$. The data was analysed using Statistica 13.1 software by StatSoft Power Solutions, Inc. (Tulsa, USA).

RESULTS

The most common demerit was forbidden holds of the rival (it concerned 13 (41.9%) competitors and it was 31.7% of all demerits). Consecutive ones were the following: pulling head during knee kick, attacking after stop signal, holding rival's leg after his front kick, kick in the groin

Table 1. Competitors' demerits in decreasing and alphabetic order.

Demerits	Related to competitor		Related to all demerits	
	n	%	n	%
Forbidden hold	13	41.9	13	31.7
Attacking after stop signal	3	9.7	3	7.3
Holding rival's leg after his front kick	3	9.7	3	7.3
Kick in the groin	3	9.7	3	7.3
Pulling head during knee kick	3	9.7	3	7.3
Double knee kick during one holding	2	6.5	2	4.9
Excessive rotating	2	6.5	2	4.9
Forbidden techniques on the thigh	2	6.5	2	4.9
Intentional fall	2	6.5	2	4.9
Punching with the interior part of the glove during hook punch	2	6.5	2	4.9
Spitting out the mouth guard	2	6.5	2	4.9
Attacking the back of the head	1	3.2	1	2.4
Elbow punch	1	3.2	1	2.4
Kicking in the back	1	3.2	1	2.4
Pushing the rival	1	3.2	1	2.4
Total	41	132.5	41	100

(they concerned 3, 9.7% competitors each and they were 7.3% of all demerits each). Double knee kick during one holding, intentional fall, spitting out the mouth guard, excessive rotation, punching with the interior part of the glove during hook punching, forbidden techniques on the thigh concerned 2 (6.5%) competitors each and they were 4.9% of all demerits each. Kicking in the back, elbow punch, attacking the back of the head and pushing the rival occurred to 1 (3.2%) competitor each and they were 2.4% of all demerits each (Table 1).

Table 2. Number of demerits in 31 kickboxers competitors.

Number of demerits	Competitors	
	n	%
None	8	25.8
1	8	25.8
2	12	38.7
3	3	9.7
Total	31	100

Twelve competitors (38.7%) had 2 demerits each, 8 (25.8%) had one and 8 (25.8%) had no demerits. 3 competitors (9.7%) had 3 demerits each (Table 2).

Competitors on average 1.32 demerits, the median was 1, minimum value 0, maximum value 3 lower quartile 0.00, upper quartile 2.00, and standard deviation 0.98.

The effectiveness of the attack was graded on average as 46.63 ± 11.15 points (range 22 to 76.14), activeness of the attack was on average 91.61 ± 22.86 (range 44 to 144). Efficiency of the attack was on average 60.6 ± 6.81 (range 43.0 to 71.0) (Table 3).

Statistically significant relations between the number of demerits and effectiveness, activeness and efficiency of the attack were not confirmed (Table 4).

DISCUSSION

The most common demerit of the participants in the study was forbidden holding of the rival, where competitors had to be separated by the referee.

Table 3. Effectiveness, activeness and efficiency of the attack

Variable	Statistics indicators							
	n	\bar{x}	Me	Min.	Max.	Q1	Q3	SD
Effectiveness (Ea)	31	46.63	45.23	22.00	76.14	41.10	53.60	11.15
Activeness (Aa)	31	91.61	92.00	44.00	144.00	73.00	107.00	22.86
Efficiency (Sa)	31	60.16	61.00	43.00	71.00	58.00	65.00	6.81

n: number of observations, \bar{x} : arithmetic mean, **Me:** median, **Min.:** minimum, **Max.:** maximum, **Q1:** lower quartile, **Q3:** upper quartile, **SD:** standard deviation

Table 4. Pearson's linear correlation coefficient (r) and testing probability (p) between the number of demerits vs. effectiveness, activeness and efficiency of the attack.

Relations between variables	r	p
Number of demerits vs. effectivity	-0.09	0.631
Number of demerits vs. activeness	-0.04	0.829
Number of demerits vs. efficiency	0.00	0.987

Excessive use of forbidden holds can be specific kind of defence or resting during the fight. Similar behaviour is characteristic for boxers, who during their fights often use clinching [15]. Another demerit was pulling the head during knee kick. This regulation was introduced relatively soon and that could be the reason why competitors may just use a locomotor habit which is very common during a sparring match. Pulling the head additionally increases efficiency and strength of the kick [16]. Attacking the rival after the stop signal given by the referee can be a result of aggression and some kind of rage that can be present while competitors exchange blows [17]. Holding rival's leg after his front kick is allowed in *muay thai* and it is usually followed by sweep [18]. Many competitors in kickboxing events come from *Thai boxing* and that is why this particular demerit can be a result of a locomotor habit, similarly to multiple knee kicks during one hold.

There were also some kicks in the groin that caused a break in the bout. This type of demerits occurs mostly when a competitor tries to give a low kick in the interior part of the thigh [19]. Analysis of bouts also allowed to see intentional causing breaks in a fight, particularly during defensive actions. This category of demerits include intentional falling or stumbling or spitting out the mouth guard. There were also

forbidden techniques on the thigh which are allowed in karate, so they be a result of previous style of fighting of a competitor [20]. Elbow punch, which could be intentional, was the most drastic regulatory offense. Among rarely occurred offenses we can name kicks in the back or blows in the back of the head. They could be a result of a dynamic fight and quick moving of competitors. Statistically significant relations between the number of demerits and effectiveness, activeness and efficiency of the attack were not confirmed. The indicators of technical and tactical training in K1 formula of kickboxing are high and not connected to number of demerits of kickboxers. The analysis showed also relatively low number of demerits which can indicate high level of fair play in kickboxing bouts in K1 formula.

CONCLUSIONS

Based on the results of the study it can be stated that: the largest group of competitors had 2 demerits in a bout; the largest number of demerits in a bout was 3; forbidden holding was the most common demerit of kickboxers in K1 formula; effectiveness, activeness and efficiency of the attack were on a high level and were not connected to the number of demerits in a bout.

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