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INDICES OF TECHNICAL AND TACTICAL TRAINING DURING KICKBOXING AT DIFFERENT LEVELS OF COMPETITION IN THE K1 FORMULA

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A. Study design/planning
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D. Data interpretation
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G. Funds collection

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Abstract:

Background: Kickboxing is a combat sport with many variations in its competition. Fighting, according to K1 Rules, is characterised by the greatest freedom in terms of the number of allowed techniques and the strength of their execution. The objective of analysis was to determine indices of technical and tactical training (activity, efficacy, attack effectiveness) during a kickboxing fight according to K1 rules, carried out at various levels of competition.

Materials and methods: The study comprised 24 kickboxing fights, analysed according to K1 Rules. From the World Championships, National Championships and local tournaments, 8 fights were considered and analysed. The technical and tactical training indices were determined on the basis of formulas provided in the literature.

Results: Statistically significant changes in the level of technical and tactical training indices for fighters were demonstrated between the world championships, the national championships and the local tournament, $p<0.001$.

Conclusions: The highest values of the measured technical and tactical training indices occurred during the World Championships, while the lowest during the local tournament. The results of the research allow for a preliminary interpretation of the level of technical and tactical preparation during fights according to K1 rules.

Introduction

Kickboxing is a combat sport with many variations in its competition. Fighting, according to K1 Rules, is characterised by the greatest freedom in terms of the number of allowed techniques and the strength of their execution. All the techniques used in this sport are acceptable, without limiting the power of inflicting them [1]. In light of literature on the subject, kickboxing fights are increasingly becoming the object of much scientific research. Researchers are exploring the aspects of combat analysis in terms of physiological [2–5], physical fitness [6,7] and innovative determination of technical and tactical training indices [6–8]. By determining these indices, it is possible to diagnose a competitor's baseline skills. This type of analysis of the technical performance of athletes was initiated in Judo, where similar measurements are systematically made [9–13]. Inspired by the formulas specified for Judo, the formulas were adapted to the analysis of the kickboxing fight in the K1 formula. The relationship between the technical and tactical training indices and the offenses of the competitors during the fight was assessed [8]. It has been determined in detail which motor skills should be developed to increase activity, efficacy and effectiveness in combat [6]. The correlation between training indices and the body composition of athletes has been presented [5].

However, there is no existing assessment of technical and tactical training indices in kickboxing at various levels of competition. This type of verification was defined in Judo, where the values of the technical and tactical preparation level during the 2 most important championship events were compared [10].

The aim of this study is to assess the technical and tactical training indices at various levels of competition during a kickboxing fight according to K1 rules. This analysis will help to define the detailed level of competitor's baseline abilities, contributing to the improvement of quality in coaching control.

Materials and methods

Study design

The study included 24 kickboxing fights, analysed according to K1 Rules. From the World Championships, the National Championships and a local tournament, 8 fights were analysed. Only the final fights were assessed by calculating the technical and tactical training indices for the winners of each weight category: -63.5 kg, -67 kg, -71 kg, -75 kg, -81 kg, -86 kg, -91 kg and +91kg.

Technical and tactical analysis

Analysis of the sports competition was carried out on the basis of a digital register of the match. Taking this recording into account, the indices of technical and tactical training were determined according to the established formulas [2,6–8].
Efficiency of the attack (Sa)

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

n – number of offensive actions (attacks) scored by points, 1 pt
*According to K1 Rules, each clean hit, 1 pt
N – total of observed fights for given competitor
Effectiveness of the attack (Ea)

$$Ea = \frac{\text{number of effective offensive actions}}{\text{total number of offensive actions}} \text{ x } 100$$

* An effective offensive action (attack) is considered a technical action for which a point has been awarded
* The total number of offensive actions (attacks) is considered all attempts at offensive techniques
Activeness of the attack (Aa)

$$Aa = \frac{\text{number of registered of offensive for competitor}}{\text{number of combats fought by studies competitor}}$$

Statistical analysis

Statistical analysis of the collected material was carried out using the PQstat v1.8.2 program (PQStat Software, Poznań). The basic descriptive statistics were calculated: arithmetic mean, standard deviation, minimal and maximal values, and the level of the first and third quartiles. The Kruskal-Wallis ANOVA test was applied to assess the significance of differences for 3 variables, then, the post-hoc Bonferroni test was used to evaluated the significance of differences between individual levels of competition. The level of statistically significant differences was assumed as $p<0.05$.

Results

The attack activity index for individual levels of competition demonstrated statistically significant differences. The highest values were recorded at the World Championships and the lowest during the local tournament (Tab. 1).

The attack efficacy index for individual levels of demonstrated statistically significant differences. The highest value of the index was recorded successively during the World hcampionships, the National Championships and the local tournament (Tab. 2).

The attack effectiveness demonstrated statistically significant differences, its highest level being recorded during the World Championships, while its slightly lower was noted during the National Championships. The athletes competing during the local tournament showed the lowest effectiveness (Tab. 3).

Table 1. Values of attack activity index

Attack actvity	n	$\bar{x}$	Min.	Max.	Q1	Q3	SD	NC	LT
World Championships (WC)	8	145.37	110	179	125	166.5	25.49	$p=0.11$	***p*<0.001**
National Championships (NC)	8	97.13	44,00	134,00	73.00	122.00	32.04	–	$p=0.25$
Local tournament (LT)	8	60.625	48.00	74.00	51.00	70.25	10.81	$p=0.25$	–
Anova *p*					***p*<0.001**				

n – number of studied subjects, Min – minimal value, Max – maximal value, Q1 – first quartile, Q3 – third quartile, SD – standard deviation, NC – National Championships, LT – Local tournament; statistically significant values are in bold

Table 2. Values of attack efficacy index

Attack efficacy	n	$\bar{x}$	Min.	Max.	Q1	Q3	SD	NC	LT
World Championships (WC)	8	127.75	97	161	97.5	153.5	28.76	$p=0.14$	***p*<0.001**
National Championships (NC)	8	72.00	29.00	104.00	53.50	88.00	25.42	–	***p*=0.04**
Local tournament (LT)	8	27.44	16.66	42.85	20.26	34.52	10.30	***p*=0.04**	–
Anova *p*					***p*<0.001**				

n – number of studied subjects, Min – minimal value, Max – maximal value, Q1 – first quartile, Q3 – third quartile, SD – standard deviation, NC – National Championships, LT – Local tournament; statistically significant values are in bold

Table 3. Values of attack effectiveness index

Attack effectiveness	n	$\bar{x}$	Min.	Max.	Q1	Q3	SD	NC	LT
World Championships (WC)	8	87.28	77.6	92.99	82.08	92.23	6.33	$p=0.11$	***p*<0.001**
National Championships (NC)	8	71.70	52.27	79.31	67.81	77.58	9.06	–	$p=0.06$
Local tournament (LT)	8	11.75	6.00	23.00	7.50	15.50	6.27	$p=0.06$	–
Anova *p*					***p*<0.001**				

n – number of studied subjects, Min – minimal value, Max – maximal value, Q1 – first quartile, Q3 – third quartile, SD – standard deviation, NC – National Championships, LT – Local tournament; statistically significant values are in bold

Discussion

In this work, the levels of technical and tactical training are assessed during kickboxing competitions carried out according to the K1 formula at various levels of competition.

In the evaluation of training, specialised formulas were used, which are reliable for assessing the level of technical and tactical skills of a competitor [2,5,7,8]. In measuring the attack activity of the subjects, the highest values were demonstrated for those fighting in the World Championships. This may be related to the highly-developed motor and technical capabilities. The athletes competing at the World Championships are the winners of national tournaments who demonstrate a professional level of training [1,14]. The average level of attack activity during the national Championships was 97.13 points, which was close to the values recorded during the analysis of 20 competitors demonstrating high sports level [6]. Fighting on the basis of K1 requires the competitor to execute accurate hits and kicks that will end the fight ahead of time due to 'knockout' [15]. Therefore, the high activity of athletes may indicate a fierce duel, accompanied by a frequent exchange of techniques. Additionally, the decrease in activity may be caused by worse fitness preparation, an activity necessary for effective fighting [2,16–18].

A similar trend was observed in the attack success rate, which was also the highest during the World Championships. A comparison of research results shows statistically significant differences between the efficacy of the attack during the World Championships and the local tournament, the difference of which was 100 points. The proper efficacy of an attack requires appropriate baseline experience and a developed level of physical fitness [6,7]. Competitors with more experience in competitions have a better developed reflexes and so-called timing, which allows to successfully make clean hits on the opponent [19].

Statistical analysis of the effectiveness index allowed to show statistically significant differences between the values achieved during the local tournament and the World Championship. In addition, the presented index demonstrates the lowest difference between the World and National Championships. The winners of the National Championships are called up to appear at the World Championships, therefore, a similar range of effectiveness may prove the high level of final competitions at the National Championships.

Limitations

The main limitation in this study was the small number of analysed fights, based solely on final competitions. The author of the work did not have access to more recorded fights in order more reliably determine the training indices for each level of competition. The original assumption of this study was to develop a scale to be able to interpret the indices of technical and tactical preparation, however, this requires broader analysis of the entire work, with a division into weight categories.

Conclusions

The indices of attack activity, efficacy and effectiveness turned out to be the highest during the competition at the World Championships, and the lowest during the local tournament. The smallest differences in the level of technical and tactical preparation of the competitors fighting at the World Championships, compared to this National, were shown in the attack effectiveness index. Further research should be carried out in which the ranges of these indices would be determined at a particular level of competition which, in turn, will enable the qualification of competitors immediately after the end of the fight.

Practical applications

Specific indices of technical and tactical training at different levels of competition can be used by researchers to make preliminary comparisons and interpret them based on the average values demonstrated in this study. Based on the results obtained for the best fighters, it is possible to designate training directions for weaker adepts for particular elements occurring during a fight.

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