

## FREQUENCY OF INDIVIDUAL TECHNIQUE OF PUNCHING AND KICKING DURING A KICKBOXING MATCH BASED ON ANALYSIS OF THE 5<sup>TH</sup> BALKAN BEST FIGHTERS TOURNAMENT

Milija Ljubisavljević<sup>1</sup>, Veselin Bunčić<sup>1</sup>, Đurica Amanović<sup>2</sup>,  
Nenad Jerković<sup>1</sup> and Milorad Stanić<sup>3</sup>

<sup>1</sup>High School of Vocational Studies for Education of Teachers and Trainers, Subotica, Serbia

<sup>2</sup>University of Criminal Investigation and Police Studies, Belgrade, Serbia

<sup>3</sup>Serbian primary school Segedin

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### Abstract

The aim of this research is to determine the frequency of technical and tactical elements of kickboxing based on the analysis of the 5th Balkan Best Fighters tournament, which was held in Jagodina, Serbia. The sample for analysis consisted of 15 final fights, or 30 fighters. Based on the video, the paper analyzes the fights using nine variables. The frequency of four hand strike techniques (direct, hook, uppercut, uraken) as well as five foot strike techniques (low kick, maegeri, mawashi geri, ushiro mawashi, knee) was monitored. Based on statistical analyzes, calculating the frequencies of monitored variables expressed as relative and absolute values, and then trend analysis, the analysis of the direction of movement of variables in terms of growth and decline, it was concluded that there is a difference in quantitative representation of technical elements defeated. The most commonly used attack techniques are hook(28.49%) and low kick (28.60%). By comparing the monitored phenomena, it is possible to determine that the trend line by rounds recorded a decline and rise. There is also a difference between victors and defeated fighters, in the number of blows placed in favor of the winner. The obtained results can contribute to a better understanding of the parameters of situational efficiency, as well as the planning and programming of kickboxing training.

**Key words:** technique, kickboxing, competitive activity.

### Introduction

Without a complex and comprehensive approach to the problems encountered in kickboxing and without the appropriate methodology, today it is not possible to achieve the top result that every fighter, team and coach strives for (Mudrić, Milošević, Jovanović, 2004; Milošević, Milošević, 2014). The basis for a rational approach to planning, programming, implementation and evaluation of the effects of the training process is found in the analysis of fighter activities during the match (Blažević, 2007; Ljubisavljević, Blažević, Amanović, 2011; Blažević, Kačar, Ljubisavljević, Amanović, Crnja, 2012a; Blažević, Kačar, Ljubisavljević, Amanović, Crnja, 2012b). Combat activity can be conditionally observed in two relatively independent spaces, motor space and technical-tactical space. The dominant place in kickboxing is occupied by technique and it directly reflects on the result. When analyzing technical-tactical activity, attention is usually focused on the technical elements used during the match, their frequency during the match, but also their efficiency. Practice has shown that there are differences in the quantity and quality of manifestation of certain technical and tactical abilities of fighters (Mudrić et al., 2004; Kapo, Kajmović, Ramadanović, 2006; Kačar, Blažević, Ljubisavljević et al., 2012; Ljubisavljević, Čokorilo, Kostovski et al., 2014; Ljubisavljević, Amanović, Blažević et al., 2015). So far, no serious, consistently rounded system for monitoring and analyzing the fight has been set up in kickboxing,

which would enable a complete understanding of the technical and tactical characteristics of fighters. The reasons for that can be found in the objective complexity of the fight, the identification of technical and tactical elements and the manner of their use for the analysis of competitive activity, etc. Kickboxing belongs to the group of polystructural acyclic sports dominated by acyclic unpredictable movements, where the result is usually a binary variable (won - lost), and the movement is performed and limited in direct conflict with the opponent, in order to avoid opponent blows and destruction (Milosevic, Gavrilović, Ivančević, 1988; Blažević, 2007; Milošević, Milošević, 2014). Competitive activity requires the fighter to fight at a very fast pace and to have a large number of technical and tactical activities (Kapo, Cikatić, Rađo, Bonacin, Kajmović, Hmjelovjec, 2008; Krupalija, Kapo, Rađo, Ajnadžić and Simonović, 2010). This complex activity of kickboxing during the match requires fighters to be versatile, and in their repertoire they must have adequate fighting techniques and different tactics for each technique. It is especially important for a fighter to perform as many blows as possible to the body and head of his opponent, because in the event that the fight does not end before the time expires, the fighter who inflicts more blows wins. The aim of this paper was to determine the dominance and frequency of technical and tactical elements of fighters in this tournament.

<sup>1</sup>Specific motor knowledge (motor algorithms), e.g. a specific form of position, movement and designed martial arts movements that are precisely defined by the method of performance and name (Jovanović, 1992).

## Methods

### Sample of subjects

The research was conducted by analyzing the fights of the 5th Balkan Best Fighters tournament, which was held in Jagodina on December 11-13, 2020 in the discipline of low kick and K1. The sample of respondents consisted of 30 kickboxers in the senior competition, 24 men and 6 women. A total of 15 matches were analyzed. The competition was held in the following categories up to 54kg; 63.5 kg; 67kg; 71 kg; up to 81kg; 86kg, 91kg and + 91kg. In the women's competition, three matches were held in the category up to 62kg, 70kg and 81kg.

### Sample of variables

The paper follows nine variables described by a set of technical elements: four hand techniques - direct, uppercut, hook, uraken, and five foot techniques - low kick, maegeri, mawashi geri, mawashi geri from the turn and knee kick. During the preparation of this paper, the method of video observation was used by competent experts. In order to obtain the most accurate data on the techniques performed during the match, the videos were processed in a special program Premiere Pro CC, which allowed to obtain more accurate results. After the processing of the video into specially prepared tables, constructed for this research, the frequency and type of performed hand and foot techniques were recorded.

### Statistical analysis

All data collected during the research were processed by descriptive and causal statistics. For mathematical processing of original data and their graphic illustration, the application program for

personal computers Microsoft Excel was used. After finalizing the complete analysis of all 15 matches and entering variables (for each match and for each fighter) in Excel, a special table was also constructed which entered data on the total number of techniques performed in all 15 matches, and two more tables (one for victors and defeated), so that we have a complete overview and more accurate access to relevant data. The analysis of the trend, graphically and numerically, shows the direction of movement of the monitored variables (total number of realized techniques) by rounds.

## Results and discussion

The research is based on the analysis of matches of kickboxing fighters who participated in the 5th Balkan Best Fighters tournament held in Jagodina. A total of 15 final fights were analyzed. In connection with the set goal of the work, the frequency of the used techniques of hand and foot strikes was monitored. The paper follows nine variables with described technical elements, namely four hand techniques and five foot techniques. Based on the registered data, numerical and percentage indicators of the monitored elements were calculated, and then a comparative analysis of their presence in the winners and losers was performed. Tables 1, 2, and 3 show the total number of performed hand and foot techniques in each round separately. In the first round (Table 1), a total of 867 strokes (arms and legs) were performed, of which 244 or 28.14% were performed, and the least (in relation to hand and foot strokes) performed was uraken (1 or 0.12%). Of the kicks, low kick was used the most (292 or 33.68%), and ushiro mawashi geri was the least used (9 or 1.04%).

**Table 1.** Total number of realized techniques – round 1.

Technique	Round 1 number of techniques	Absolute frequency %	% of all techniques in round	All rounds in total	% of all techniques
Direct	158	24.84	18.22	636	23.14
Hook	244	31.16	28.14	783	28.49
uppercut	40	27.78	4.61	144	5.24
Uraken	1	8.33	0.12	12	0.44
Low kick	292	37.15	33.68	786	28.60
Mae geri	62	35.43	7.15	175	6.37
Mawashi geri	48	32.43	5.54	148	5.39
Ushiro mawashi geri	9	47.37	1.04	19	0.69
Knee	13	28.89	1.50	45	1.64
In total	867		100.00	2748	100

In the second round, the total number of punches (hands and feet) was 966 and significantly increased (by 99) compared to the first round. Of these, the largest number (as in the first round) refers to hand-strikes (254 or 26.29%), which are slightly increased compared to direct (246 or 25.47) (by 8) and the smallest number of hand-held strokes is uraken (6 or 0.62%). Of the kicks, low kick was used the most (263 or 27.23%), and ushiro mawashi geri was the least used (2 or 0.21%).

In the third round (compared to the second round), the total number of hand and foot strikes decreased (by 51), which shows a slight decrease in the activity of fighters, probably due to fatigue.

As in the previous two rounds, hooks were performed the most (285 or 31.15%), and uraken (5 or 0.55%) the least (from hand strikes). Of the kicks, low kick was also the most used (231 or 25.25%), and the least ushiro mawashi geri (8 or 0.87%).

**Table 2.** Total number of realized techniques – round 2.

Technique	Round 2 number of techniques	Absolute frequency %	% of all techniques in round	All rounds in total	% of all techniques
Direct	246	38.68	25.47	636	23.14
Hook	254	32.44	36.29	783	28.49
uppercut	50	34.72	5.18	144	5.24
Uraken	6	50.00	0.62	12	0.44
Low kick	263	33.46	27.23	786	28.60
Mae geri	72	41.14	7.45	175	6.37
Mawashi geri	53	35.81	5.49	148	5.39
Ushiro mawashi geri	2	10.53	0.21	19	0.69
Knee	20	44.44	2.07	45	1.64
In total	966		100.00	2748	100

**Table 3.** Total number of realized techniques – round 3.

Technique	Round 3 number of techniques	Absolute frequency %	% of all techniques in round	All rounds in total	% of all techniques
Direct	232	36.48	25.36	636	23.14
Hook	285	36.40	31.15	783	28.49
uppercut	54	37.50	5.90	144	5.24
Uraken	5	41.67	0.55	12	0.44
Low kick	231	29.39	25.25	786	28.60
Mae geri	41	23.43	4.48	175	6.37
Mawashi geri	47	31.76	5.14	148	5.39
Ushiro mawashi geri	8	42.11	0.87	19	0.69
knee	12	26.67	1.31	45	1.64
In total	915		100.00	2748	100

Observed by techniques, the highest prevalence is shown by low kick. Namely, this technique was scored 786 times (28.60%). A total of 783 points (28.49% - 3 fewer repetitions) were achieved with the hook technique, which is a negligible difference compared to low kick. Considering this negligible difference in kick performance between lowkick and hook, we can conclude that these two techniques are equal in application during matches. The direct punch was applied 636 times (23.14%), the upper technique was performed a total of 144 times or 5.24% of the foot technique, maegeri 175 times or

6.36% mawashigeri 148 times or 5.38%, and knee 45 times or 1.63%. Other techniques have seen very little representation: urakenuchi 12 or 0.43%, ushiro mawashi geri 19 or 0.69%. Thus, in most cases, scoring was achieved by hand techniques (57.31%), while foot techniques scored in 42.68% of cases. Tables 4, 5, and graphs 1, 2, show the number of realized techniques by rounds of victors and defeated, which will give us an answer to the question of whether activity increases in both fighters in the match or only in one (victor).

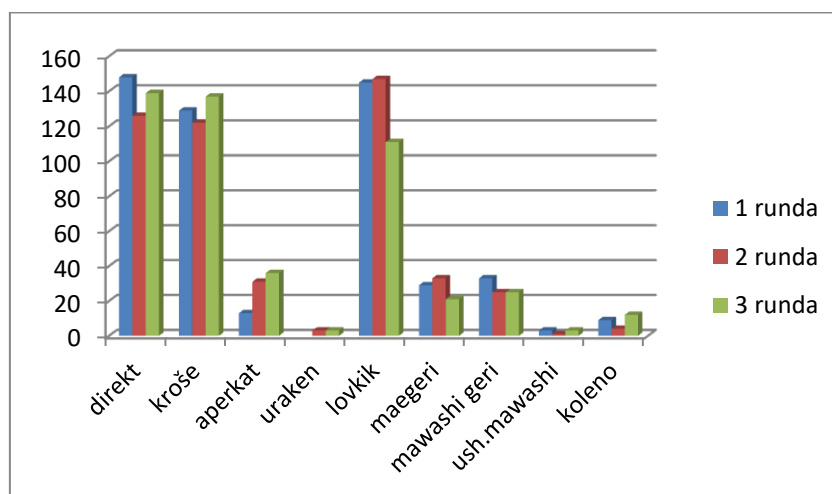
**Table 4.** Number of realized techniques by rounds – victors.

	Direct	Hook	Uppercut	Uraken	Low kick	Mae geri	Mawashi geri	Ush. Mawashi	Knee	SUM	AVERAGE	STDEV
Round 1	68	129	15		145	29	33	3	9	431	95.78	55.18
Round 2	130	122	31		147	33	25	1	15	504	112.00	59.21
Round 3	139	131	30	3	111	21	24	3	12	474	94.80	56.92
Σ	337	382	76	3	403	83	82	7	36	1488		
%	22.65	25.67	5.11	0.20	27.08	5.58	5.51	0.47	2.42			

From hand strikes, the hook is in the first place (among the victors with a frequency of 382 or 25.67% and the defeated with a frequency of 394 or 29.47%). The defeated performed a slightly higher number of crochets (12).

A larger number of hooks was noticed among the defeated in the third round, which did not help them win. The obtained results showed that even with the low kick, the victors (frequencies 403 or

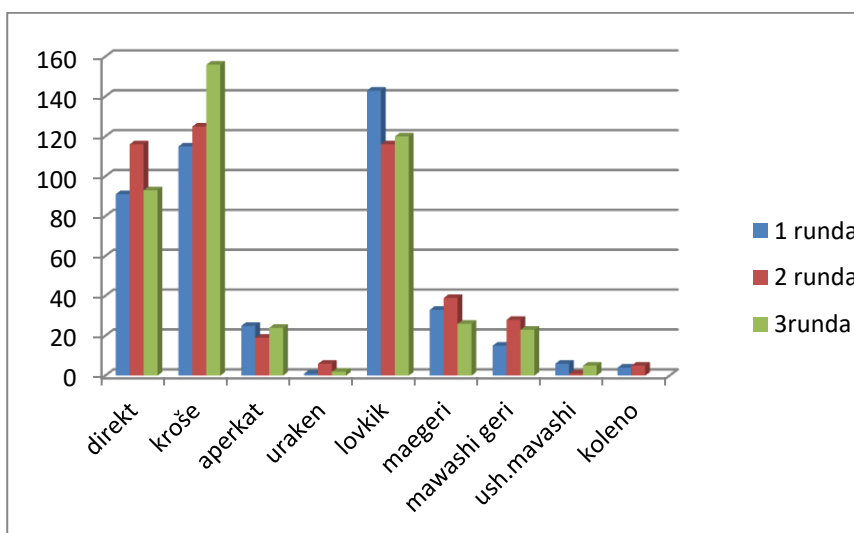
27.08%) - the defeated (frequencies 383 or 28.65%) did not have significant differences in the executed blows (the victors performed 20 more). The defeated, as with the hook, had an increased number of shots in the third round, but not enough to win (Table 5). Of the hand techniques, the lowest among the victors and defeated was uraken. From the feet, it is ushiro mawashi with the victors and the knee with the defeated, as in our previous research (Ljubisavljević, et al. 2014).



**Graph 1.** Presentation of realized techniques by rounds (victors). Direct, hook, uppercut, uraken, low kick, mae geri, mawashi geri, ush. mawashi, knee. Round 1, round 2, round 3. In Serbian.

**Table 5.** Number of realized techniques by rounds – defeated.

	Direct	Hook	Uppercut	Uraken	Low kick	Mae geri	Mawashi geri	Ush. Mawashi	Knee	SUM	AVERAGE	STDEV
Round 1	90	115	25	1	147	33	15	6	4	436	87.20	54.55
Round 2	116	125	19	6	116	39	28	1	5	435	91.00	52.75
Round 3	93	154	24	2	120	26	23	5		447	33.33	58.06
Σ	299	394	68	9	383	98	66	12	9	1337		
%	22.36	29.47	5.09	0.67	28.65	7.33	4.94	0.90	0.67			



**Graph 2.** Presentation of realized techniques by rounds – defeated. Direct, hook, uppercut, uraken, low kick, mae geri, mawashi geri, ush. mawashi, knee. Round 1, round 2, round 3. In Serbian.

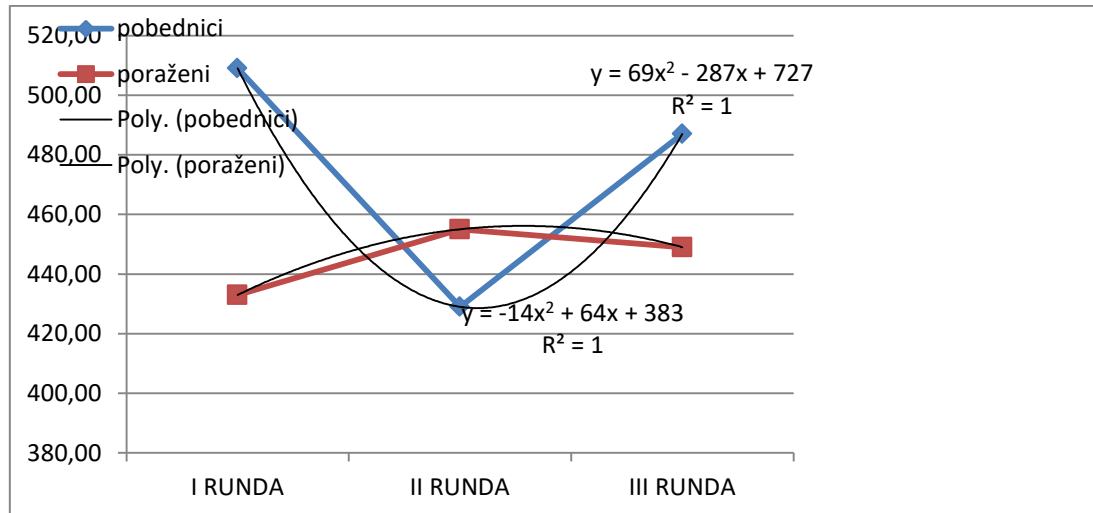
The obtained results showed that in this rank of the competition, in relation to the B class competition (Ljubisavljević et al. 2014), hooks dominate in hand techniques in all three rounds, while low kick is dominant in foot kicks. The higher representation of hooks indicates that the fighters were at a shorter distance for a longer time and used the direct less, which distinguishes them from the top K-1 fighters, where the direct is more dominant

(Kapo et al. 2008). According to the number of total strikes per round, the victors were not in a constant - dominant advantage in all three rounds in relation to the "losers", but varied (Charts 1 and 2). When it comes to low kick technique (victors 27.08% and defeated 28.65%), there is a difference between class B and top K-1 fighters who are dominated by hand techniques (65%) compared to foot techniques (35%).

In general, hand techniques are more economical, faster and simpler, with a more significant effect (Kapo et al. 2008).

By comparing the monitored phenomena, it is possible to determine that the trend line by rounds recorded a decline and rise (Chart 3). The decline is recorded in the second round and the rise in the

third round with the victor, and with the defeated a slight rise in the second and a decline in the third round. The coefficient of determination for the monitored phenomena ( $R^2 = 1$ ) is very high, from which it can be concluded that the explained variability is high and the given model depicts empirical data extremely well and provides an opportunity for reliable prediction of results.



**Graph 3.** Trend of total realized techniques by rounds. Pobednici = victors; poraženi = defeated. In Serbian.

Previous conclusions lead us to a reliable prediction and suggest that during the fight the fighter must not allow his activity to fall significantly during the fight, and that he suddenly "wakes up" to make up for lost points to win (although practice has shown that sometimes a "stray blow" from a fighter facing defeat, i.e. a knockout, can reverse the outcome of a fight. The obtained results are similar to our previous research of class A (Ljubisavljević et al., 2014), which indicate that of the total number of performed hand and foot techniques (2748), the most used is hook by hand (783 times or 28.49%), and the most used foot technique was low kick (786 times or 28.60%), while the number of other techniques performed (hand and foot) during the entire match, are far below the number of these two elements (direct 636 times or 23.14 % and maegeri 175 times or 6.37%). Of the hand techniques as in previous studies of class A (Ljubisavljević et al. 2014), uraken was the least used (12 times or 0.44%), while of the foot techniques, mawashi from the turn was the least used (19 times or 0.69%). Practically, that tells us that it is dangerous to turn your back on the opponent, although in practice, at the right moment (during the match), these two blows decide the match (knock out the opponent). In the paper Kapo et al. (Kapo et al., 2008) analyzed the fights of the most successful K-1 fighters in the world, at the final K-1 tournament GP Tokoy Dome from 1993-2004, and the authors came to the information that manual techniques in K -1 use more and some less. Analyzes have shown that direct and crochet are more dominant and less used and turns from turns, which is confirmed by the results of our research.

## Conclusion

In the research of technical and tactical activity of kick boxers, on a sample of 15 matches, which were held at the 5th Best Fighter Tournament in 2020, 9 variables were followed: four hand techniques - direct, uppercut, hook, uraken, and five foot techniques - low kick, maegeri, mawashigeri, mawashigeri from the turn and a blow to the knee. The main goal of the paper was to determine the frequency of individual techniques (punches and kicks) during a kickboxing match and the contribution to the final result. The obtained results showed that in this rank of the competition, hooks (783) dominate in all three rounds.

A total of 28.49% was scored (compared to other hand strikes), while foot kicks were dominated by low kick, which achieved 786 points or 28.60% in relation to all techniques. According to the number of total shots taken in rounds, the victors were not in a constant - dominant advantage in all three rounds in relation to the "losers", but they varied. The trend line by rounds marked a decline and rise. A slight drop is seen in the second and third rounds for the victors, and for the defeated there is a noticeable drop in the second and a rise in the third round.

The results of the research unequivocally confirm that hand technique is the primary technique, but in combination with foot kicks, it increases the chances of winning. The obtained results can contribute to a better understanding of situational efficiency in kickboxing as well as training planning and programming.

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*Corresponding author:*

*Milija Ljubisavljević*

*<sup>1</sup>High School of Vocational Studies for*

*Education of Teachers and Trainers,*

*Subotica, Serbia*

*e-mail: milija.ljubisavljevic@gmail.com*