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The effectiveness of blows use on the basis of competitive activity analysis in taekwondo WTF at the Olympic Games in Tokyo

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Abstract: The article analyzes the use of blows in WTF taekwondo and their effectiveness in a competitive duel. ***Materials and research methods.*** In order to estimate the number of blows, we analyzed the video of 20 competitive duels using dartfish program. ***Results.*** We revealed the percentage of blows, fulfilled during the combat. The most frequently performed blow was miro – yop chagi (33.8%); the least frequently performed blow was dvit chagi to the head (0.03%). ***Conclusion.*** The analysis of the competitive activity among the world's strongest taekwondo athletes, based on the results of competitive duels at the XXXII Olympic Games (Tokyo, 2020), showed that the sports training of a modern taekwondo athlete places heavy demands on the speed-strength training of athletes and determines the correct selection of training and competitive processes means and methods.
Keywords: taekwondo, video analysis, the Olympic Games, blows, sports training, competitive activity, speed-strength readiness, training process.

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Introduction

At the present stage of taekwondo WTF development training of highly-qualified athletes for the official starts is realized by means of training exercises. They model competitive activity. In order to select correctly means and methods of sports training it is necessary to know effective blows, fulfilled by taekwondo athletes in competitive duels.

We analyzed 20 competitive duels of the strongest taekwondo athletes (WTF) at the XXXII Olympic Games (Tokyo, 2020), including the final and semifinal combats.

Materials and methods

In order to estimate the amount of the blows we realized video analysis of competitive duels with the help of dartfish program. We revealed the following blows, used in competitive combats: single blows, continuous recurrent blows, series of blows.

Results and discussion

As a result of the carried out research we revealed the most frequently fulfilled blows.

The most frequently performed blow was miro – yop chagi, its percentage ratio in relation to all blows was 33,8% ($p<0,05$). This index is explained by technical characteristic of a pushing blow. It is preparatory for further actions toward the opponent.

During miro – yop chagi blow fulfillment the main load is on knee-joint and hip joint flexors and extensors. This situation places high demands on speed-strength oriented training of taekwondo athletes.

The guide in taekwondo WTF [2] demands athletes' high level of speed-strength oriented abilities. Escaping the duel or passive conduct of combat are punished by warning ("Gamdzhom"). The athlete, who constantly shows defensive manner of combat conduct is punished. In order to prevent this situation athletes have to fulfill constantly the attacking actions. Apart from this, miro – yop chagi blow use doesn't give any time for the opponent to prepare the attack. Mentioned above factors explain frequent use of this blow during competitive duels.

The next frequently used blow is dolio chagi with the close-in leg to the body. Its percentage ratio in relation to general amount of blows is 18,3% ($p<0,05$).

In earlier analysis of competitive activity [3,4] the most frequently used blow was dolio chagi. But taekwondo rules change each Olympic cycle and as a result of this, taekwondo athletes' motor actions and their amount change.

The least frequently performed blow was dvit chagi to the head. The percentage ratio of this blow was 0,03% ($p<0,05$) from general amount of blows. This blow belongs to difficult for coordination blows and this explains why athletes don't often use it

during competitive combats.

Table 1 presents the blows, fulfilled by taekwondo athletes in competitive combats, depending on frequency of use.

Table 1

The blows fulfilled by taekwondo athletes in competitive duels, depending on frequency of use

Names of the blows	Percentage ratio in relation to general amount of blows
Miro – yop chagi	33,8%
Dolio chagi to the body with close-in leg	18,3%
Dolio chagi to the body with far leg	9,2%
Dolio chagi from clinch with far leg	9,1%
Nerio chagi with close-in leg	5,9%
Dolio chagi to the head with close-in leg	5,8%
Punch on the body	5,7%
Nerio chagi from clinch	4,7%
Khurio chagi with close-in leg to the body	2,2%

If we consider the fulfilled blows according to the rounds, we see the tendency of the blows amount increase by the third round, in case we don't take into account difficult for coordination blows (table 2).

With the help of Fisher's ratio test we revealed that the number of the round and biomechanics of the blow fulfillment influence directly the quantity indicator of the blows in a round (table 3,4).

Table 2

Amount of the blows during the round

The blow		№ of the round		
		1	2	3
Dolio chagi to the body	Close-in	4,98 ±3,52	5,33 ±3,84	5,43 ±4,18
	Far	2,1 ±2,27	2,33 ±2,55	3,43 ±3,35
Dolio chagi to the head	Close-in	1,63 ±1,78	1,63 ±1,58	1,78 ±3,00
	Far	0,2 ±0,56	0,4 ± 0,71	0,48 ±0,82
Nerio chagi	Close-in	1,38 ±1,71	1,48 ±1,63	2,25 ±2,76
	Far	0	0,1 ±0,38	0,03 ±0,16
Nerio chagi (clinch)		0,85 ±1,49	1,4 ±2,09	1,7 ±2,08
Miro – yop chagi		9,85 ±4,73	8,88 ±4,73	10,53 ±6,82
Dvit chagi	Body	0,33 ±0,89	0,43 ±0,78	0,68 ±1,02
	Head	0	0,03 ±0,16	0
Khurio chagi	Body	0	0,03 ±0,16	0,2 ±0,52
	Head	0	0,08 ±0,27	0,18 ±0,5
Khurio chagi with close-in	Body	0,6 ±1,35	0,8 ±1,51	0,48 ±1,06
	Head	0,25 ±0,87	0,2 ±0,46	0,38 ±0,81
Punch on the body		1,5 ±1,8	1,5 ±2,08	1,85 ±2,14
Dolio chagi (clinch)		2,1 ±2,39	2,58 ±3,69	3,13 ±3,4

Table 3

Minimal and maximal amount of the blows according to the rounds

Names of the blows		Minimal amount of the blows			Maximal amount of the blows		
		№ of the round			№ of the round		
		1	2	3	1	2	3
Dolio chagi to the body	Close-in	0	0	1	15	15	20
	Far	0	0	0	9	10	14
Dolio chagi to the head	Close-in	0	0	0	7	6	17
	Far	0	0	0	3	3	3
Nerio chagi	Close-in	0	0	0	5	5	12
	Far	0	0	0	0	2	1
Nerio chagi (clinch)		0	0	0	7	8	7
Miro – yop chagi		0	0	2	20	22	26
Dvit chagi	Body	0	0	0	4	3	5
	Head	0	0	0	0	1	0
Khurio chagi	Body	0	0	0	0	1	2
	Head	0	0	0	0	1	2
Khurio chagi with close-in	Body	0	0	0	7	5	5
	Head	0	0	0	5	2	4
Punch on the body		0	0	0	6	9	8
Dolio chagi (clinch)		0	0	0	9	15	12

Table 4

Minimal and maximal amount of the blows within the duel

Names of the blows		Minimal amount of the blows within the round	Maximal amount of the blows within the round
Dolio chagi to the head	Close-in	0	20
	Far	0	14
Nerio chagi	Close-in	0	17
	Far	0	3
Nerio chagi (clinch)		0	12
Miro – yop chagi		0	2
Dvit chagi	Body	0	8
	Head	0	26
Khurio chagi	Body	0	5
	Head	0	1
Khurio chagi with close-in	Body	0	2
	Head	0	2
Punch on the body		0	7
Dolio chagi (clinch)		0	5

Conclusion

As a result of video analysis of competitive duels we revealed the most frequently used blows among highly-qualified taekwondo athletes. The most frequently performed blow was miro – yop chagi, the amount of the fulfilled blows was 33,8% ($p<0,05$) in relation to general amount of the blows.

Then goes dolio chagi to the body with close-in and far leg- 18,3% and 9,2%. The least used blow among highly-qualified taekwondo athletes was dvit chagi to the head – 0,03% ($p<0,05$).

The analysis of the competitive activity among the world's strongest taekwondo athletes, based on the results of competitive duels at the XXXII Olympic Games (Tokyo, 2020), showed that the sports training of a modern taekwondo athlete places heavy demands on the speed-strength training of athletes and, determines the correct selection of training and competitive processes means and methods. The results of the present research work have practical significance for the training programs planning and creation for taekwondo WTF athletes.

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