

**ANALYSIS OF THE COMPETITIVE ACTIVITY OF TAEKWONDO
ATHLETES 12-14 YEARS OLD**

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Purpose: to analyze the indicators of competitive activity of taekwondo athletes 12-14 years.

Material and methods: the following research methods were used to solve the tasks: analysis and generalization of scientific and methodological sources and Internet; analysis of protocols and videos of all fights of athletes aged 12-14; methods of mathematical statistics. 117 matches were analyzed, the schedule of which was 2 rounds of 1,5 minutes with a break of 30 seconds in the age group of cadets, during the All-Ukrainian tournament "Children of Ukraine 2020".

Results: from all technical arsenal taekwondo players of 12-14 years most often carry out simple kicks: «bandal chagi» - 61,93%, «dolio chagi» - 13,32 %, «neryo chagi» - 8,18 %, «miro chagi» - 5,80 %, «yop chagi» - 4,58 %, «dzhumok girugi» - 3,91 %. Complex kicks are not performed very often, especially girls. «Twit chagi» boys - 1,26% and girls 0,09 %, «mamdolio chagi» - boys 0,63 % and girls 0,08%, «sambe bandal chagi» - boys 0,19% and girls 0,02% from all kicks. Of the 117 matches analyzed, 92 (78,64 %) of all matches ended in victory in the final. Wins in the additional "golden" round 4 times – 3,43 %. The victory on the difference of points ended 18 matches, which is 15,38 %. Victory according to the referee's preference - 1 time (0,85 %), according to comments - 1 time (0,85 %), due to the termination of the match by the referee (0,85 %).

Conclusions: among the whole arsenal of percussion techniques, simple kicks are most often used, which are performed without revolutions. However, boys use sophisticated technique and punch more often than girls, and girls, in turn, strike more kicks to the head. The more competitive experience an athlete has, the fewer kicks he performs, but their effectiveness is much higher, which is due to the greater number of technical and tactical actions and the expediency of their use at the right time of the fight. Also, athletes try to earn more points and finish the fight early. In order to win a match requires not only technical and tactical training, but also a high level of manifestation of physical qualities, including endurance, which ensures the performance of technical actions without reducing the effectiveness of competitive activities.

Keywords: taekwondo WTF, competitive activity, analysis of competitive activity, cadets 12-14 years old.

Introduction

Today there are many approaches to the analysis of the competitive activity of martial arts, but not many scientists dissect the competitive activity in taekwondo WTF in the kyorugi section, which the most important indicator of physical, technical and tactical skills and psychological lead-up of athletes [1, 5, 12, 13]. So, a high rate of competitive activity in conditions of direct contact with the enemy puts forward new needs for improving the process of training athletes. The effectiveness of taekwondo athlete's performances at competitions depends on the athlete's ability to perform technical and tactical actions during all fights without reducing their quality. During the fight, the athlete's heart rate reaches 160-180 beats/min, which indicates the manifestation of such a physical quality as endurance. In connection with the changes in the rules, and consequently in the competitive activity, there were significant changes [3, 4, 7, 9].

The branch of competitive activity in taekwondo WTF, at different times, was studied by I. N. Pashkov, A. S. Rovny (2010), A. S. Koscheev (2004), Lukina Elena, Strelchuk Sergey, Gandziarski Krzysztof, Puszczałowska-Lizis Ewa (2019). One of

the latest developments by Vyacheslav Romanenko is the use of computer technology for quick and convenient video analysis of competitive activity using the "Martial Arts Video Analysis" program [8, 9].

There are many methods of studying competitive activity, in particular A.A. Novikov, A.S. Sagaleev, G.S. Tumanyan, using the example of boxing and wrestling, proposed to determine the number of strikes delivered and those that hit the target in order to be able to evaluate the quality of the athlete's competitive activity. Based on the results obtained, it is possible to assess the effectiveness of combat operations [1, 2, 14, 15, 16]. Thus, having determined the coefficients of attacking, defensive actions, competitive activity in a certain weight category, the information obtained allows us to analyze where a particular athlete has an advantage, and where he is inferior to his rivals, and timely adjust the training process to obtain high sports achievements [11, 13, 15, 16].

Connection of work with scientific programs, plans and topics. The study was carried out in accordance with the theme of the research work of the Kharkiv State Academy of Physical Culture: "psycho-sensory regulation of motor activity of athletes in situational sports" (state registration number 0116U008943) and the topic "Scientific and methodological foundations of the use of information technologies in the preparation of specialists in the field of physical culture and sports "(State registration number 0113U001207).

Purpose of the research: to analyze the indicators of the competitive activity of taekwondo athletes 12-14 years old.

Material and Methods of research

The following research methods were used to solve the set tasks: analysis and generalization of scientific and methodological sources and the Internet; analysis of protocols and video recordings of all fights of athletes 12-14 years old, methods of mathematical statistics. 117 fights were analyzed, the regulations of which were 2 rounds of 1.5 minutes with a break of 30 seconds in the age group of cadets, during the All-Ukrainian tournament «Children of Ukraine 2020», which was held in Kharkiv. The number of victories according to the final score, according to the

difference in points, according to preference, according to comments, in the additional round, due to the termination of the match by the referee has been determined; the number of strikes of each type separately. Statistical data were obtained on the coefficients of the effectiveness of attacking actions, defensive actions, competitive activity. Coefficients of variation, variance, arithmetic mean, standard error of arithmetic mean, standard deviation of technical execution of punches and kicks during a fight were analyzed.

Results of the research

The striking technique can be conventionally divided into two parts: simple and complex. Simple technique include the following kicks: bandal chagi, dolyo chagi, neryeo chagi, miro chagi, yop chagi, jumok chirugi. To complex: dwit chagi, mamdolio chagi, sambe bandal chagi.

Table 1

Indicators of the volume of taekwondo players technique, which is used during competitive activity (boys $n_1 = 103$; girls $n_2 = 48$), kicks

		Bandal chagi	Dolyo chagi	Yop chagi	Miro chagi	Dwit chagi	Mamdolio chagi	Sambe bandal chagi	Naeryeo chagi	Jumok chirugi
$\bar{X} \pm m$	B	33,52± 2,78	6,00± 1,06	3,4± 0,69	3,85± 0,82	2,1± 0,51	1,79± 0,50	1,44± 0,74	5,14± 1,40	4,19± 0,87
	G	31,55± 4,38	9,10± 2,97	4,5± 1,15	4,84± 1,92		1,06± 0,11		6,36± 1,41	2,99± 1,03
σ	B	10,14	3,91	2,47	2,83	1,46	1,11	1,21	3,98	2,68
	G	10,99	6,63	2,99	3,75		0,19		3,68	2,24
σ^2	B	108,62	16,88	9,33	9,46	2,73	1,44	1,91	18,81	8,35
	G	129,57	56,26	14,11	18,21		0,17		17,21	6,10
V(%)	B	30	66	78	73	69	60	60	76	70
	G	34	59	57	75		22		61	68

Having analyzed the obtained data of striking technique at the competitions, the following results were obtained in Table. 1, 2; Fig. 1, 2: so, the bandal chagi is used by the boys 33-45 times per fight and by the girls 31-42 times. The standard deviation is 10,14 and 10,99 beats, respectively. The coefficient of variation is 30% for boys and 34% for girls. Most often, the bandal chagi is used – 61,93%, by the boys – 43,5% and by the girls – 18,88% of the total number of kicks inflicted.

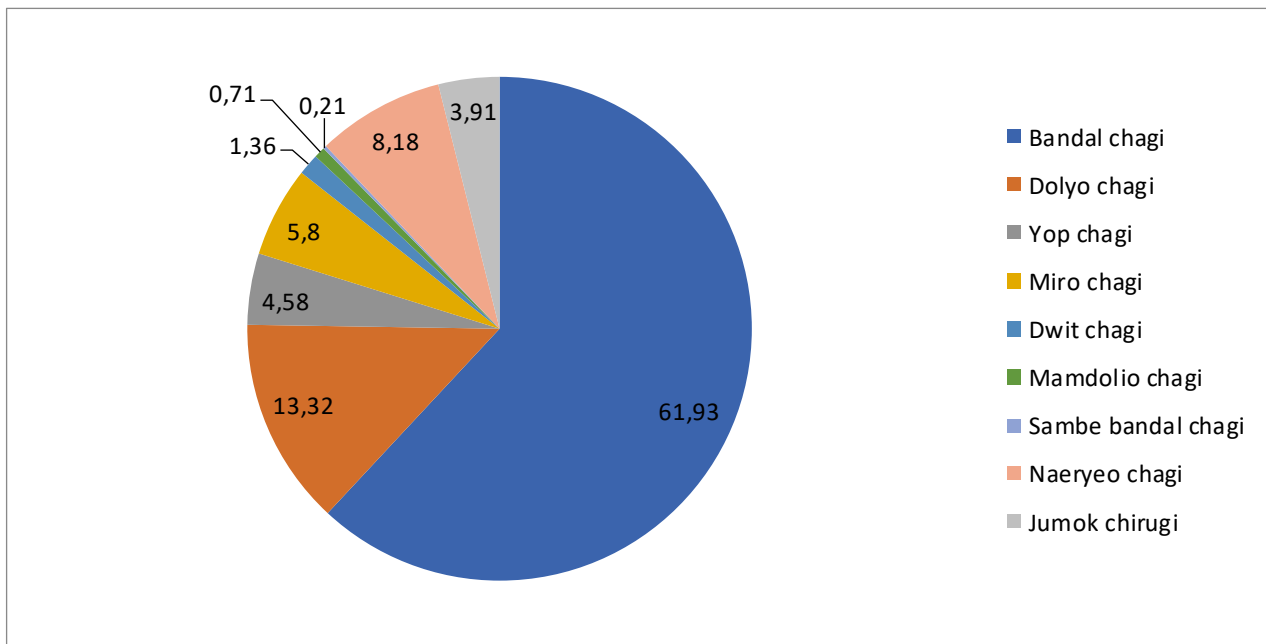


Fig. 1. Use of the volume of equipment during a competitive fight, %

Dolyo chagi is used by boys 6-10 times and by girls 9-19 times. The standard deviation of this stroke is 3,91 for men and 6,63 for women. The coefficient of variation was 66% for boys and 59% for girls. According to the results, the boys use 7,58 % of the total number of kicks, and the girls use 5,74 and in general 13,32 %. Thus, we see that dolyo chagi is performed more often by girls than by boys.

Throughout the fight, the boys perform naeryeo chagi 4-11 times and the girls 6-13 times. The standard deviation is 3,98 beats for boys and 3,68 for girls. The coefficient of variation for boys was 76 % and 61 % for girls, respectively. Naeryeo chagi is used by boys at 5,33 % and girls by 2,85 %. So, this kick is used less often than the previous one. Thus, the overall utilization rate is 8.18%, but the boys use it often – 5,33 %, and the girls only 2,85 % of all striking techniques.

The boys use miro chagi 5-8 times, and the girls 4-10 times during the fight. The standard deviation is 2,83 hits for boys and 3,75 for girls. The coefficient of variation for boys was 73 % and 75% for girls, respectively. Miro chagi use 5.80% of the total number of kicks, but boys more often – 4,04 % than girls – 1,76 %.

During the fight, the boys perform yop chagi 4-8 times and the girls 3-7 times. In terms of standard deviation, yop chagi has 3,91 kicks for boys and 6,63 kicks for girls. The coefficient of variation for boys is 78 %, and for girls it is 57%. In general,

based on the data obtained, yop chagi is used in the amount of 4,58% of all strokes, while the boys are 2,91%, and the girls are 1,67 %.

Jumok chirugi the boys use 4-8 times, and the girls 2-6 times. The standard deviation is 2,68 hits for boys and 2,24 for girls. The coefficient of variation for boys was 70% and 68% for girls. Jumok chirugi, is in great demand among boys 3,21 %, while among girls this figure is only 0,69 %. In general, the punch is used 3,9 1% of all striking techniques.

The boys use the dwit chagi during the fight 2-4 times. The standard deviation is 1,46 and the coefficient of variation is 69. So, the dwit chagi takes 1,36% of all hits, the boys using this kick 1,26%, and the girls only 0,09%.

During the fight, boys perform mamdolio chagi 1-3 times and 1-2 times girls. The standard deviation is 1,11 for boys and 0,19 for girls. The coefficient of variation for boys was 60% and 22% for girls. Mamdolio chagi makes up 0,71% of all kicks inflicted, 0,63% for boys and 0,08% for girls.

Sambe bandal chagi is used by boys 1-2 times. The standard deviation is 1,21. The variation coefficient for the boys was 60%. Sambe bandal chagi makes up 0,21 % of all strikes. For boys, 0,19 % and 0,02 % for girls.

Table 2

Comparison of the use of kicks between boys and girls

		Bandal chagi	Dolyo chagi	Yop chagi	Miro chagi	Dwit chagi	Mamdolio chagi	Sambe bandal chagi	Naeryeo chagi	Jumok chirugi
%	B	43,05	7,58	2,91	4,04	1,26	0,63	0,19	5,33	3,21
	G	18,88	5,74	1,67	1,76	0,09	0,08	0,02	2,85	0,69
Σ%		61,93	13,32	4,58	5,80	1,36	0,71	0,21	8,18	3,91

Complex techniques of strikes with tutning, such as dwit chagi, mamdolio chagi and sambe bandal chagi, are used very rarely, but boys, despite the complexity of execution, use them more often than girls.

So, after analyzing the data obtained on the use of the volume of kicks, we can say that the boys perform more diverse and complex techniques in fights and hit with the hand much more often, and the girls give more preference to simple techniques, but at the same time the number of kicks to the head is greater.

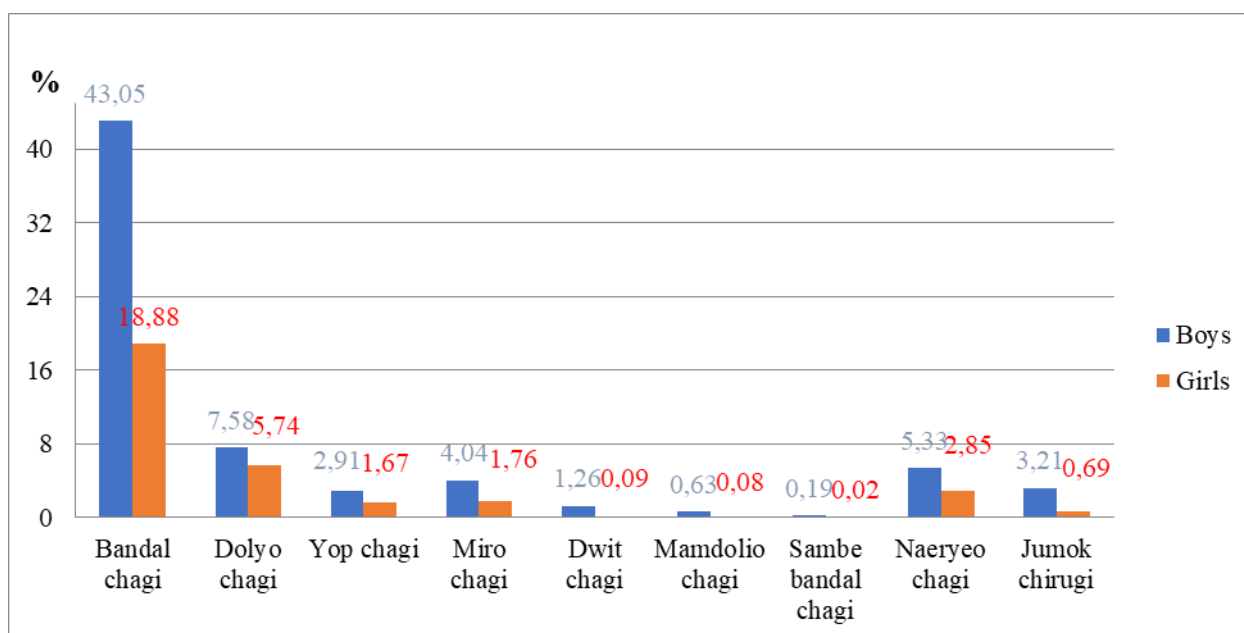


Fig. 2. Comparison of the use of punches by boys and girls, (%)

After analyzing the coefficients of the effectiveness of the competitive activity of taekwondo players, the following results were obtained in Table 3: the number of kicks delivered for the boys is $48,48 \pm 3,42$, and for the girls $57,15 \pm 8,56$ punches. The standard error for the boys is 13,09, and for the girls 12,91 strokes. At the same time, the samples of boys - 32% and girls - 25% are not stable in their indicators. This suggests that in each fight the number of strikes is different due to the fact that the opponents have different sports qualifications.

Table 3

Coefficients of the effectiveness of the competitive activity of taekwondo athletes

Index	Gender	CS	CEAA	CEDA	CECA	Density of the fight
$\bar{X} \pm m$	Boys	$48,48 \pm 3,42$	$0,27 \pm 0,07$	$0,79 \pm 0,05$	$1,08 \pm 0,03$	$0,58 \pm 0,03$
	Girls	$57,15 \pm 8,56$	$0,26 \pm 0,09$	$0,85 \pm 0,07$	$1,11 \pm 0,08$	$0,64 \pm 0,03$
σ	Boys	13,09	0,15	0,13	0,08	0,12
	Girls	12,91	0,14	0,10	0,13	0,09
σ^2	Boys	187,93	0,03	0,02	0,01	0,02
	Girls	185,75	0,03	0,01	0,03	0,01
V(%)	Boys	32	54	17	7	20
	Girls	25	59	12	12	16

Note: CS – coefficient of strikes; CEAA – coefficient of effectiveness of attacking actions; CEDA – coefficient of effectiveness of defensive actions; CECA – coefficient of effectiveness of competitive actions

The coefficient of effectiveness of defensive actions reflects the number of the opponent's kicks that were reflected. When analyzing the data, the following results

were obtained: for boys, the arithmetic mean is $0,79\pm 0,05$, and for girls, $0,85\pm 0,07$ strokes. The standard error is 0,13 for boys and 0,10 for girls, indicating a small deviation from the arithmetic mean. The coefficient of variation is 17 and 12 %, which means they have an average run-up between the indicators.

The coefficient of the effectiveness of competitive actions indicates how effective the attacking and defensive actions were during the fight. The arithmetic mean value for boys is $1,08\pm 0,03$ and $1,11\pm 0,08$ for girls. The standard error for boys is 0,08 and for girls 0,13. The coefficient of variation for boys is 7 %, which indicates the stability of the indicators of the general population and 12 % for girls, where the stability of indicators is average.

The density of the fight reflects the time of the fight that was spent by the athlete directly on the performance of attacking or defensive actions. In these competitions, the sum of the time of two rounds is 3 minutes. So, this coefficient for boys was $0,58\pm 0,03$ and $0,64\pm 0,03$ for girls. The standard error for boys is 0,12 and 0,09 for girls. The coefficient of variation was 20 % and 16 %, respectively, which indicates the average stability of the indicators.

Table 4

Qualitative indicator of victories in fights

	Decisions	Number of fights	%	Total fights
1	Win by final score	92	78,64	117
2	Win by point gap	18	15,38	
3	Win by superiority	1	0,85	
4	Win by referee`s punitive declaration	1	0,85	
5	Win by Golden Point	4	3,43	
6	Win by Referee stops Contest	1	0,85	

Analyzing the obtained data of victories in fights, the following table results were obtained. 4: 92 fights win by final score, which is 78,64% of the total number of fights. The win by the point gap, ended 18 fights, which is 15,38%. Only one fight ended with a win by superiority, which is 0,85% of all. The win by Golden Point ended 4 times, which amounted to 3,43%. There was also only one victory by

referee's punitive declaration – 0,85 %. The victory by Referee stops Contest has one case and which is 0,85 % of all matches.

Conclusions / Discussion

1. Among the entire arsenal of striking techniques, simple strikes are most often used, which are performed without revolutions. However, the boys use a complex technique and punch with a higher frequency than the girls, and the girls, in turn, strike more to the head.

2. The more competitive experience a sportsman has, the fewer strikes he performs, however, their effectiveness is much higher, which is due to the large number of technical and tactical actions and the expediency of their use at the necessary moment of the fight. Also, athletes try to earn more points and finish the fight ahead of schedule.

3. In order to win a duel, not only technical and tactical training is necessary, but also a high level of physical qualities manifestation, in particular endurance, which ensures the implementation of technical actions without reducing the effectiveness of competitive activity.

4. Of all the fights analyzed, 78% wins by final score, which indicates that the competition in weight categories is quite high and the sports experience and qualifications of athletes are approximately the same.

Prospects for further research in this direction will be aimed at analyzing WTF taekwondo fights by rounds and identifying the dynamics of density changes during the rounds, which will reveal the mechanisms that affect the victory, taking into account the manifestation of the athlete's endurance and provide information on improving the effectiveness of the competitive activity of taekwondo athletes 12-14 years.

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