



EXPERT EVALUATION OF THE TECHNICAL
PREPAREDNESS OF QUALIFIED
TAEKWONDISTS AT THE STAGE OF
SPECIALIZED BASIC TRAINING

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Annotation

Objective: To determine the quality of performance of the technical actions of qualified taekwondists at the stage of specialized basic training. **Material and methods:** expert evaluation method; methods of mathematical statistics. **Results:** The results of the study showed that the experts technical actions in the middle level, which were performed by qualified Taekwondists of the experimental group before conducting the pedagogical experiment, were evaluated no higher than 3.85 points. After the pedagogical experiment, three technical actions received average marks above four points: pandal-chagi - 4.22 points, miro-chagi - 4.07, jirugi - 4.27 points, respectively. It indicates a significant improvement in performance quality of the technical actions of the experimental group ($p < 0.01$). In the athletes of the control group, when performing technical actions in the middle level, the expert evaluation did not exceed 3.88 points (punch the body). The experts evaluated the quality of technical actions by the Taekwondists of the experimental group in the upper level with higher scores than at the beginning of the pedagogical experiment: dolio-chagi - 4.03 and nerio-chagi - 4.25 points, respectively. It indicates a significant improvement in the quality of the technical group's implementation of the technical actions of the experimental group ($p < 0.01$). The Taekwondists of the control group also increased their expert judgment scores, but significantly less than the athletes of the experimental group (the highest score for nerio-chagi was 3.83). **Conclusions:** It was found that according to the expert evaluation on the 5-point scale after conducting the pedagogical experiment, the quality of performance of all technical actions in the experimental and control groups of the Taekwondists increased. However, the increase in performance is higher in the athletes of the experimental group. When performing the technical actions in the middle level, the Taekwondists of the experimental group improved their results in the range from 10.9% to 26.1%; athletes of the control group - from 1.28% to 8.38%. When performing technical actions in the upper level, the athletes of the experimental group increased the indicators in the range from 12.73% to 32.85%; athletes of the control group - from 2.5% to 7.91%. It indicates a significant improvement in the quality of performance of the technical actions of the experimental group of Taekwondo ($p < 0.01$) compared with the athletes of the control group.

Key words: expert evaluation of the technical preparedness of Taekwondo; hits in the middle; blows to the upper level; stage of specialized basic training.

Анотація

Мета: визначити якість виконання технічних дій кваліфікованих тхеквондистів на етапі спеціалізованої базової підготовки. **Матеріал і методи:** метод експертної оцінки; методи математичної статистики. **Результати:** результати дослідження показали, що експерти технічні дії у середній рівень, які виконувались кваліфікованими тхеквондистами експериментальної групи, до проведення педагогічного експерименту, оціню-

валились не вище 3,85 балів. Наприкінці педагогічного експерименту три технічні дії отримали середні оцінки вище чотирьох балів: пандаль-чаги – 4,22, міро-чаги – 4,07, джиругі – 4,27 бали відповідно. Це свідчить про значне покращання якості виконання технічних дій тхеквондистами експериментальної групи ($p < 0,01$). У спортсменів контрольної групи при виконанні технічних дій у середній рівень експертна оцінка не перевищувала 3,88 балів (удар рукою у корпус). Експерти оцінили якість виконання технічних дій у верхній рівень тхеквондистами експериментальної групи більш високими балами, ніж на початку педагогічного експерименту: дольо-чаги – 4,03 і нерьо-чаги – 4,25 бали відповідно. Це свідчить про значне покращання якості виконання технічних дій тхеквондистами експериментальної групи ($p < 0,01$). Тхеквондисти контрольної групи також підвищили свої показники експертної оцінки, але значно менше, ніж спортсмени експериментальної групи (найвищий бал – 3,83 за нерьо-чаги). **Висновки:** Встановлено, що за показниками експертної оцінки за 5-ти бальною шкалою після проведення педагогічного експерименту, якість виконання всіх технічних дій у тхеквондистів експериментальної і контрольної груп зросла. Однак приріст показників значно вище у спортсменів експериментальної групи. При виконанні технічних дій у середній рівень тхеквондисти експериментальної групи покращали свої результати у межах від 10,9 % до 26,1 %; спортсмени контрольної групи – від 1,28 % до 8,38%. При виконанні технічних дій у верхній рівень спортсмени експериментальної групи збільшили показники у межах від 12,73 % до 32,85 %; спортсмени контрольної групи – від 2,5 % до 7,91 %. Це свідчить про значне покращання якості виконання технічних дій тхеквондистами експериментальної групи ($p < 0,01$) у порівнянні зі спортсменами контрольної групи.

Ключові слова: експертна оцінка технічної підготовленості тхеквондистів; удари у середній рівень; удари у верхній рівень; етап спеціалізованої базової підготовки.

Аннотация

Цель: определить качество выполнения технических действий квалифицированных тхэквондистов на этапе специализированной базовой подготовки. **Материал и методы:** метод экспертной оценки; методы математической статистики. **Результаты:** результаты исследования показали, что экспертами технические действия в средний уровень, которые выполнялись квалифицированными тхэквондистами экспериментальной группы до проведения педагогического эксперимента, оценивались не выше 3,85 баллов. После педагогического эксперимента три технических действия получили средние оценки выше четырех баллов: пандаль-чаги – 4,22 балла, миро-чаги – 4,07, джируги – 4,27 балла соответственно. Это свидетельствует про значительное улучшение качества выполнения технических действий тхэквондистами экспериментальной группы ($p < 0,01$). У спортсменов контрольной группы, при выполнении технических действий в средний уровень, экспертная оценка не превышала 3,88 баллов (удар рукой в корпус). Эксперты оценили качество выполнения технических действий в верхний уровень тхэквондистами экспериментальной группы более высокими баллами, чем в начале педагогического эксперимента: дольо-чаги – 4,03 и нерьо-чаги – 4,25 баллов соответственно. Это свидетельствует про значительное улучшение качества выполнения технических действий тхэквондистами экспериментальной группы ($p < 0,01$). Тхэквондисты контрольной группы также повысили свои показатели экспертной оценки, но значительно меньше чем спортсмены экспериментальной группы (наивысший балл – 3,83 за нерьо-чаги). **Выводы:** Установлено, что по показателям экспертной оценки по 5-ти бальной шкале после проведения педагогического эксперимента, качество выполнение всех технических действий у тхэквондистов экспериментальной и контрольной групп возросла. Однако прирост показателей выше у спортсменов экспериментальной группы. При выполнении технических действий в средний уровень тхэквондисты экспериментальной группы улучшили свои результаты в пределах от 10,9% до 26,1%; спортсмены контрольной группы – от 1,28% до 8,38%. При выполнении технических действий в верхний уровень спортсмены экспериментальной группы увеличили показатели в пределах от 12,73% до 32,85%; спортсмены контрольной группы – от 2,5% до 7,91%. Это свидетельствует о значительном улучшении качества выполнения технических действий тхэквондистами экспериментальной группы ($p < 0,01$) по сравнению со спортсменами контрольной группы.

Ключевые слова: экспертная оценка технической подготовленности тхэквондистов; удары в средний уровень; удары в верхний уровень; этап специализированной базовой подготовки.

Introduction. One of the main tasks of optimizing the training process of Taekwondists is to determine the main factors of differentiation and individualization that directly influence the achievement of the highest result in competitions of different levels [2; 5; 7; 9; 13].

According to martial arts experts [1; 4; 12; 13; 17], the current level of development of Taekwondo WTF is characterized by the presence of significant competition, resulting in increasing requirements for the manifestation of physical and moral-volitional qualities of athletes, which is the basis of a high level of technical preparedness, which allows to perform effective techniques in competition [1; 6; 11; 18; 19].

In martial arts, the principle of individualization is of particular importance because high athletic performance can be achieved in different ways of conducting a competitive battle [6; 8; 14; 15; 20]. Specialists in martial arts distinguish three basic styles of conducting a battle: power, tempo and game ones [3; 9; 14; 17].

Leading experts believe that the individual style of running an athlete's battle is largely formed at the stage of specialized basic training. The main tasks for the development of basic and special physical qualities, improving the technical and tactical preparedness of the athlete are solved in the process of training at this stage. All this contributes to the formation of a stable and reliable individual style of conducting a competitive duel [3; 4; 10; 13; 16].

Modern taekwondo refers to those sports in which the search for optimal rules of competition and, as a consequence, methods of competitive training in order to improve the efficiency of technical and tactical preparedness of athletes and the general entertainment of competitions is going on [1; 6; 9; 12; 14].

As a result of these factors, the technical and tactical arsenal of skilled taekwondists has recently changed, requiring them to bet-

ter reproduce technical actions in a competitive battle.

The purpose of the study is to determine the quality of performance of the technical actions of qualified Taekwondo cadets at the stage of specialized basic training.

Material and methods.

Participants. Testing of the technical preparedness of qualified taekwondists at the stage of specialized basic training was carried out. Qualification of athletes – I-II sports category and Candidate for master of sports. The number – 30 taekwondists aged 12-13 years, which were divided into experimental (15 athletes) and control (15 athletes) groups.

Organization of research. To determine the quality of the technical actions of the Taekwondo experts, an expert evaluation of these indicators at the beginning and at the end of a pedagogical experiment was conducted, which was held on the basis of the City's Specialized Children and Youngsters Sport School of Olympic Reserve (C S Y S O R) (Taekwondo WTF Branch) (Dnipro).

Determining the quality of mastering of the technical actions of Taekwondo WTF was carried out with the help of expert assessments on the following technical actions:

1) middle level (protective vest) – pandal-chagi (lateral kick with the outside of the foot), yop-chagi (direct lateral kick with the outer edge of the foot), miro-chagi (direct pushing kick with the inside of the foot), twit-chagi (direct heel turn), tornado-pandal-chagi (bounce lateral kick from turning back with outside of the foot), two-pandal-chagi (bounce lateral kick from the outside of the foot), jirugi (direct punch), countermeasure in the middle level;

2) upper level (head) – dolio-chagi (lateral kick with the outside of the foot), baccat-dolio-chagi (lateral kick with the outside of the foot), nerio-chagi (direct kick from up to down with the inside of the

foot), twit-dolyo-chagi (lateral kick from turning with inside of the foot), yop-chagi (direct lateral kick with the outer edge of the foot), twit-chagi (direct kick with a turn heel), tornado-dolio-chagi (jump lateral kick with a turn through the back with outer side of the foot), counter-reception to the upper level.

These techniques are the main technical arsenal of modern competitive activity of highly qualified Taekwondists of the cadet age categories (11-13 years), juniors (14-16 years) and adults, as well as the content of technical training in the school program for Taekwondo WTF [4; 6; 14; 18; 20].

Performance quality of the technical actions was assessed on a five-point scale, according to the opinion of the expert group. In total, four experts were involved: two – judges of the international category, two – of national category (all experts have the category Master of sport, one – the head coach of the national team of Ukraine in the deaflympic taekwondo). The performance of techniques (strokes) was evaluated by experts depending on the quality of the technical actions and the following indicators were taken into account: impact preparation, starting speed, impact velocity, amplitude and trajectory of impact, asymmetry of execution, statodynamic stability during execution of impact, final phase for impact execution, technical action, etc. (Table 1).

Expert consistency was estimated according to the calculation of the Kendall coefficient of concordance (W).

Statistical analysis. The processing and analysis of expert evaluation of the technical preparedness of qualified taekwondists was carried out using the integrated statistical and graphical packages "MS Excel-7" and "Statistica-9.0".

Research results.

Expert evaluation of the technical actions of qualified taekwondists is presented in Table 2.

In the analysis of the obtained

Table 1

Criteria for evaluating the technical skill of a taekwondist when performing techniques

Points	Criteria for evaluating technical technique
5	The technical action is performed clearly, entirely, without stopping, with maximum amplitude and effort in the final phase of impact.
4	The technical action is performed with slight delays, with insufficient amplitude in impact execution and effort in the final phase.
3	The technical action is performed with considerable delays, impaired impact amplitude and effort in the final phase, impaired statodynamic stability of postures after impact.
2	The technical action is performed slowly and inaccurately, with incomplete amplitude of movement, without control of the impact leg (arm) in the final phase, a significant violation of the statodynamic stability of the posture after the impact.
1	The technical action is performed slowly and inaccurately, with incomplete amplitude of motion, without the control of the impact leg (arm) in the final phase, which results in the loss of equilibrium of the kick-ass performer.

data it was found that according to the indicators of the expert evaluation on a 5-point scale, all technical actions of the athletes of the experimental and control groups before conducting the pedagogical experiment were at the same level. It indicates the homogeneity of the studied samples ($p > 0.05$).

The following technical actions obtained the highest expert evaluation:

pandal-chagi (medium level), miro-chagi (medium level), jirugi (medium level), dolio-chagi (upper level), nerio-chagi (upper level). These technical actions are the most common and easy to perform for cadet taekwondists.

It should be noted that the punch jirugi is not often performed by athletes in training and competitive sparring. However, this technical

action is very simple to perform, so the overall expert evaluation is quite high. Yop-chagi should be noted in the middle and upper level. Although this technical action is often performed by athletes in duels [9; 11; 15], it is technically difficult and experts are not rated high.

On average, experts evaluated the performance by athletes of the basic technical actions that are performed at the middle and upper levels of no higher than four points, where the average value is from 3.77 to 2.45 points. Performance of more complex motor tasks (yop-chagi in middle and upper levels, twit-chagi in medium and upper levels, twit-dolyo-chagi, tornado-dolio-chagi, counter-reception in middle and upper levels) is estimated by experts almost the lowest among all indicators - from 3.05 to 2.45 points.

After carrying out the pedagogical experiment, the expert evaluation of the technical actions of the Taekwondo Cadets was repeated (Table 3).

In the analysis of the data obtained after conducting the pedagogical experiment, it was found that according to the expert evaluation on a 5-point scale, the quality of performance of all technical actions in the experimental and control group of Taekwondists increased. However, it should be noted that the increase in indicators is significantly higher in the athletes of the experimental group compared with the control ($p < 0,05$).

Thus, when performing technical actions in the middle level, the Taekwondists of the experimental group improved their results in the range from 14.64% to 26.10% (Table 3, Fig. 1). The greatest increase of indicators is observed at performance by athletes a twit-chagi - for 26,10%, a yop-chagi - for 25,24%, two-pandal-chagi - for 22,01% and counter-reception in the middle level - 22,01% ($p < 0,01$).

It should be noted that the expert evaluated technical actions in the middle level, which were performed

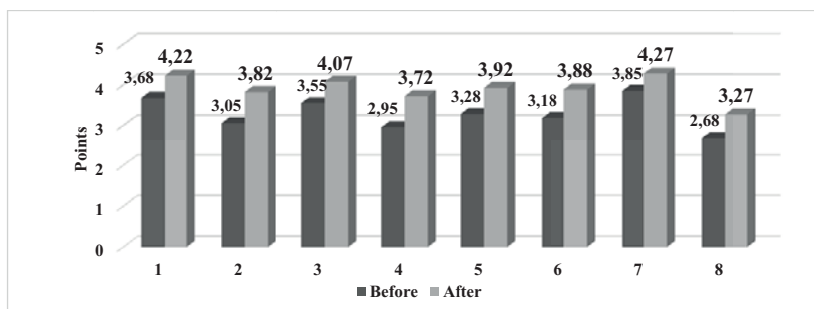


Fig. 1. Expert evaluation of the technical actions performed in the middle level (protective vest) of the experimental group cadets before and after the pedagogical experiment:

1. Pandal-chagi. 2. Yop-chagi. 3. Miro-chagi. 4. Twit-chagi. 5. Tornado-pandal-chagi. 6. Two-pandal-chagi. 7. Jirugi. 8. Counter-reception in the middle level.

Table 2

Expert evaluation of the technical actions of qualified taekwondists of the experimental (n=15) and control groups (n=15) to the pedagogical experiment

Technical actions, points	Groups	X+m	t	p
Middle level (protective vest)				
Pandal-chagi	CG	3,65 ± 0,10	0,277	p>0,05
	EG	3,68 ± 0,06		
Yop-chagi	CG	2,98 ± 0,14	0,370	p>0,05
	EG	3,05 ± 0,11		
Miro-chagi	CG	3,53 ± 0,14	0,09	p>0,05
	EG	3,55 ± 0,12		
Twit-chagi	CG	2,92 ± 0,15	0,168	p>0,05
	EG	2,95 ± 0,13		
Tornado-pandal-chagi	CG	3,18 ± 0,12	0,584	p>0,05
	EG	3,28 ± 0,11		
Two-pandal-chagi	CG	3,27 ± 0,10	-0,527	p>0,05
	EG	3,18 ± 0,11		
Jirugi	CG	3,88 ± 0,04	-0,529	p>0,05
	EG	3,85 ± 0,04		
Counter-reception	CG	2,63 ± 0,10	0,372	p>0,05
	EG	2,68 ± 0,09		
Upper level (head)				
Dolio-chagi	CG	3,62 ± 0,07	-0,626	p>0,05
	EG	3,55 ± 0,07		
Bakkat-dolio-chagi	CG	3,20 ± 0,16	-0,208	p>0,05
	EG	3,15 ± 0,17		
Nerio-chagi	CG	3,72 ± 0,07	0,424	p>0,05
	EG	3,77 ± 0,09		
Twit-dolio-chagi	CG	2,83 ± 0,19	-0,124	p>0,05
	EG	2,80 ± 0,18		
Yop-chagi	CG	2,75 ± 0,13	0,097	p>0,05
	EG	2,77 ± 0,10		
Twit-chagi	CG	2,78 ± 0,16	-0,077	p>0,05
	EG	2,77 ± 0,14		
Tornado-dolio-chagi	CG	2,95 ± 0,14	0,264	p>0,05
	EG	3,00 ± 0,12		
Counter-reception	CG	2,55 ± 0,09	-0,709	p>0,05
	EG	2,45 ± 0,10		

by the taekwondists cadets of the experimental group before conducting the pedagogical experiment, not higher than 3.85 points. And already at the end of the pedagogical experiment, three technical actions

received average marks above four points: pandal-chagi - 4,22, miro-chagi - 4,07, jirugi - 4,27 points, respectively. It indicates a significant improvement in the technical performance of the experimental

group by the experimental group ($p < 0.01$).

The control group athletes also improved the performance of all technical actions in the average after the pedagogical experiment, but significantly less than the athletes of the experimental group (Table 3, Fig. 2). Thus, the largest increase is observed in the performance of the yop-chagi (8.38%, the average score - 3.23), the twit-chagi (6.84%, the average score - 3.12), the miro-chagi (6.23%, the average a score of 3.75) and a pandal-chagi (6.02%, an average score of 3.87). As it can be seen from Fig. 4.2 the average performance of the technical actions in the middle level of the control group's taekwondists does not exceed 3.93 points.

Regarding the implementation of technical actions by cadets taekwondists, the athletes of the experimental group improved their results in the range from 12.73% to 32.85% (Table 3, Fig. 3).

The greatest increase of indicators is observed at performance by the athletes of six technical actions: twit-dolio-chagi - 32,85%, counter-reception - 32,65%, yop-chagi - 31,76%, twit-chagi - 28,15%, baccat-dolio-chagi - for 25.39%, tornado-dolio-chagi - 24.00% ($p < 0.01$).

Experts rated the quality of the technical actions performed in the upper level by the athletes of the experimental group with higher scores than at the beginning of the pedagogical experiment, where the best score - 3.77 points was in the performance of the technical action of nerio-chagi. After conducting a pedagogical experiment, for such technical actions as nerio-chagi and dolio-chagi, the athletes of the experimental group received average marks of 4.25 and 4.03 points, respectively. It indicates a significant improvement in the technical performance of the experimental group by the experimental group ($p < 0.01$).

The control group athletes also

Table 3

Expert evaluation of the technical actions of the qualified taekwonders of the experimental (n=15) and control groups (n=15) after the pedagogical experiment

Technical actions, points	Groups	X+m	t	p
Middle level (protective vest)				
Pandal-chagi	CG	3,87 ± 0,06	3,407	p<0,05
	EG	4,22 ± 0,07		
Yop-chagi	CG	3,23 ± 0,12	3,607	p<0,05
	EG	3,82 ± 0,09		
Miro-chagi	CG	3,75 ± 0,11	2,244	p<0,05
	EG	4,07 ± 0,08		
Twit-chagi	CG	3,12 ± 0,14	3,294	p<0,05
	EG	3,72 ± 0,11		
Tornado-pandal-chagi	CG	3,35 ± 0,11	3,900	p<0,05
	EG	3,92 ± 0,08		
Two-pandal-chagi	CG	3,45 ± 0,10	3,187	p<0,05
	EG	3,88 ± 0,09		
Jirugi	CG	3,93 ± 0,05	4,335	p<0,05
	EG	4,27 ± 0,05		
Counter-reception	CG	2,77 ± 0,10	3,878	p<0,05
	EG	3,27 ± 0,07		
Upper level (head)				
Dolio-chagi	CG	3,77 ± 0,06	2,993	p<0,05
	EG	4,03 ± 0,05		
Bakkat-dolio-chagi	CG	3,28 ± 0,14	3,682	p<0,05
	EG	3,95 ± 0,10		
Nerio-chagi	CG	3,83 ± 0,05	4,459	p<0,05
	EG	4,25 ± 0,07		
Twit-dolio-chagi	CG	3,02 ± 0,17	3,328	p<0,05
	EG	3,72 ± 0,11		
Yop-chagi	CG	2,92 ± 0,13	4,612	p<0,05
	EG	3,65 ± 0,08		
Twit-chagi	CG	3,00 ± 0,16	2,905	p<0,05
	EG	3,55 ± 0,10		
Tornado-dolio-chagi	CG	3,17 ± 0,13	3,680	p<0,05
	EG	3,72 ± 0,06		
Counter-reception	CG	2,68 ± 0,08	5,013	p<0,05
	EG	3,25 ± 0,07		

increased their scores given by the experts, but significantly less than the experimental group's athletes (Table 3, Fig. 4).

So the biggest increase is observed when performing twit-chagi

(7.91%, average score - 3.00), tornado-dolio-chagi (7.91%, average score - 3.00), twit-dolio-chagi (6, 71%, average score - 3.02), yop-chagi (6.18%, average score - 2.92). As it can be seen from Fig. 4 and

table. 4, the average score of performance quality of technical actions in the top level of the control group's taekwondists does not exceed 3.83 points.

Consistency of experts' assessment (n = 4) of technical preparedness of qualified Taekwondists cadets was confirmed by the values of the coefficient of concordance for the pedagogical experiment in experimental (Wm = 0.748; p<0.05) and control groups (Wm = 0.775 p<0.05); after the pedagogical experiment in experimental (Wm = 0.806; p <0.05) and control groups (Wm = 0.747 p<0.05) (Table 5).

As it can be seen from the data obtained (Table 2), before the beginning of the pedagogical experiment, all indicators of technical actions were at the same level both in the athletes of the control and experimental groups in terms of expert evaluation on a 5-point scale, indicating the homogeneity of the studied samples (p>0.05).

However, after conducting the pedagogical experiment, the technical characteristics of the control and experimental group Taekwondists differ. The obtained data indicate true differences (p <0.05), values of t vary from 2,244 to 5,013 (Table 3).

Discussion.

Thus, the obtained data of the expert evaluation of technical preparedness before and after the forming experiment allowed to discover that the athletes of the experimental group improved their performance of technical actions significantly more than the athletes of the control one. This fact, in our opinion, testifies to the effectiveness of the presented experimental program of improving the level of technical and tactical preparedness of Taekwondists at the stage of specialized basic training, which contributed to improving the quality of performance of technical and tactical athletes' actions.

The obtained data are confirmed by the data of leading experts in martial arts [3; 4; 5; 7; 13].

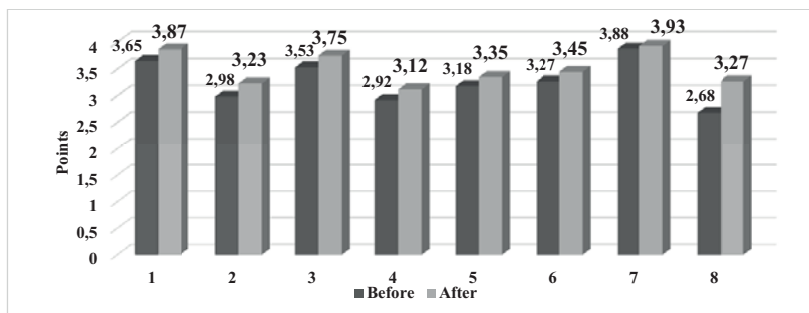


Fig. 2. Expert evaluation of the technical actions performed in the middle level (protective vest) of control group cadets before and after the pedagogical experiment:
1. Pandal-chagi. 2. Yop-chagi. 3. Miro-chagi. 4. Twit-chagi. 5. Tornado-pandal-chagi. 6. Two-pandal-chagi. 7. Jirugi. 8. Counter-reception in the middle level.

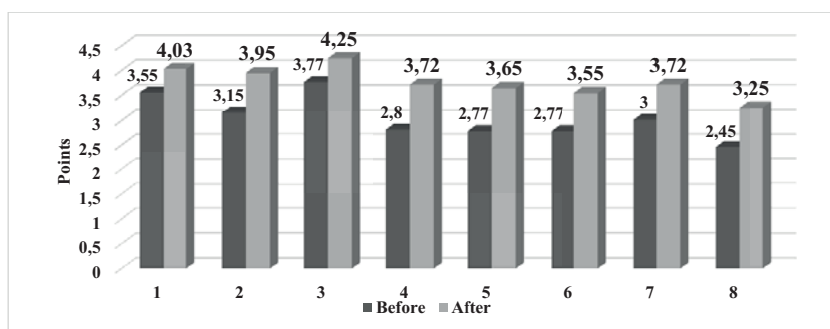


Fig. 3. Expert evaluation of the technical actions performed in the upper level (head) by the experimental group's cadets before and after the pedagogical experiment:
1. Dolio-chagi. 2. Bakkat-dolio-chagi. 3. Nerio-chagi. 4. Twit-dolio-chagi. 5. Yop-chagi. 6. Twit-chagi. 7. Tornado-dolio-chagi. 8. Counter-reception in the upper level.

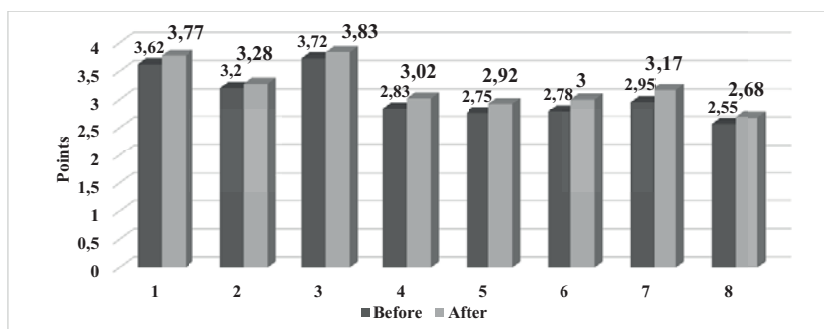


Fig. 4. Expert evaluation of technical actions performed in the upper level (head) of the control group's cadets taekwondists before and after the pedagogical experiment:
1. Dolio-chagi. 2. Bakkat-dolio-chagi. 3. Nerio-chagi. 4. Twit-dolio-chagi. 5. Yop-chagi. 6. Twit-chagi. 7. Tornado-dolio-chagi. 8. Counter-reception in the upper level.

Conclusions.

1. The quality of performance of technical actions of qualified taekwondists at the stage of specialized basic training is investigated. The data obtained were in accordance with the normal law of distribution, and the data sets were processed using standard methods of mathematical statistics.

2. In the analysis of the obtained data it was found that according to the indicators of the expert evaluation, all technical actions of the athletes of the experimental and control groups before carrying out the pedagogical experiment were at the same level. The following technical actions received the highest expert evaluation: pandal-chagi (middle level), miro-chagi (middle level), jirugi (middle level), dolio-chagi (upper level), nerio-chagi (upper level). These technical actions are the most common and easy-to-perform for cadet taekwondists.

On average, experts evaluated the execution of basic technical actions by the taekwondoists not higher than four points, where the arithmetic value is from 3.77 to 2.45 points. Performing complex technical actions (yop-chagi in the middle and upper levels, twit-chagi in the middle and upper levels, twit-dolio-chagi, tornado-dolio-chagi, middle and upper level counter-reception), estimated by experts with low scores - from 3.05 to 2.45.

3. After conducting the pedagogical experiment, it was found that, according to the expert evaluation on a 5-point scale, the quality of performance of all technical actions in the experimental and control group of the taekwondists increased. However, the increase in indicators is significantly higher in the athletes of the experimental group compared with the control one ($p < 0.05$).

Thus, when performing technical actions in the middle level, the taekwondists of the experimental group improved their results in the range from 10.9% to 26.1%; athletes of the control group - from 1.28%

Table 4

Increase of indicators of expert evaluation of technical actions of qualified taekwondists of experimental (n=15) and control groups (n=15) before and after the pedagogical experiment

Technical actions, points	Group	Indicator of expert evaluation		Increase	
		Before	After	Absolute values	%
Middle level (protective vest)					
Pandal-chagi	CG	3,65	3,87	0,22	6,02
	EG	3,68	4,22	0,54	14,67
Yop-chagi	CG	2,98	3,23	0,25	8,38
	EG	3,05	3,82	0,77	25,24
Miro-chagi	CG	3,53	3,75	0,22	6,23
	EG	3,55	4,07	0,52	14,64
Twit-chagi	CG	2,92	3,12	0,20	6,84
	EG	2,95	3,72	0,77	26,10
Tornado-pandal-chagi	CG	3,18	3,35	0,17	5,34
	EG	3,28	3,92	0,64	19,51
Two-pandal-chagi	CG	3,27	3,45	0,18	5,50
	EG	3,18	3,88	0,70	22,01
Jirugi	CG	3,88	3,93	0,05	1,28
	EG	3,85	4,27	0,42	10,90
Counter-reception	CG	2,63	2,77	0,14	5,32
	EG	2,68	3,27	0,59	22,01
Upper level (head)					
Dolio-chagi	CG	3,62	3,77	0,15	4,14
	EG	3,55	4,03	0,48	13,52
Bakkat-dolio-chagi	CG	3,20	3,28	0,08	2,5
	EG	3,15	3,95	0,80	25,39
Nerio-chagi	CG	3,72	3,83	0,11	2,95
	EG	3,77	4,25	0,48	12,73
Twit-dolio-chagi	CG	2,83	3,02	0,19	6,71
	EG	2,80	3,72	0,92	32,85
Yop-chagi	CG	2,75	2,92	0,17	6,18
	EG	2,77	3,65	0,88	31,76
Twit-chagi	CG	2,78	3,00	0,22	7,91
	EG	2,77	3,55	0,78	28,15
Tornado-dolio-chagi	CG	2,95	3,17	0,22	7,45
	EG	3,00	3,72	0,72	24,00
Counter-reception	CG	2,55	2,68	0,13	5,09
		2,45	3,25	0,80	32,65

to 8.38%. When performing technical actions in the upper level, the athletes of the experimental group increased their performance in the range from 12.73% to 32.85%; athletes of the control group - from

2.5% to 7.91%.

It indicates a significant improvement in the quality of performance of the technical actions of the experimental group ($p < 0.01$) compared to the control group athletes.

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Table 5

Concordance coefficient for expert evaluation (n = 4) of technical preparedness of qualified taekwondists of experimental (n = 15) and control groups (n = 15)

Technical action	Kendal criterion (W)			
	Before experiment		After experiment	
	EG	CG	EG	CG
Middle level (protective vest)				
Pandal-chagi	0,67	0,63	0,73	0,66
Yop-chagi	0,72	0,77	0,84	0,8
Miro-chagi	0,8	0,8	0,86	0,84
Twit-chagi	0,71	0,8	0,87	0,69
Tornado-pandal-chagi	0,79	0,79	0,72	0,67
Two-pandal-chagi	0,77	0,79	0,8	0,83
Jirugi	0,66	0,8	0,7	0,81
Counter-reception	0,76	0,72	0,82	0,67
Upper level (head)				
Dolio-chagi	0,77	0,83	0,87	0,74
Bakkat-dolio-chagi	0,84	0,85	0,83	0,82
Nerio-chagi	0,74	0,86	0,81	0,76
Twit-dolio-chagi	0,75	0,84	0,86	0,84
Yop-chagi	0,69	0,77	0,74	0,68
Twit-chagi	0,79	0,73	0,85	0,76
Tornado-dolio-chagi	0,69	0,76	0,82	0,77
Counter-reception	0,82	0,66	0,78	0,61
	0,748	0,775	0,806	0,747

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Conflict of interests

The authors declare no conflict of interests.

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