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SPECIAL PERFORMANCE CONTROL IN TAEKWONDO (POOMSAE)

*In connection with the changes in the rules for conducting WTF Taekwondo competitions (poomsae) and the criteria for evaluating the effectiveness of competitive activity, there is an urgent need to develop methods for controlling special endurance and ways to improve it. To date, there are several referee systems that allow you to conduct taekwondo (poomsae) competitions and carry out the most accurate analysis of competitive activity. Each of the electronic systems has its own distinctive features. In accordance with these coaches and athletes, it is necessary to choose the most effective way to build the training process, as well as its nature, in accordance with the specifics of the competition on a particular judging system. The **purpose** of our study is to develop methods for controlling special endurance in taekwondo and ways to improve it. **Research objectives:** 1. To reveal the characteristics of the development of endurance, and in particular in taekwondo; 2. To study the nature of competitive activity in taekwondo (poomsae) 3. To develop a methodology for evaluating special endurance and determine its effectiveness; 4. Develop recommendations for improving special endurance in taekwondo. The article presents the structure and content of competitive programs in taekwondo (poomsae), on the analysis of which some coefficients of special endurance of athletes were developed. **Conclusions:** Using these methods to improve special endurance allowed us to improve the quality of performance of athletes of the national team of Ukraine in taekwondo (poomsae) at the World Championship 2018 and European Championship 2019 and win victories in certain types of programs.*

Key words: endurance, taekwondo, poomsae, competitive activity, control.

Коцеев О. С. Контроль спеціальної витривалості в тхеквондо (пумсе). У зв'язку із змінами правил проведення змагань по тхеквондо ВТФ у пумсе і критеріях оцінки ефективності змагальної діяльності з'явилася гостра необхідність в розробці методик контролю спеціальної витривалості і шляхів її вдосконалення. **Мета нашого дослідження** полягає в розробці методики контролю спеціальної витривалості в тхеквондо і шляхах її вдосконалення. **Завдання дослідження:** 1. Розкрити особливості розвитку витривалості, а зокрема в тхеквондо; 2. Вивчити характер змагальної діяльності в тхеквондо (пумсе); 3. Розробити методику по оцінці спеціальної витривалості і визначити її ефективність; 4. Розробити рекомендації по вдосконаленню спеціальної витривалості в тхеквондо. **Висновок:** Використання даних методів вдосконалення спеціальної витривалості дало змогу підвищити якість виступу спортсменам збірної команди України з тхеквондо (пумсе) на Чемпіонаті Світу 2018 та Чемпіонаті Європи 2019 років та здобути перемоги у певних видах програм.

Ключові слова: витривалість, тхеквондо, пумсе, змагальна діяльність, контроль.

Коцеев А.С.. Контроль спеціальної виносливості в тхеквондо (пумсэ). В связи с изменениями правил проведения соревнований по тхэквондо ВТФ (пумсэ) и критериях оценки эффективности соревновательной деятельности появилась острая необходимость в разработке методик контроля специальной выносливости и путей ее совершенствования. **Цель нашего исследования** состоит в разработке методики контроля специальной выносливости в тхэквондо и путей ее совершенствования. **Задачи исследования:** 1. Раскрыть особенности развития выносливости, а в частности в тхэквондо; 2. Изучить характер соревновательной деятельности в тхэквондо (пумсэ) 3. Разработать методику по оценке специальной выносливости и определит ее эффективность; 4. Разработать рекомендации по совершенствованию специальной выносливости в тхэквондо. **Выводы:** Использование данных методов совершенствования специальной выносливости позволило повысить качество выступления спортсменов сборной команды Украины по тхэквондо (пумсэ) на Чемпионате Мира 2018 и Чемпионате Европы 2019 и одержать победы в определенных видах программ.

Ключевые слова: выносливость, тхэквондо, пумсэ, соревновательная деятельность, контроль.

Problem statement and analysis of recent publications. The current level of sports development places high demands on the training process of high-class Taekwondo players. Further improvements can be made by refining known and finding new ways of training [1, 2, 4].

It is known that a high level of physical fitness is one of the main conditions that determine an athlete's athletic skill. In particular, endurance largely determines the effectiveness of both training and competitive activities [3, 5, 6]. When improving endurance in taekwondo, it is necessary to be guided not only by the knowledge of the corresponding physiological mechanisms, but

also to take into account the specificity of the sport.

Given the change in the rules of the competition and the evaluation of the effectiveness of competitive activity, the specificity of the development of special endurance steadily tends toward difficult coordination and speed. For example, a year or two later, only the basic elements of the program were evaluated and the complex-coordinating, high-speed component of the program was not taken into account; now, with the advent of electronic devices, the whole structure of the program of performance of athletes is determined, both in individual and team competitions, depending on age categories of athletes. Thus, there is a need to focus the training process, and in particular the development of a technique for controlling endurance [2, 6, 9].

Today, there are several refereeing systems (Ubi Spo (taekwon soft), Dae-Do, KP&P that allow to hold competitions of different levels in taekwondo and to carry out the most accurate non-subjective analysis of competitive activities [1, 2, 8, 9]. Electronic systems have their own distinctive features for scoring points, and an important factor is the number of judges in the referee team and their position in relation to the competing athlete. Accordingly, coaches and athletes need to choose the most effective way to build the training process, and in Ukraine, while competitions are held only on the amateur system, which generally simplifies the outcome of the athlete's performance, but does not give a valid assessment of his performance, all this gives an approximate model of competitive activity, but not gives the whole character of the athlete's readiness.

The overall difference between the different refereeing systems is the way in which the total or final score for the athlete's performance and his demonstration on the screen is calculated, taking into account the number of judges in the refereeing team. This, in turn, constantly makes some adjustments to the system of training athletes and their competition programs, in which the paramount is the display of special endurance.

Special endurance is one of the most important physical qualities of an athlete - a taekwondo player. Due to this quality, the athlete can last from 30 seconds to 1.30 minutes (when performing traditional poomsae time of performance lasts from 30 to 90 seconds, and in free performances 60-70 seconds), without reducing endurance to perform different combinations of strokes and protection [2, 4, 7, 10]. The experience of leading coaches and professionals has shown that endurance is given much attention in the training process, but control methods are limited only by competitive assessments. Therefore, we have made an attempt to develop a technique for assessing the special endurance of Taekwondo players and ways to improve it. Existing methods for determining the level of special endurance and the way to improve it, described in the works of V. Platonov, M. Godika and other authors are designed mainly for the fighters of free and Greco-Roman style [6]. In taekwondo (Poomsae section) no such studies have been conducted.

Analyzing the movements of the taekwondo player, it is easy to note that many of them refer to the zones of maximum and submaximal as well as high and moderate power. It is known that the main source of energy for muscle contraction is adenosine triphosphoric acid (ATP) [3, 4, 6].

ATP resynthesized is carried out at the expense of energy produced by chemical reactions both with and without oxygen. In other words, ATP resynthesized is carried out at the expense of both aerobic and anaerobic mechanisms of energy supply of motor activity [3, 4]. Anaerobic energy mechanisms are essential in short-term high power spurts [6]. Aerobic mechanisms play a major role in prolonged operation of relatively low intensity and during recovery after exercise. In Taekwondo, these endurance mechanisms are complex.

The relative brevity of the performance, the high intensity, the presence of a large number of dynamic moments - all this requires a high level of anaerobic performance. At the same time, the ability to quickly recover during the performance, between rounds of competition - is determined by aerobic performance. Thus, the effectiveness of competitive activity is largely determined by the perfection of anaerobic and aerobic mechanisms to ensure specific motive activity of the taekwondo [7, 9].

Despite the wide variety of tools used to improve special endurance, the most effective is the simulation of training performances with maximum load, in which the mental stress allows you to approximate their intensity to competitive [4, 5, 6, 10].

The **purpose of our study** is to develop a technique for the control of special endurance in Taekwondo and ways to improve it. **Objectives of the study:** 1. To reveal the features of endurance development, and in particular in taekwondo; 2. To study the nature of competitive activities in Taekwondo; 3. Develop a methodology for assessing special endurance and determine its effectiveness; 4. Develop recommendations for improving taekwondo endurance.

Communication with scientific plans, topics. The work is carried out in accordance with the RW Joint Plan in the field of physical culture and sports for 2016-2020 on the topic "Historical, organizational, legal and theoretical and methodological bases of training athletes in non-Olympic sports", state registration number 0116U003008.

The following **research methods** were used in our work: 1. Study and analysis of literary sources; 2. Pedagogical observation; 3. Pedagogical experiment; 4. The method of expert assessments; 5. Pedagogical testing; 6. Mathematical and statistical processing and analysis of the results.

Outline of the main research material. We developed a technique for assessing the special endurance of a Taekwondo player while performing a poomsae based on the calculation of some performance indicators that are performed in accordance with the Rules of Competition [1, 2, 7].

Testing was conducted both in training conditions and in competition conditions. In training and competition conditions, the complexity of the performance program was determined by peer review through a refereeing program. The evaluation of the athlete's demonstration performance was calculated by 5 to 7 experts (judges) with some qualifications.

The structure of the performance of the athlete consists of some mandatory and auxiliary elements such as: jump with a kick to the side, the number of direct kicks in the jump, the number of degrees in the turnover when performing a kick, a sports track that includes kicks from sports taekwondo and acrobatic exercises with kicks in the jump [2, 7].

In our case, the technique for determining endurance consisted of counting program elements by the following five

indicators, such as the number of strokes, legs, and the number of traditional postures, steps and jumps. According to expert estimates, the group average was 50 items when executing the program.

Pedagogical observation and the method of expert assessment allowed us to formulate a formula for determining the coefficient of endurance (SEC):

$$SEC = TNE / 5 \times 50$$

Where, TNE is the total number of elements

5 - The number of basic elements

50 is the group average

The coefficient of endurance is determined by the following range of scatter:

> 0.1 - low

0.2-0.5 - average

0.6-0.9 - high

<1 - maximum

This gave us the opportunity to evaluate the level of expression of special endurance of athletes and to identify ways to improve the quality of the training process to meet the objectives of the study.

In our study, high qualification athletes, members of the national team of Ukraine on Poomsae participated. The quantitative composition of which consisted of 7 athletes of groups of higher sportsmanship with experience of training work more than 8 years. To compare different indicators of competitive activity, we analyzed the strongest athletes, Taekwondo, finalists of the 2018 World Championship, a total of 8 people.

The special endurance of the group was 0.4-0.5, which is the average level of SEC. World-level athletes show a much higher (0.7-0.8) special endurance rating, enabling them to achieve higher results in top-level international competitions ($p > 0.05$).

A high level of endurance is a leading factor in achieving high athletic performance, but a decisive factor in this is the content of the competitive program performed by the athlete.

Given the latest trends in refereeing, the importance of the competition program is increasing every year, as a well-trained athlete with a weak program will show a low result as well as a weak athlete with a complex performance program. There must be a golden mean in everything to reflect the athlete's capabilities and the complexity of the program.

Therefore, analyzing the performances of the strongest athletes, we tried to develop another indicator that reflects the level of special endurance, and more precisely the motor density of the program.

The motor density of the program is calculated as follows (MDP):

$$MDP = TNE / 60$$

Where, TNE is the total number of elements

60 - Duration of the performance (sec)

The motor density of the program is determined by the following range of variation:

> 1 - low

1-1.5 - average

1.6-2 - high

The analysis of the motor density of the programs made it possible to conclude that the leading sportsmen of the world in their programs have indicators of motor density of 1.6-1.8 while in our athletes this indicator is equal to an average of 1.4 ($p > 0.05$).

Indicators of the athletes' endurance, as well as the motor density of the competition program, suggest that this problem is urgent and requires approaches to its improvement. If these two indicators are not taken into account, it will be very difficult to control the training of athletes, and also casts doubt on the effectiveness of competitive performance.

To increase the level of endurance there are many methods and tools used in sports practice, but it is necessary to take into account the specificity of the sport and the coefficients mentioned above. So, in our opinion, interval-circular and competitive methods are the most effective. Examples of using these methods are the following techniques: The inter-circular method is used as a sequential execution of the performance programs or compulsory elements in a circle with different rest intervals, which will increase the special endurance and reflect the rhythm of the structure of the program itself. The competition method is characterized by the performance of programs of competition in competitive conditions using the judging systems and calculating the coefficients mentioned above. Also, this method increases the motivation of athletes and their competitive result, promotes mental stability and concentration on the implementation of certain elements of the program.

Conclusions: 1. At present, the theoretical basis and the rich experience gained in using various methods of improving the endurance of special endurance of high-class athletes, whose use will significantly increase the efficiency of the training process; 2. The technique we have developed to control the special endurance combined with the analysis of competitive activity can be fully used by trainers in the training process in taekwondo, taking into account the different systems of competition. 3. The use of these methods of improving endurance has made it possible to improve the performance of athletes of the national team of taekwondo at the 2018 World Cup and 2019 European Championships and to win certain types of programs.

The **prospect of further research** is related to the correction of athletes training programs aimed at increasing competitive activities in Taekwondo (Poomsae).

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СУЧАСНІ ПІДХОДИ ДО ФІЗИЧНОЇ ТЕРАПІЇ ДІТЕЙ МОЛОДШОГО ШКІЛЬНОГО ВІКУ З КОМБІНОВАНОЮ ПЛОСКОСТОПІСТЮ

Проведено огляд літературних джерел з питання фізичної терапії дітей молодшого шкільного віку з комбінованою плоскостопістю. Окреслена постановка проблеми дослідження, надано аналіз останніх публікацій провідних фахівців в галузі фізичної терапії з даного питання. Сформульовано мету та завдання дослідження. Розроблено комплексну програму фізичної терапії для дітей з комбінованою плоскостопістю, яка включала: лікувальну гімнастику, фізіотерапію, лікувальний масаж та сучасні методи, кінезіотейпування, технічні засоби. Програма відновлення була спрямована на зміцнення м'язово-зв'язкового апарату стоп, утримання в правильному положенні їх і адаптації до фізичних навантажень.