Psychophysiological features of fighters of different tactical styles of conducting competitive duels

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Abstract

Objective: To determine the psychophysiological features of skilled freestyle wrestlers with different tactical ways of fighting.

Materials and Methods: The study involved 15 freestyle wrestlers who are students of the H.S. Skovoroda Kharkiv National Pedagogical University. The athletes had experience in free-fighting from 5 to 7 years, qualification of the Meister kandidat (n = 6) and the 1st sport category (n = 9), age of the examinees - 17-21 years. With the help of V. Schulte’s technique, testing of stability of attention and dynamics of efficiency of fighters was carried out. The indicators of switching and distribution of attention of the investigated by the method of FD were also tested. Humpback. A hierarchical cluster analysis of psychophysiological test results was conducted, according to which the investigated fighters were divided into two groups.

Results: According to the results of testing psychophysiological indicators, some differences were found between the groups. Cluster analysis of testing results of psychophysiological features of freestyle wrestlers divided the studied athletes into two groups. The first group includes fighters who lead competitive duels against defense, using mostly counter-attacks (defensive, counter-attacking style of conducting a competitive duel). The second group of investigated fighters included athletes, who are fighting in an active style (attacking style of running a competitive fight). The wrestlers of the second group, in terms of performance (p <0.001) outperform the wrestlers of the first group. The first group showed a better time switching attention than their opponents (p<0.05).

Conclusions: The results of the study can be used in the individual training of fighters to determine the optimal tactical manner of the fight for specific athletes.

Keywords: psychophysiological features; freestyle wrestlers; students; cluster analysis; tactical manner; duel.

Анотація

Огарь Г.О., Левандовський Є.І. Психофізіологічні особливості борців з різними тактичними стилями ведення змагальних поєдинків

Мета: Визначити психофізіологічні особливості кваліфікованих борців вільного стилю з різними тактичними манерами ведення поєдинка.

Матеріалі і методи: У дослідженні брали участь 15 борців вільного стилю, які є студентами ХНПУ ім. Г.С. Сковороди. Спортсмени мали стаж занять вільною боротьбою від 5-ти до 7-ми років, кваліфікацію КМС (n=6) і спортивний розряд (n=9), вік досліджуваних - 17-21 років. За допомогою методики В. Шульте було проведено тестування стійкості уваги і динаміки працездатності борців. Також були протестовані показники перемикання і розподілу уваги досліджуваних за методикою Ф.Д. Горбова. Був проведений ієрархічний кластерний аналіз результатів тестування психофізіологічних показників, за яким досліджуваних борців було поділено на дві групи.

Результати: За результатами тестування психофізіологічних показників, між групами були виявлені певні розходження. Кластерний аналіз результатів тестування психофізіологічних особливостей борців вільного стилю розподілив досліджуваних спортсменів на дві групи. До першої групи увійшли борці, які ведуть змагальні поєдинки від захисту, використовуючи, переважно, контратаки (захисний, контратакуючий стиль ведення змагального поєдинку). До другої групи досліджуваних борців увійшли спортсмени, які ведуть поєдинки в активному стилю (атакуючий стиль ведення змагальної схватки). Борці другої групи за показниками ефективності роботи (p<0,001) перевершують спортсменів першої групи. Досліджувані першої групи показали кращий час перемикання уваги, ніж їх опоненти (p=0,05).

Висновки: Результати дослідження можуть бути використані при індивідуальній підготовці борців для визначення оптимальної тактичної манери ведення поєдинку для конкретних спортсменів.

Ключові слова: психофізіологічні особливості; борці вільного стилю; студенти; кластерний аналіз; тактична манера; поєдинок.

Annotation

Ogar G.O., Lewandowski E.I. Psychofизиологические особенности борцов с различными тактическими стилями ведения соревновательных поединков

Цель: Определить психофизиологические особенности квалифицированных борцов вольного стиля с различными тактическими манерами ведения поединка.

Материалы и методы: В исследовании принимали участие 15 борцов вольного стиля, которые являются студентами ХНПУ имени Г.С. Сковороды. Спортсмены имели стаж занятий вольной борьбой от 5-ти до 7-ми лет, квалификацию КМС (n = 6) и И спортивный разряд (n = 9), возраст испытуемых - 17-21 лет. С помощью методики В. Шульте было проведено тестирование устойчивости внимания и динамики работоспособности борцов. Также были протестированы показатели перемежения и распределения внимания испытуемыми по методике Ф.Д. Горбова. Был проведен иерархический кластерный анализ результатов тестирования психофизиологических показателей, по которым исследуемые борцы были разделены на две группы.

Результаты: По результатам тестирования психофизиологических показателей, между группами были выявлены определенные различия. Кластерный анализ результатов тестирования психофизиологических особенностей борцов вольного стиля распределил исследуемых спортсменов на две группы. В первую группу вошли борцы, которые ведут соревновательные поединки от защиты, используя преимущественно контратаки (защитный, контратакующий стиль ведения соревновательного поединка). Во второй группе исследуемых борцов вошли спортсмены, ведущие поединки в активном стиле (атакующий стиль ведения соревновательной схватки). Борцы второй группы, по показателям эффективности работы (p<0,001) превосходят спортсменов первой группы. Испытуемые первой группы показали лучшее время перемежения внимания чем их оппоненты (p <0,05).

Выводы: Результаты исследования могут быть использованы при индивидуальной подготовке борцов для определения оптимальной тактической манеры ведения поединка для конкретных спортсменов.

Ключевые слова: психофизиологические особенности; борцы вольного стиля; студенты; кластерный анализ; тактическая манера; поединок.

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Introduction

Achieving the highest possible results in competitive activities is the goal of a long-term educational process in the sport of higher achievement. Competitive activity in sports is complicated by direct close contact of athletes during the fight [1]. The technical and tactical arsenal in the sport of wrestling is very diverse and from all this diversity, the coach and athlete should choose the amount of techno-tactical techniques that will best suit the features of a given fighter. The success of the athlete in the sport depends largely on the rational use of individual typological features of the athlete during the fight. Today, elite wrestlers who win continental and world competitions and are the favorites of the highest, in terms of tournaments, conduct matches in completely different styles. Wrestlers such as Olympic champions Jordan Burrows and Kyle Snyder take advantage in physical strength and power during duels. Three-time Olympic champion Buvaizar Sitiyev defeated his rivals at the expense of filigree technique and tactile sensitivity, as is the current athlete, former world champion Frank Chamizo. 2016 Olympics champion Soslan Ramonov wins at the expense of incredible toughness, and our Ukrainian fighter Valery Andriytsev, silver medalist of the 2012 Olympics, uses good functional fitness and superior endurance to win.

In order to effectively build an optimal tactical scheme for conducting matches in competitions, the coach must have enough complete information about the typological features of the athlete, including the peculiarities of his psychophysiological qualities. In order to show high athletic performance, at the current stage of sports development, coaches need to interact side by side with scientists, or by owning methods of scientific research.

A number of specialists have been engaged in the study of individual tactical manners of fighting in different types of martial arts [2; 3; 4]. It has been found that tactical styles of dueling are influenced by a number of factors, including individual typological features of athletes. Today, the overwhelming number of scientists in the field of martial arts, there are three variants of tactical styles of fighting: game, power, tempo [5; 4; 6]. A number of authors, investigating individual typological features of highly skilled athletes in martial arts, determined their model characteristics [7, 8, 9]. It was found that the level of development of psychomotor reactions and the specific perception of athletes has some relationship with the typical styles of running a match. Other experts have devoted their research to the individualization of technical and tactical training of fighters [10; 11; 12]. The results of these studies indicate the feasibility of training fighters for individual programs, especially for qualified athletes. This method of training athletes is more effective than a group training process. Other scientists have found that in the dynamics of the training macrocycle the main individual-typological factors that determine the psychophysiological state of the body in highly skilled athletes is the functional mobility of nervous processes, a high level of which is consistent with the digestibility of the digestive system. against the background of perfect mechanisms of the system of autonomic neurohumoral regulation of heart rhythm [13; 14:15].

This work is devoted to the study of psychophysiological features of qualified athletes, students of the Faculty of Physical Education and Sports, who specialize in free wrestling. It was assumed that the wrestlers who conduct competitive duels in different tactical manners also differ in psychophysiological indicators.

The purpose of the work is to determine the psychophysiological features of skilled freestyle wrestlers with different tactical ways of fighting.

Material and methods

Participants

Students aged 17-21 years engaged in sports participated in the study. The athletes had experience in freestyle wrestling from 5 to 7 years. All subjects were qualified wrestlers, had 1 class qualification (n = 9), a candidate for a masters of sport (n = 6). Test conditions for all athletes were the same.

Experiment protocol

To solve the problems of the study the following methods were used: analysis of scientific and methodological information, generalization of best practical experience, psychophysiological methods of research, methods of mathematical statistics. Analysis of scientific and methodological sources, pedagogical observations helped to identify the problem, to set the purpose and objectives of the study. Common methods of testing were used to determine psychophysiological features. Studies of attention stability and performance of fighters were carried out using the method of V. Schulte. To estimate the switching and distribution of attention of the investigated, the technique of FD was used. Humpback.
**Statistical analysis**

A hierarchical cluster analysis was used to divide the studied athletes into groups. The technology of hierarchical cluster analysis is that each case forms its own cluster first. At each step, two separate clusters, having the closest contact with each other in their structure, are combined into one cluster, and so on. The results of testing the psychophysiological indicators of the athletes of the two groups were carried out using the methods of mathematical statistics. We determined: the arithmetic mean of the samples, the standard error of the mean, the Student’s t-test.

**Results**

Based on the tasks set to substantiate the informativeness of psychophysiological indicators as a basis for forming the style of conducting a fight in sports, a hierarchical cluster analysis of indicators of psychophysiological testing was conducted. The stages of clustering are presented in Table 1. The data of Table 1 and the dendrogram (Fig. 1) show that in the first stage athletes Nos. 13 and 14 were merged into one cluster. This indicates that these fighters are close in their own structure of psychophysiological indicators. It is advisable to take this into account when conducting training. At the next stage of this analysis, athletes # 11, 15, 3, 13, etc. join the previous wrestlers.

To determine the optimal number of clusters, it is necessary to subtract from the number of subjects the step number at which the coefficients of the cluster analysis begin to increase nonlinearly. In our analysis, this is step # 13. Thus, we subtract 13 from 15 and get 2 clusters. The dendrogram shows that each fighter belongs to a particular cluster. Thus, hierarchical cluster analysis revealed the presence of 2 groups of athletes. According to the expert evaluation of the styles of conducting a competitive fight, the first group includes fighters who conduct competitive duels, mainly from defense, waiting for a favorable motive situation for counter-attacking (defensive, counter-attacking style of conducting a competitive duel). The second group of experienced wrestlers included athletes who lead active-style bouts (attacking style of combat).

| Step № | Cluster of fighters (according to conventional numbers) | Coefficients |
|--------|--------------------------------------------------------|--------------|
| 1      | 13, 14                                                 | 3,202        |
| 2      | 11, 15                                                 | 4,059        |
| 3      | 3, 13                                                  | 5,185        |
| 4      | 8, 9                                                   | 6,630        |
| 5      | 2, 12                                                  | 7,839        |
| 6      | 5, 8                                                   | 8,545        |
| 7      | 3, 11                                                  | 9,890        |
| 8      | 2, 10                                                  | 11,057       |
| 9      | 3, 5                                                   | 12,207       |
| 10     | 2, 4                                                   | 13,527       |
| 11     | 3, 7                                                   | 14,973       |
| 12     | 1, 2                                                   | 15,755       |
| 13     | 3, 6                                                   | **20,950**   |
| 14     | 2, 4                                                   | 23,985       |
| 15     | 1, 3                                                   | 26,000       |

Since the cluster analysis used exclusively psychophysiological indicators, and the studied athletes were divided into two groups, which are actually groups of fighters of different styles of dueling, it can be argued that the hypothesis of the influence of psychophysiological features of athletes in the tactical manner of fighting in the competitive struggle.
Fig. 1. Dendogram using intragroup method. Distribution of fighters into groups by cluster analysis of psychophysiological indicators (n = 15)

For a more detailed test of this hypothesis, a comparison of the formed groups of investigated fighters according to the Student's t-test was performed (Table 2).

| №  | Indicator                        | Group | n   | \( \bar{x} \) | S     | m    | t    | p     |
|----|----------------------------------|-------|-----|-------------|-------|------|------|-------|
| 1  | Performance (Schulte test) (c.u.)| 1     | 10  | 52,30       | 7,73  | 2,44 | 5,40 | <0,001|
|    |                                  | 2     | 5   | 32,40       | 3,38  | 1,51 | -0,73| >0,05 |
| 2  | Degree of work (Schulte test) (c.u.)| 1     | 10  | 0,90        | 0,16  | 0,05 | 0,34 | >0,05 |
|    |                                  | 2     | 5   | 0,97        | 0,17  | 0,08 | -2,21| <0,05 |
| 3  | Psychological stability (Schulte test) (c.u.)| 1     | 10  | 89,10       | 22,54 | 7,13 | -2,21| <0,05 |
|    |                                  | 2     | 5   | 122,80      | 37,15 | 16,61|       |       |

Comparison of the two groups of tested athletes by Student's t-test revealed some differences between them in some psychophysiological indicators. Thus, the fighters of the second group appeared to be better in terms of performance (\( t = 5.40; \ p <0.001 \)). The study of switching time of attention of athletes of two groups showed the superiority of the representatives of the first group, confirmed by mathematical calculations (\( t = -2.21; \ p <0.05 \)). The calculation of the results of testing the degree of training and psychological stability did not reveal any significant differences between the groups of tested fighters (\( p> 0.05 \)).

Discussion

The results of the study confirm the working hypothesis that fighters who use different tactical ways of wrestling during competitive matches also differ in psychophysiological features. Attacking style in sports is characterized by considerable expenditures of power and energy resources, which requires from athletes good special power readiness and special endurance [16]. These qualities compensate for the lag in some neurodynamic parameters. Due to the constant active management of the competitive fight such fighters spend a lot of forces and resources of the body. In terms of energy efficiency, this is not always justified. As an example, in the finals of this year's World Junior Wrestling Championships, Moldova's wrestler Vasily Deacon, defeating Ukrainian athlete Erik Arushanian 5-0, lost 5: 6. The Moldovan wrestler is characterized by high power condition and always
1) athletes leading active-style competitive bouts;  
2) athletes who are in a competitive battle against defense and, when appropriate, counterattack, using their energy resources more economically.

2. Attacker-style fighters have a nearly equal degree of training and stability of mental processes with the representatives of the second group, but surpass them in terms of performance. Wrestlers in a defensive, counterattacking style differ from the first group athletes with the best indicator of switching attention, which certainly has an effective effect on their style of wrestling.

3. The results of this study should be used when planning the individual training of athletes in sports, to determine the optimal style of running a competitive match for certain athletes.

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Conflict of interest

The authors declare that there is no conflict of interest.

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