



Psychophysiological Determinants of Successful Training and Competitive Activity of Martial Artists

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Abstract

Single combats, according to many researchers, are characterized by multilevel interaction of physical and mental factors, motive technical and tactical complexity, a high mental and psych-emotional voltage of activity. Permanently high nervous tension, both in competitive, and in educational and training duels which is followed by appreciable mental loads [5, 6, 22, 23, 56] is characteristic of any single combats.

In this work, data of a CNS are submitted: level of attention, memory, emotions and indicators of different types of adaptive behavior. Successful training and competitive activity – requires a comprehensive investigation of psychomotor qualities of athletes in the form of a complex simple and difficult the sensomotor of reactions.

Keywords: martial artists, psychophysiological examination, sensomotor reaction, technical and tactical skill.

STATEMENT OF A PROBLEM

The success of educational, training and competitive activity of martial artists is in many respects caused by quality of their sports skill, which is characterized by harmonious unity of all components of optimum readiness of the athlete for the best achievements: functional, physical, technical, tactical, and psych-emotional. Our researches show that the efficiency of integrated interaction of these components of sports skill of martial artists is provided, first, with psychophysiological prerequisites. Specifics of sports and fighting single combats (taekwondo, karate, judo, fight, boxing, kickboxing, etc.) is the psychomotor complexity of educational and training and competitive activity of athletes in a duel situation, conflict and extreme on character, as causes in dynamics of growth of qualification of martial artists relevance of studying of psychophysiological elements determinants of their sports skill [10, 19, 23, 37, 40].

The analysis of competitive activity of martial artists shows that to the athlete in the conditions of training and competitive activity it is necessary to process constantly and quickly a large number of the most various information (actions of the opponent, a fight situation, distance assessment, the direction of blows, the nature of actions of the opponent, etc.) that imposes increased requirements to their psychophysiological state [5, 6, 7, 10, 19, 30, 37].

RELEVANCE

According to many researchers, high sports results of martial artists, practically at all stages of a long-term training, in many respects are defined by the psychophysiological status which is the major condition for development of special physical qualities, ability to transferring of high specific loadings, an opportunity to intensive course of recovery processes and increase in sports working capacity. The psychophysiological status

and level of fitness are the defining factor of success of a performance of the athlete at competitions [19, 32, 36, 37]. Besides, at martial artists of high level, owing to specific features of power exchange in an organism when performing various on intensity and duration the physical of loadings, it is possible to reveal with high probability the psychophysiological prerequisites regulating development of the qualities promoting sports success that will allow to make on the basis of these data specialization and selection of athletes which with a bigger share of probability in the future will show outstanding sports results [4, 5, 6, 14].

DISCUSSION

As an integrated psychophysiological indicator of a normal or pathological state of a CNS, reserve opportunities of an organism, safety or damage of mechanisms of a regulation of levels of wakefulness, attention, memory, emotions and different types of adaptive behavior many authors point to the high diagnostic value of a research an omega potential of a brain [43, 44, 48].

Constant potentials in a CNS, as well as fluctuations of other electric and not electric parameters are widespread, and shifts of levels of constant potential indicate not only prevalence of this bioelectric phenomenon in the central nervous system, but also on its high functional importance [38, 41, 47].

In sports activity often apply an omegametriya method to definition of super slow physiological indicators. In studying of mechanisms of adaptation of an organism indicators of a brain and a hemodynamics allow to estimate features of prestarting conditions of healthy faces with normal and hypertensive tone of response to loads of different intensity [10, 11, 14, 27].

Many authors in the researches have defined a complex of the most informative characteristics of super

slow physiological processes for various conditions of an organism of the athlete [11, 58, 59]:

- in a condition of quiet wakefulness stabilization time an omega potential has the greatest informational content;
- in a condition of active wakefulness – intensity and expressiveness of SSPP (superslow physiological processes) and time of stabilization an omega potential;
- in a condition of exhaustion - size an omega potential, intensity and expressiveness of SSPP;
- for assessment of optimality of adaptation of an organism – stabilization time an omega potential and also intensity and expressiveness of SSPP [11, 58, 59].

P.M. Muftakhina and E.Sh. Shayakhmetova have established interrelation of a psychophysiological condition of an organism, including against the background of training and competitive loads, with dynamics of indicators an omega potential of a brain of boxers of various age and qualification groups. Besides, they assume that size shift a brain omega potential in the range of non-optimal values (0-19 mV) can be the indicator of violation of a psychophysiological condition of an organism, and increase an omega potential in the range of optimum values (20-39 mV) is followed by improvement of indicators of psychomotor system [33].

The literary data given above, demonstrate that S and the OP (omegapotentsiat) level of a brain not only define the modes of the functional statuses of structures of nervous system and a brain as whole, but also are the sensitive indicator of influence of natural, labor, social training factors on an organism of athletes.

For successful training and competitive activities in many sports the ability accurately and quickly to react to actions of the opponent is extremely important. In this regard, we analyzed a row of operations in which psychomotor qualities of athletes in the form of a complex simple and difficult the sensomotor of responses were comprehensively probed [10, 26, 32, 49, 54, 55].

So, Shevchenko D.V., etc. is assumed that in formation of rhythmic movements the parietal area of bark of big hemispheres is a directly involved. Increase in the maximum frequency of movements is result of assimilation of a rhythm the functional system and is reflected increase in lability of centers and executive bodies. With an age the maximum frequency of elementary movements progressively increases at persons of both sexes, however these changes are uneven and have personal character [57, 59, 60].

Rates of development of high-speed abilities during various age periods aren't identical. So, for example, the maximum augmentation of speed of movements was observed by Ozerov V. P. aged up to 12-13 years then results of researches authentically don't change. Frequency of percussions a brush in the age range from 8-9 to 12-13 years on average increases from 6,5 up to 7,7 blows a second (bl. / sec). Some children in 8-9 years develop speed to 9,5 bl. / sec. These indicators are explained by their motor endowments [35].

The ability to performance of movements at fast speed depends on individual and typological features of athletes. By Ilyin I. P., it is shown that the minimum frequency of movements is observed at persons with an average force of nervous processes, and the maximum frequency of movements is observed at persons with weak and average and weak nervous processes [16, 18].

V.S. Farfel suggested that the ability to carry out the movements at high speed is bound to lability of a CNS – ability of the nervous centers innervating groups of muscles to pass quickly from a condition of exaltation into a condition of inhibition and back. However, the ability to make the movements at fast speed is caused by the whole complex of properties of a nervous system [53]. The maximum frequency of movements is higher at persons with balanced nervous processes whereas at persons with prevalence of the maximum exaltation the rate of movements is higher, than persons with prevalence have inhibitions, but below, than at persons with balanced nervous processes. Probably, the prevalence of exaltation of a CNS leads to depression of mobility of nervous processes and, as a result, to depression of the maximum frequency of movements [45].

Some authors consider that the research of typological features of implication of the main properties of a nervous system is of great importance for forecasting of success in work of the individual and also in educational and training and competitive activity of the athlete and therefore, is widely applied as one of indicators of level of skill of athletes and also enters the complex of indicators of the psychomotor organization of the person used for carrying out professional selection on many specialties [46, 47].

Time of sensomotor reaction of athletes depends on typological features of the person. A series of researchers is specified that time of reaction is determined by congenital features of higher nervous activity and can serve as the indicator of the main properties of a nervous system [3, 17, 18]. Based on it V.D. Nebylitsyn developed a technique of assessment of force of nervous processes on time indicators the sensomotor (visual and acoustical) reactions. This technique is based on various implication of "the law of force" at persons with a weak and strong nervous system. For example, in sound option of this technique the intensity of an incentive (tone of 1000 Hz) changes from 20 to 120 dB. In light option, 6 fixed levels of intensity of a stimulus are used: from 0,002 to 2000 lx. Intervals between presentations of stimuli make 10-15 pages. Each subsequent intensity exceeds previous approximately by 10 times. The interrelation of time of simple sensomotor reaction with mobility inactivity of nervous processes is taped. At persons with high mobility of inhibition time of reactions to any stimuli (light, sound, strong, weak) are, as a rule, shorter, than at persons with low mobility. The similar dependence is found in response to a sound in persons with various mobility of processes of exaltation [9]. Time of difficult sensomotor reaction authentically differed in the groups examined, differing on functional mobility of nervous processes. Pesoshin, A.V. notices that

athletes with higher lability of nervous processes are capable to make the movements at higher speed [39].

In researches of athletes it was shown that time of simple motive reaction to light and a sound of various intensity is shorter at persons with a weak nervous system on exaltation in comparison with strong [37, 39, 43, 48].

N.P. Fetiskin specifies that at athletes with prevalence of excitative processes the time of simple visual reaction (TSVR) was 260 ms, in group with a balanced nervous system this indicator was 280 ms, and in group with prevalence of brake processes of VPZR made 310 ms [54].

Etc. specify by V.P. Kira that time idle time of sensomotorny reaction of the person to in advance agreed signal can't be below a certain physiological limit which consists of a heating-up period of the corresponding generating potential in receptors, its carrying out on afferent ways, processings in structures of a CNS, carrying out a signal to executive bodies and exercises of the movement. For example, in case of response to an acoustical stimulus in a peripheric organ about 1 ms and change of this delay depending on intensity of a stimulus is lost doesn't exceed 0,4 ms. On carrying out action potential in an acoustical cortex from 8 to 10 ms are required, and changes depending on intensity of a stimulus make no more than 1-2 ms. Processing of a signal in the center, carrying out on centripetal ways and reduction of muscle fibers demands about 70-80 ms even at the highest intensity of a stimulus. Thus, the delay ("a nonreducible minimum") makes about 100-110 ms. [20]

By data, Boyko E.I. time of reaction to incentives of various modality significantly differs and averages: for visual incentives – 150-225 ms; for acoustical incentives – 120-182 ms; for tactile incentives – 117-182 ms [8].

A number of researchers have experimentally shown that time of sensomotor reaction can significantly change in various situations [9, 24, 25, 26, 35]. So, under the influence of a training time of reaction not only is shortened, but also stabilized, i.e. becomes to less subject different influences. Shortening of time of reaction is most essential in the first days of performance of the corresponding exercises [8]. Simple reaction comes under influence of exercises in much smaller degree, than choice reaction. For example, after only one day of occupations time of reaction of the choice can be reduced by 30-40% whereas time of simple sensomotor reaction only to 10%. Thus, it is possible to use time of reaction as the indicator of the physiological and psychophysiological states characterizing a certain level of sports readiness (for example, the level of fitness of athletes) or qualities of warm-up. After effective warm-up in most cases time of reaction decreases and its variability decreases. Insufficient warm-up, on the contrary, extends time of reaction and reduces its stability [13].

Psychometric characteristics are of great interest to successful training and competitive activity. For example, in successful realization of tactical and technical actions of the athlete, the major component is not just the speed of simple sensomotor reaction, but the speed of response to a moving object. The ability instantly and precisely "to blow

up" in efforts and also to show automatism of skills and their separation from a verbal component, i.e. from need to think in the conditions of sharply limited time [43, 49] depends on well-developed kinetic feeling and visual and motor coordination.

By A.V. Lebedev when studying psychometric characteristics (the tapping-test, TSVR (time of simple visual reaction), TDVR (time of difficult visual reaction)) of swimmers it is shown that athletes with the best sports readiness had also more good results of tests of psychometric characteristics. Besides, the athletes who reduced results of tests on a psychomotor system on the last interval of time considerably worsened the indicators in swimming on longer distances [28].

Researches M.A., Genov E., Ermakov P.N. Is opaque showed that when comparing rate of simple motive reaction at the persons who aren't playing sports and at the qualified athletes, irrespective of character of a stimulus the qualified athletes have much higher precision and rate of reaction [13, 15, 31].

In Litvinova N.A. researches. It is shown that at hindrances boxers had a value of the latent period of TSVR and time of reaction of the choice authentically less, than at mountain skiers. It is bound to the fact that feature of training activity of boxers is quick response at stimuli, weak and average in size, that explains selection of persons with a weak and average force of a nervous system in this sport [29].

Thus, the success of competitive activity more depends on the level of development of specific qualities, which gain paramount value in single combats. At the same time, experts assign the leading role to psychophysiological indicators: to sensomotor reactions, operational thinking, attention to the features, i.e. the indicators forming tactical abilities of athletes, and defining efficiency of wrestling in changing duel situations. At the same time, each athlete martial artist possesses the, unique combination of psychophysiological properties, which are defining in formation of an individual manner of maintaining a duel [43, 49].

Body height of technical and tactical skill in single combats is caused by use of actions in situations of the educational, training, and competitive fights demanding implication of kinds of motive reaction and options of readiness for realization of intentions [49, 50]. The success of maintaining competitive duels is caused by a wide complex of individual and typological properties of an organism of athletes, and productive performance of the majority of fighting action is accompanied by high rates of motive qualities of martial artists. Therefore for diagnostics of sports abilities it is important to have not only exhaustive information on structure of operations of competitive activity, to know the level of physical fitness of the martial artist, but also to consider specific features of a psychomotor system [5, 6, 7, 10].

Developed by P.K. Anokhin of an architectonic of functional systems it will be compounded with the statement of a series of experts that the psychomotor system of the person is the difficult functional system consisting of sensory, motor and cognitive and ideational

subsystems of management of difficult motive activity [11, 12, 14, 15, 21]. However, in literature there are a little works devoted to studying of psychophysiological determinants of successful training and competitive activity of martial artists. For example, agents of a regulation of a prestarting condition of martial artists depending on force, mobility and steadiness of nervous processes were developed by Rodionov A.V. [42]. The condition of emotional tension and emotional fastness at martial artists with different types of the fixed installation was studied by Khachaturian Yu.A. [55]. In the Turkish B.V. researches, proceeding from individual coefficients of activity and nature of the preparing actions of fencers, it is allocated four types of activity: position and offensive, maneuverable and offensive, maneuverable and defensive, position and defensive [51].

In V.V. Zhitlov's work, it is shown that are defined by individual and typological features of athletes as means of training of martial artists at various stages of an annual cycle, and problems of their sports preparation [16]. For example, "preworking" psychophysiological shifts at martial artists with maneuverable and offensive tactics are insignificant, but first of all those which reflect a condition of the visual analyzer because the manner of conducting fight imposes increased requirements to perception of large volume of visual information worsen. For martial artists of maneuverable and defensive style the main thing – expectation of the situation corresponding to own tactical plan. Their installation on the forthcoming activity is expressed in certain psychophysiological "ekonomization". Athletes martial artists with position and offensive tactics are adjusted in advance on the attacking, mentally intense activity therefore they register noticeable excitement.

Individual styles of adult and young martial artists were compared in Antokhin A.V. work and et. al. [2]. They have allocated four groups corresponding to thinking types in a duel: "receptor", "reflexive", "analytical" and "rational". For each group of thinking there are special symptomokompleks including raznourovnevy (psychophysiological, intellectual and personal) properties of complete identity.

Activity of martial artists in a sports duel at all variety of motive structure represents the complicated models of the simple and difficult motive reactions including the hidden period and a motor component [1, 3, 8, 10, 13, 24, 28, 34, 39]. So, Tolasova D.G. specifies that the character and possibilities of application of technical and tactical actions in a duel are defined by features of the latent period which can differ at different athletes martial artists. The beginning of performance of deliberate actions is based on speed of simple motive reactions, and actions of athletes when means of the attack and counterattack are applied, are similar to actions at difficult reactions to visual signals [50].

According to Bayovay N.A. transition from the attacks to counterattacks in a duel corresponds to differentiation reactions with switching [4]. At the same time the temporary, spatial and existential anticipation of remote and moment characteristics is characteristic of all the actions and actions of the rival. Therefore, the

efficiency of technical and tactical actions of the martial artist, especially correctness of the choice the impromptu of actions in the finishing part of the attack with the choice or switching depends on speed and the accuracy of motive reactions [4].

The efficiency of technical and tactical actions of martial artists in a duel, according to D.A. Tyshler, depends on the level of the corresponding types of motive reactions. And, focusing attention on value of sensomotor reaction in the course of technical and tactical preparation, he specifies that the excellent indicator of a condition of special readiness of athletes is dynamics of time of the hidden period of specific reactions [52].

It is specified in work as N.A. Litvinova that on latent time of motive reaction on sound and light incentives appreciable impact is exerted by a profile of the functional asymmetry of a brain (FAB) and degree of motor asymmetry (in the tepping-test) [29].

CONCLUSION

1. The analysis of literary researches showed that first of all in successful training and competitive activity of athletes martial artists psychophysiological determinants play an important role.
2. Indicators of psychomotor qualities in the form of a complex of simple and difficult sensory reactions can be applied to development of ability accurately and quickly to react to actions of the opponent.
3. Different physical qualities, which depend on lability of a CNS and the whole complex of properties of a nervous system, develop in the different age periods.
4. Typological features of a nervous system exert impact on brake and excitable processes, high-speed and high-speed and power qualities of athletes.

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