Original Article

Features of psycho-functional status in skilled women boxers

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Abstract:

We studied specifics of psycho-functional status in women boxers. It was revealed that psychoemotional state in women boxers features higher anxiety and more significant deviation from autogenic norm. Performance of functional systems of sensomotor reactions in women boxers largely depends on functional status of the central nervous system and psychoemotional state. Sportswomen are more sensitive and emotionally excitable that may result in lesser adaptation to impact of destabilizing factors.

Key words. Psycho-functional status, psychoemotional state, women's boxing, skilled boxers

Introduction

At the present stage women's boxing that was included in the program of Summer Olympics in 2012 has received recognition in the world arena [11]. The pressing issue is the fiercer world competition in this kind of sports between the world-powers. This situation raises a question of effectiveness and result of training and competitive process in women's boxing as influenced by gender factor [1; 2]. Psychologists concur that women's boxing has features of surrogate sports [6]. According to specialists, women boxers have less speed, punching power, endurance, combat intelligence, patience and quiet confidence in self-superiority than men [5; 6]. It is assumed that many high-class sportswomen are born with male somatotype as at birth they have large body mass (macrotype of physical development) and masculine dermatoglyphics [6]. Women's essential ambition to achieve high sport performance requires full-scale scientific substantiation and sets several topical issues for scientists and experts. One of these issues is scientific research on the woman's body as influenced by specialized intensive training and competitive loads in boxing [10]. The second topical issue is development of research and instructional foundations for optimization of training and competitive loads that allow high sport performance without threat to women's health [6]. Account must be taken of specifics of adaptation processes in the woman's body.

Research technique. We examined 20 skilled boxers – participants and winners of national and international competitions at the age of 20-25 during precompetition training for the Russian Championship. All boxers were divided into 2 groups by gender (10 athletes in each group): 1 group – women boxers (weight categories: from 51 to 64 kg); 2 group – men boxers (weight categories: from 52 to 75 kg). The research was conducted in the morning, at relative physiological rest. Before each test athletes received preliminary instruction that was always followed by the tentative testing. We used psychophysiological hardware-software complex "Psikhotest" produced by "OOO "Neyrosoft" (LLC), Ivanovo [3]. Psychoemotional state features were defined by means of eight-colour Lüscher test (adapted by L. Sobchak) [3]. We calculated the numerical index of Lüscher's method - "total deviation from autogenic norm" and anxiety level [8]. Rate of visuomotor reactions was measured under different conditions: simple (simple visuomotor reaction - SVMR) and complex (choice reaction – CR; discrimination reaction – DR and reaction to a moving object – RMO). Accuracy of reactions was calculated using Whipple's index (ratio between wrong reactions and total of presented signals). Basing on ratio of forward and deferred reactions we calculated balance of excitative and inhibitory processes [3]. The present functional status of the central nervous system (CNS) was defined using three criteria offered by T.D. Loskutova: functional level of the system (FLS), stability of reactions (SR) and level of functional capabilities (LFC). FLS is specified by absolute values of SVMR time; SR is interpreted as CNS stability; LFC suggests that the examined is able to form the functional system appropriate for the task and to keep it long enough [3].

For processing of the results we used program Statistica 6.0. Significance of differences between two gender-specified groups of boxers was defined using Mann-Whitney U test and Fisher's ratio test. Correlation analysis was performed using Spearman's rho [4].

Results

Mean group values of FLS, SR and LFC were within average range and did not have gender-related differences (Table 1). Average level of functional status of the CNS in all athletes was optimal for the precompetition training period of the full-year cycle.

Table 1. Functional status of the CNS in skilled boxers

Indices	Groups		z	P
	Women	men		
FLS (SVMR), cu	4.77 ± 0.11	4.73 ± 0.34	0.22	0.82
SR (SVMR), cu	2.1 ± 0.16	2.03 ± 0.15	0.29	0.77
LFC (SVMR), cu	3.74 ± 0.18	3.72 ± 0.17	0.07	0.94

Mean group anxiety level in athletes of two different samples was low. However, in women boxers the value of this parameter was close to medium level (Table 2). We did not reveal statistically significant differences for this parameter ($p > 0.05$), but 30% women boxers had increased anxiety level (statistically significant according to Fisher's ration test; $p < 0.05$) (Fig. 1).

Table 2. Anxiety level, psychoemotional state, balance of excitative and inhibitory processes in skilled boxers

Indices	Groups		Z	P
	women	men		
Anxiety level, cu	2.8 ± 0.74	2.00 ± 0.60	0.82	0.42
Psychoemotional state, cu	15.7 ± 2.25	10.22 ± 2.24	1.34	0.31
Balance, %	-41.4 ± 9.08	-25.95 ± 10.61	1.21	0.24

Fig. 1. Psychoemotional state of skilled boxers

By value of deviation from autogenic norm psychoemotional state was not gender-related. Gender-based differences were detected in analysis of individual distribution by levels. More than third of women boxers had adverse level of deviations from autogenic norm (statistically significant according to Fisher's ration test; $p < 0.05$) that corresponds to other scientists' data [6]. Thus, though mean group results for psychoemotional state indices are not statistically significant, there are some intragroup differences. We may distinguish state of discomfort, concern and lack of confidence that is aroused in women boxers when situations are uncertain and threatening for their activity and health, which is apparently connected with specifics of woman's psychology. Due to more prominent excitement, sportswomen tend to thrill even under the small influence of negative psychogenic (stress) factors in complicated conditions of training and competitions. Apparently, the revealed tendencies are specified by excess risk of injury in boxing. In light of their biological role, women are evolutionally more careful and try to avoid factors that are dangerous for their health and labour [5; 8].

Our assumptions are confirmed by results of research on balance of nervous processes in percentage ratio (Fig. 2).

Fig. 2. Balance of excitement and inhibition in skilled boxers

We revealed significant prevalence of excitative processes in majority of women (60%). Unbalanced men only amount to one third (30%) of all the representatives of this gender. Balance of excitative and inhibitory

processes predetermines refraining from untimely movement in boxing. Excessive excitement of women boxers affects physical and operational skills: hasty and wrong actions, decreased efficiency of physical and operational skills, instable performance during competitions [9]. Acyclic kinds of sports require the maximum accuracy of movements in the definite moment of time. Higher balance of processes in men boxers gives them opportunity to a large extent to use the possible maximum of their functional reserves in important periods of sports competitions with minimal psychophysiological "price" of adaptation.

The system approach in analysis of psycho-functional status in boxers of both genders basing on correlation analysis revealed the differences in effectiveness of cooperation between different levels of hierarchy of the motor activity functional systems. If the functional status of the CNS is optimal the intrasystem sensomotor integration of functional system of visuomotor reactions is presented with larger number of correlations (Fig. 3). Correlation analysis for men boxers demonstrated direct strong correlations between indices of different reactions.

Fig. 3. Diagram of cooperation of components of visuomotor reaction functional system in men boxers

At this training stage, in men boxers we observe many correlations with Whipple's index (WI) specifying the amount of wrong actions. Direct correlation is between simple visuomotor reaction rate and number of mistakes in choice reactions and discrimination reactions. Such intrasystem integration lets boxer effectively and unexpectedly change from attacking actions to defense and vice versa, from maneuvering to attacking and counter-attacking.

Psychoemotional state of men boxers (Fig.4), the values of which were within optimal range as we stated above, in conditions of relative physiological rest almost did not influence the speed and the accuracy of visuomotor reactions.

Fig. 4. Diagram of functional state of visuomotor reactions in men boxers as influenced by psychoemotional state

Significant correlations between balance of nervous processes and rate of reaction to a moving object (RMO) are very important for boxer's competitive activity as almost all attacking and defensive actions depend on speed and effective forecast of projection of opponent's movement ($r=0.80$).

Functional status influences the performance of functional system of visuomotor reactions through relation between stability of reactions and rate of SVMR. Apparently, this fact explains medium value of SVMR described above.

Fig. 5. Diagram of cooperation of components of visuomotor reaction functional system in men boxers

Parameters of psychoemotional state and functional status of the CNS in men boxers during precompetition training period were not correlated. Functional status in skilled men boxers in conditions of relative physiological rest does not influence psychoemotional state of sportsmen that may be indicator of insufficient intersystem integration in the functioning of higher brain regions providing mental functions of the organism [8]. Specifics and directivity of correlations and, consequently, performance of functional systems in women boxers differed. Women have considerably strong correlations between results of reaction accuracy defined by Whipple's index (Fig. 6). Women making a few mistakes in discrimination reactions (mobility of nervous processes) make a few mistakes both in simple reactions and in choice reactions. "Triangle" of direct correlations between reaction rates (excitability of nerve centers and mobility of nervous processes) observed in men boxers under different conditions is absent in women's functional system.

Fig. 6. Diagram of cooperation of components of visuomotor reaction functional system in women boxers

Influence of psychoemotional state on performance of visuomotor reaction functional system in women also differed (Fig. 7).

Fig. 7. Diagram of functional state of visuomotor reactions in women boxers as influenced by psychoemotional state

Accuracy in discrimination reactions is directly correlated with balance of nervous processes in women boxers ($r=0.64$). Sportswomen with better functional mobility of nervous processes during precompetition training period are more well-balanced and should make fewer mistakes at opponent's feints. Psychoemotional state defined by autogenic norm does not significantly influence the processes of realization of sensomotor reactions. Functional status of the CNS influences the performance of visuomotor reaction functional system differently than in men (Fig. 8).

Fig. 8. Diagram of cooperation of components of visuomotor reaction functional system in women boxers

One of the most complicated, but very important abilities to forecast the projection of opponent's punch for timely blocking in women boxers depends on the integrated index of the functional status – LFC.

Though in men boxers we did not reveal significant correlations between functional status of the CNS and psychoemotional state, in women these mutual interactions are rather important and significant (Fig. 9).

Fig. 9. Psychoemotional state of skilled women boxers as influenced by functional status of the CNS

Women boxers with better level of FLS, SR and LFC have more favourable psychoemotional state according to parameters of autogenic norm. Anxiety level specifies stability of reactions of the CNS in sportswomen. Thus, skilled women boxers differ from sportsmen in psychoemotional state that influences their functional status in general. We assume that this dependence will also vary according to phase of ovarian menstrual cycle of sportswomen. Revealed features give opportunity to concentrate on development of programs of psycho-functional correction and purposive mental conditioning of women boxers.

Conclusions

1. Psychoemotional state of women boxers features higher anxiety and more prominent deviation from autogenic norm.
2. Performance of functional systems of sensomotor organizations in women boxers to a larger extent depends on functional status of the CNS and psychoemotional state. Sportswomen are more sensitive and emotionally excitable that leads to high sensitivity to influence of destabilizing factors, disturbance of planned psycho-functional conditioning and, in general, poor stability in results of competitive fights.

3. Features of psycho-functional status in women boxers should be considered at planning and correction of the training process, development of programs of psychological and psycho-functional correction of the sportswomen's state.

References

- Bleyer, A. N. (2001). Professionalnyy vzglyad trenera na tseli, zadachi i problemyi sovremennoy sportivnoy meditsiny *{Professional view of the coach on aims, objectives and problems of the modern sports medicine}*. *Teoriya i praktika fizicheskoy kulturyi*, 12, 28-32.
- Vrublevskiy, E. P. (2008). Problemyi i perspektivyi sovremennogo zhenskogo sporta: monografiya *{Problems and prospects of the modern women's sports: monograph}*. Smolensk: SGAFK.
- Mantova, I. N. (2001). Metodicheskoe rukovodstvo po psihofiziologicheskoy i psihologicheskoy diagnostike *{Methodological guideline on psychophysiological and psychological diagnostics}*. Ivanovo: OOO Neyrosoft.
4. Rebrova, O. Yu. (2002). Statisticheskiy analiz meditsinskikh dannyikh. Primenenie paketa prikladnykh programm STATISTICA *{Statistical analysis of medical data. Using the pack of application programs STATISTICA}*. Moscow: MediaSfera.
- Sokha, T. (2002). Zhenskiy sport: novoe znanie - novyye metodyi trenirovki *{Women's sports: new knowledge - new training techniques}*. Moscow: Teoriya i praktika fizicheskoy kulturyi.
- Sultanova R. A. Gendernaya problema v zhenskom bokse [E-document] *{Gender problem in women's boxing}*. – Available at: <http://bmsi.ru/doc/4a87c843-be43-483a-a273-41ab6db49ab9>.
- Shayakhmetova, E. Sh. (2008). Osobennosti protsessov vospriyatiya vremeni i prostranstva u bokserov razlichnoy sportivnoy kvalifikatsii : *{Specifics of perception of time and space in boxers with different levels of sport skills}*. *Problemnyie voprosyi fiziologii i psihologii: mezhvuzovskaya nauchno-prakticheskaya konferentsiya*. (pp. 152-155). Ufa: BashIFK.
- Ilyin, E. P. (2003). *Differential psychophysiology of the man and woman*. SPb.: Piter.
- Markov, V. A. (2011). *Boxing: Encyclopedia*. Moscow: Person Olympia.
- Shakhov, S. K. (2012). The problem of correcting the gender identity. *Journal of Sports professional athletes strain*, 2, 19-22.
- Tcherkasov, M. (2015). History of female boxing. *Sports the review*, from <http://www.sportobzor.ru/boks/istoriya/zhenskogo-boksa>.