EXPERIENCE EXCHANGE

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PSYCHOEMOTIONAL STATE AND CONDITION OF THE VEGETATIVE NERVOUS SYSTEM OF ADOLESCENTS IN YAKUTSK

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ABSTRACT

The article is devoted to the topical issue in pediatrics – the assessment of adolescents' psychoemotional state and condition of the autonomic nervous system. It is known that vegetative dysfunction and psychoemotional condition are the basis for formation of such widespread socially significant diseases as arterial hypertension, bronchial asthma, pathology of gastrointestinal tract, which require correction of autonomic homeostasis.

Goal of the research is to study psychoemotional state and condition of adolescents' autonomic nervous system. Authors present their work on the study of 300 adolescents at the age of 15, students of secondary schools in Yakutsk. Assessment of social adaptation and autonomic stability nature was carried out on Gavlinova's questionnaire. Neuropsychological methods of Eysenck, Spielbergerand Leonhard were used to determine psychoemotional status. The variability of heart rate was studied by using the Cardio Expert computer of cardiointervalographic system.

Results of the study allowed describing the psychoemotional state and personality traits of adolescents. The teenagers are mostly extrovert or potential extroverts, and they are characterized by a high level of anxiety. Hyperthymic, affective-exalted, emotive and cyclothymic types of accentuations prevail among adolescents.

The majority of adolescents have an average level of social adaptation and vegetative resistance. Low social adaptation and low vegetative stability are most often observed in young men.

Obtained results showed that the imbalance of autonomic nervous system is present in adolescents of both sexes. Sympaticotonia, functional tension and overstrain, an increased response of the cardiovascular system to an orthostatic test, excessive, inadequate and paradoxical vegetative maintenance are characteristics of adolescents. Unsatisfactory adaptation in adolescents is often observed. Adolescents are at risk of developing psychosomatic pathology, and therefore they need regular follow-up and preventive care. The results make it possible to recommend cardiointervalography for all adolescents.

Keywords: adolescent, health, psychoemotional state, autonomic nervous system, cardiointervalography.

At present, there is much concern about the problems of preservation and strengthening the health of adolescents in Russia [10]. There are 11 293 thousand children aged 10-17 years at the beginning of 2017 in Russia. It is 8.1% of total population of the country. Indicators characterizing theincidence of adolescents, especially 15-17 years old, remain disappointing [7, 10]. At this age, the body of adolescents is very sensitive and unstable to high training loads and emotional stress.

Autonomic dysfunction is the basis of many neurotic and psychosomatic disorders among adolescents. The prevalence of this state increases with age, and it reaches 65-72% in the adolescent population [5]. It is well known that vegetative dysfunction is the basis for formation of such widespread socially significant diseases as arterial hypertension, bronchial asthma, pathology of gastrointestinal tract, which require complex rehabilitation. This rehabilitation also optimizes vegetative homeostasis [7].

The psychoemotional state of adolescent takes an important part in assessing the health condition. Psychoemotional factor should be considered as a master factor of human health andas the main component of psychological diseaseprevention. Currently, problem of studying the factors that may contribute to the health of today's adolescents is particularly relevant.

Objective of our research is to study the psychoemotional state and condition of the autonomic nervous system of adolescents at the age of 15.

Study materials and methods. Examination of 300 adolescents at the age of 15, living in Yakutsk, was conducted in the course of the work.We used the adapted personal two-factor questionnaire of M. Gavlinovato assess the adaptation of adolescents. This questionnaireis based on the use of two scales, which are social adaptation and autonomic stability.Neuropsychological methods of Eysenck, Spielberger and Leonhard were used to determine the psychoemotional state and personality traits.The variability of heart rate was studied by using the Cardio Expert computer of cardiointervalographic system.

Results and discussion. Assessment of the adolescents'psychoemotional health is one of the most important characteristics of health condition. The study of personality traits allowed to determine the severity of factors extroversion /introversion and neuroticism / emotional stability in adolescents. According to the test of Eysenck,extroversion-introversion is 14.25 ± 0.7 (max - 24 points), neuroticism-emotional stability is 10.42 ± 0.69 (max - 24 points).

Introverts and potential introverts are only 10%, ambiverts are 18% among adolescents.Extroverts and potential extroverts account for 72% among adolescents.

Thus, today's young people are mainly extroverts. They are characterized by attitude toward the world around them, by impulsiveness, initiative, sociability, behavioral flection, aspiration for contacts and new impressions. The adolescents are also characterized by uninhibited forms of behavior, high motor and speech activity [9].

Anxiety factor is among the important psychological components of personality. The study of anxiety in adolescents was carried out by using the questionnaire of C.D. Spielberger.It showed that adolescents with a high and medium-high level of anxiety are 49.0%.The average level of anxiety indicators among girls is 14,78 ± 1,3 and young men is 18,92 ± 1,5.

The peculiarities of character accentuations were studied with the help of the Leonhard'smethod during psychological research.Analysis of

Table 1

Indicators of adolescents' cardiointervalometry

	Girls	Boys
Variationalrange (X, sec)	0,25±0,01	0,21±0,01
Averageinterval (M, sec)	0,79±0,01	0,74±0,01
Mode (sec)	0,78±0,01	0,74±0,01
Mode amplitude (%)	43,64±1,38	48,23±1,36
Stress index (c.u.)	161,77±17,9	166,29±21,2
Heart Rate, sec	77,7±0,99	82,34±0,85
SDNN, sec	0,052±0,002	0,044±0,001
RMSSD, sec	0,050±0,003	0,038±0,001

Table 2

Indicators of spectral analysis

	Girls	Boys
HF	1070,62±157,03	718,20±124,85
LF	2842,06±514,10	3045,29±326,90
VLF	2874,80±446,80	3683,10±461,31
LF/HF	2,38±0,16	3,26±0,35
LF,%	62,67±1,35	68,20±1,13
HF,%	35,32±1,35	30,77±1,43
TF	4459,4±407,0	5037,2±1225,7

the results showed that adolescents predominate in the hypertensive - 0,69 ± 0,1, affectively-exalted - 0,65 ± 0,09, emotive - 0,63 ± 0,1 and cyclotimous types - 0,62 ± 0, 09.

Adolescents are characterized by manifestation of exaltation, impressionability, strong attachment to friends and companies. They easily can be fascinated by joyful events andfall unto despair by sad things.It creates the ground for social maladjustment,the risk of alcoholization and narcotization of a teenager [8].

The study of the autonomic nervous system's functional stateis important for determining the level of adolescents' health from position of organism's adaptive capabilities.

Results of the survey on determination of social adaptation and autonomic resistance showed that 77.8% of girls and 67.1% of boys had an average level of social adaptation. A high level of social adaptability is observed in 7.8% of girls and in 8.7% of young men. Low social adaptation is most often observed in young men - 24, 2% and in girls - 14.7%.

The results'analysis of the vegetative stability's determination showed that the average level of vegetative resistance is in 60.8% of girls and 53.0% of young men. 25.5% of girls and 25.6% of young men have a high level of vegetative resistance. Low vegetative stability is most often observed among young men - 21.4%, among girls - 13.7%.

The autonomic nervous system ensures maintenance of homeostasis and normal regulation of the activity of all organs and body systems [1]. In this case, the cardiovascular system is one of the most responsive to changes in the body's balance with the environment [6]. It is cardiovascular system is considered as a universal indicator of all pathological processes, reflecting the state of regulatory mechanisms and adaptive capabilities of the organism [1, 2]. The main indicators of cardiointervalometry were analyzed in the course of the study: variation range intervals (X, sec), average interval (M, sec), mode (MO, sec), mode amplitude (AMO, %), index of regulatory systems tension (IT, conditional unit).

Determination of the initial vegetative tone in adolescents of different sex's revealed differences. Vagotonia is most common among girls - 27.2%, among boys - 16.3%. Accordingly, eutonia is registered equally often among girls and boys, 27.2% and 27.5%. Sympathicotonia most frequently registered among boys - 56.3%, girls - 45.2%. Table 1 presents the main parameters of cardiointervalometry obtained in the examination of adolescents.

Index of the variational range in adolescents (> 0.30) corresponds to normotonia. The mode amplitude (31-49 in the normal condition) and stress index (51-199 in the normal condition) do not exceed the limits of normotonia. However, their increase was observed among boys in comparison with girls. It reflectsthe increase in sympathetic regulation, strain of the system functioning and confirms the predominance of sympathicotonia in young men. Relatively high MO in representatives of both sexes showed a high level of humoral factors'influence. Such mechanisms of heart regulation are imperfect, and it represents a danger of overstress and disruption of adaptation [3, 11].

The maximum value of SDNN (standard deviation) is -0.048, the value of RMSSD is 0.045. Thus, we can talk about reducing parasympathetic activity of adolescents.

Parameters of spectral analysis of heart rate variability in adolescents were also examined. Results are shown in Table 2.

Analysis of the results showed that the value of high-frequency spectrum (HF 0.15-, 4 Hz), reflecting respiratory arrhythmia and vagal control of the heart rhythm, is higher among girls - 1070.62 ± 157.03 than among boys - 718.20 ± 124, 85.Calculated component oflow-frequency oscillations index (LF 0.04-0.15 Hz), which has mixed origin and associated with both vagal and sympathetic cardiac rhythm control, is higher among young men - 3045.29.

The value of VLF (power of ultra-low frequency heart rate fluctuations <0.04 Hz), reflecting the activity of the suprasegmental level of the VNS, is higher amongboys - 3683.10.

Thus, according to cardiorhythmography, adolescents have high level of cardiac rhythm control's centralization, relatively high level of activity in the sympathetic department of the autonomic nervous system and low rates of parasympathetic activity in the autonomic nervous system.

Activity index of regulatory systems (PARS = AMO / Mo) allows to estimate the degree of functional tension and overstrain in adolescents. We found that functional tension is observed in 29.4% of adolescents, they are characterized by a lack of protective and adaptive mechanisms, an inability to respond adequately to environmental factors [3, 4].

Functional reserves of adolescents' body were determined taking into account the dynamics of heart rate variability parameters during the exercise test (an active orthostatic test).

Adequate response of the cardiovascular system to orthostatic test is determined in 63.4% of adolescents, increased and significantly increased response is determined in 25.6%.

According to the consistency of changes in the static parameters MxDMn and AMo, diagnostic algorithm of our program evaluates the vegetative support.Sufficient vegetative maintenance is found only in 37.4% of adolescents, excessive and extremely excessive provision is found in 38.1%, insufficient provision in 9.9%, paradoxical provision in 14.6%.

According to results of the Cardio Expert computer of cardiointervalographic system, satisfactory adaptation is observed in 43.6% of adolescents, the tension of adaptation mechanisms is 40.9%, unsatisfactory adaptation is 15.5%.

Conclusion. Results of the study allowed characterizing the psychoemotional state and personality traits of adolescents. It was revealed that adolescents are mostly extrovert or potential extroverts. A high level of anxiety is typical for them. Hypertensive, affective-exalted, emotive and cyclotimous types of accentuations prevail among adolescents.

Evaluation of social adaptation's nature and autonomic stability showed that most adolescents have an average level of social adaptation and autonomic resistance.Low social adaptation and low automatic stability are most often observed in young men.

According to cardiorhythmography, adolescents have a high level of cardiac rhythm control'scentralization, relatively high level of activity in the sympathetic department of the autonomic nervous system and low rates of parasympathetic activity in the autonomic nervous system.

Sympathicotonia occurs much more frequently among boys than among girls. Apparently, the young men experiencea change in social circumstances more emotionally and continuously.

Thus, the obtained data showed that imbalance of the autonomic nervous system is present in adolescents of both sexes.Adolescents are at risk of developing psychosomatic pathology in the future and therefore they need regular follow-up and preventive measures. Sympaticotonia, functional tension and overstrain, increased cardiovascular system response to an orthostatic test, excessive, insufficientand paradoxical autonomic maintenance are characteristic of adolescents.The obtainedresults make it possible to recommend cardiorhythmography for all adolescents.

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