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**CHANGE OF VEGETATIVE INDICATORS DUE TO THE INFLUENCE
OF EMOTIONAL TENSION OF THE EXAMINATION PROCESS
IN 21-YEAR-OLD STUDENTS WITH CHOLERIC TYPE**

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**ИЗМЕНЕНИЕ ВЕГЕТАТИВНЫХ ПОКАЗАТЕЛЕЙ ПОД ВЛИЯНИЕМ
ЭМОЦИОНАЛЬНОГО НАПРЯЖЕНИЯ ПРОЦЕССА ОБСЛЕДОВАНИЯ
У 21-ЛЕТНИХ СТУДЕНТОВ С ХОЛЕРИЧЕСКИМ ТИПОМ**

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Abstract. One of the factors causing stress in society is exam stress. Taking exams is stressful and quite exciting in itself. However, under the influence of excitement, the student cannot show his little knowledge. From this point of view, the study of psychological and physiological development of students is also of special importance. The study is dedicated to the change of vegetative indicators due to the influence of the exam process depending on the temperament of the nervous system in students of the 5th year of choleric type. In this regard, the main goal of the study was to reveal the age characteristics of changes in vegetative indicators depending on the type of temperament as a result of the effect of emotional stress during the examination. In order to study the effect of the exam process on emotional stress, students were divided into three groups: The first group was students studying on regular school days 2 months before the exam, the second group was 30 minutes before the exam process, and the third group was the group after the exam and 30 minutes after the exam process. First of all, the physiological indicators of different states of excitement of the temperament type and the process of excitement were studied in the experiment. In order to comprehensively evaluate the effect of emotional stress, we measured the main hemodynamic parameters, arterial pressure and number of heart beats per minute. It was determined that, depending on the type of temperament, vegetative indicators before the exam process (heart pressure, systolic and diastolic pressure) of young people on an ordinary day, before and after the exam, are different. However, after the exam, these indicators do not fully return to the norm. The tone of the sympathetic nervous system prevails during the examination process in all age groups.

Аннотация. Одним из факторов, вызывающих стресс в обществе, является экзаменационный стресс. Сдача экзаменов — это стресс и довольно волнительна сама по себе. Однако под влиянием волнения студент не может проявить свои небольшие знания. С этой точки зрения изучение психологического и физиологического развития студентов также имеет особое значение. Исследование посвящено изменению вегетативных показателей под влиянием экзаменационного процесса в зависимости от темперамента нервной системы у

студентов 5 курса холерического типа. В связи с этим основной целью исследования было выявление возрастных особенностей изменения вегетативных показателей в зависимости от типа темперамента в результате воздействия эмоционального напряжения во время обследования. Для изучения влияния экзаменационного процесса на эмоциональное напряжение учащиеся были разделены на три группы: в первую группу вошли студенты, обучающиеся в обычные учебные дни за 2 месяца до экзамена, вторая группа — за 30 минут до экзамена. Третьей группой была группа после экзамена и через 30 минут после экзаменационного процесса. Прежде всего в эксперименте изучались физиологические показатели различных состояний возбуждения по типу темперамента и процесс возбуждения. Для комплексной оценки влияния эмоционального стресса мы измеряли основные показатели гемодинамики, артериальное давление и количество ударов сердца в минуту. Определено, что в зависимости от типа темперамента вегетативные показатели перед экзаменационным процессом (сердечное давление, систолическое и диастолическое давление) у молодых людей в обычный день, до и после экзамена различны. Однако после экзамена эти показатели полностью не возвращаются к норме. В процессе обследования во всех возрастных группах преобладает тонус симпатической нервной системы.

Keywords: vegetative indicator, choleric temperament type, higher nervous activity, examination process.

Ключевые слова: вегетативный показатель, холерический тип темперамента, высшая нервная деятельность, процесс обследования.

According to the data of many authors, prominent disturbances in the autonomic regulation of the cardiovascular system occur in students before the exam session, which are manifested in an increase in heart rate and arterial frequency, muscle and psychological emotional tension, and depressive states. Psychological studies revealed that 56.1% of students have resistance to stress, and 32.4% of students have a low level of emotional stress [2].

Exam stress and resistance to stress depend on students' personal characteristics. During the exam session, compared to the semester period, there are changes in the psychophysiological indicators of students, which is manifested by an increase in the level of anxiety, a violation of vegetative balance, which leads to a decrease in the body's ability to adapt [6, 7].

The emotional stress of the examination process conducted in the educational system can seriously damage the health of students [14].

Thus, the physiological age, adaptability and severity of the examination process can cause psychophysiological changes in these students. Analyzing the opinions of scientists who study anxiety, we can conclude that any change in human life can cause anxiety, and the high level of adaptation processes and temperament type play an important role in preventing this. In the case of neurotic excitement, a person cannot assess the real danger. Despite numerous studies, the mechanisms of neurotic arousal have not yet been fully explored [15-17]. In this regard, in the conducted research, we tried to explain the role of temperament during stress effects by studying psychophysiological testing methods and vegetative indicators of 21-year-old students under the influence of exam stress, which is a model of emotional stress.

Material and Methods

21-year-old practically healthy choleric male students studying at Ganja State University were

involved in the study on a voluntary basis. Experiments on those students were conducted taking into account the proposal of the Bioethical Committee of the European Convention (Strasbourg, March 18, 1986). Also, after receiving the scientific and ethical opinion of the Ethics Committee of Ganja State University (23.10.2017), the research was started. The students involved in the experiments were divided into three groups: the students included in the first group were studied on regular school days 2 months before the exam, the students included in the second group were studied 30 min before the exam process, and the students included in the third group were studied 30 min after the exam process. The difference between them is shown in numbers and before starting the experiment, temperament types of the nervous system of students G. Aizenk test. Vegetative indicators were determined in the study. All numerical indicators obtained during the research were statistically analyzed taking into account modern recommendations. All calculations were made in MS EXCEL-2016 spreadsheet and SPSS-22 package program, the results are summarized in pictures.

Data collection

In a 21-year-old student with a melancholic type of nervous system studying at Ganja State University, 2 months before the exam, 30 minutes before the exam and 30 minutes after the exam, vegetative indicators of various anxiety states were studied. The practical health of the participants and their voluntary participation in the research are important conditions

Results and Discussion

21-year-old students with choleric type had a Kerdo Vegetative Index (KVI) of 12, calculated based on the noted hemodynamic indicators. Before the exam, the systolic arterial pressure (SAP) increased to 0.8 mm Hg rising to 117.5 ± 2.5 mm Hg, diastolic arterial pressure (DAP) 2 mm Hg rising, it was equal to 79.2 ± 2.7 mm Hg. The number of heartbeats in 1 minute decreased significantly and reached 85.2 ± 2.7 heartbeats. Based on these indicators of excitement we obtained in Choleric type students, the calculated KVI was equal to 7. During the analysis of the results of the obtained studies (OD), the emergence of hemodynamic changes under the influence of exam stress shows that compared to the usual day, the SAP increased by 0.6%, and the DAP increased by 2.1%. At the same time, number of heartbeats decreased by 3.3%. CVD calculated based on AI shows superiority of AG and pre-examination (PE) systolic blood pressure (SAP). 6.5 mm Hg compared to SAP during the examination of IS decreasing, 112.0 ± 3.6 ($p < 0.05$) mm Hg, 7.1 mm Hg in DAP decreasing, 72.1 ± 2.6 ($p < 0.05$) mm Hg was equal. In 1 minute, the number of heartbeats decreased relatively and was 84.3 ± 2.6 , corresponding to the emphasis, but it was lower than the level of OD (Table 1). Based on the recorded alarm indicators, KVI was 15. We compared hemodynamic indicators in 21- and 17-year-old students with cholera type. Due to the effect of exam stress, 17- and 21-year-old students with choleric type compared to SAP did not change with OD.

These indicators of DAP decrease by 4.6% compared to OD, PE by 14.0%; after the exam (AE), it decreases by 5.0%. Compared to the number of heart beats in 1 minute of 17- and 21-year-old choleric students under the influence of exam stress, OD is 3.0%: PE is 8.0% less, and AE is 5.0% less (Table).

Compared to the indicators of 21- and 17-year-old students, the KVI calculated based on the hemodynamic indicators of both groups of choleric students decreases by 70.6%, IE by 43.8%, and IS slightly increases, this increase is 8.7% (Figure). Compared to the indicators of 17-year-old students, 21-year-old students with choleric type have a sharp decrease in SAP and SAP, but an increase in SAP after the exam (AE) is observed.

Table

COMPARISON OF HEART RATE AND BLOOD PRESSURE DYNAMICS
 IN 21-YEAR-OLD CHOLERIC STUDENTS (M±m)

Stage	21years, choleric (n=13)	M±m	Min	Max	17 years	P _f	P _{OD}	P _{PE}
OD	SAP mm Hg	116.7±3.5	95	140	0.410	0.728		
	DAP mm Hg	77.6±4.2	60	110	0.879	0.566		
	heart accents 1 minute	88.1±4.2	68	119	0.483	0.633		
PE	SAP mm Hg	117.5±2.5	100	130	0.648	0.178	0.675	
	DAP mm Hg	79.2±2.7	60	98	0.522	0.387	0.592	
	heart accents 1 minute	85.2±2.7	75	109	0.376	0.775	0.861	
AE	SAP mm Hg	112.0±3.6	90	130	0.563	0.375	0.133	0.132
	DAP mm Hg.	72.1±2.6	60	91	0.563	0.336	0.133	0.023*
	heart accents 1 minute	84.3±2.6	75	105	0.832	0.443	0.366	0.783

Note: Statistical integrity of the difference between indicators P_{OD} — with indicators of a typical day in the corresponding group (according to the paired — Wilcoxon criterion) P_{PE} — with AE indicators in the corresponding group (according to the pair — Wilcoxon criterion)

Therefore, the KVI of 21-year-old choleric type students proves that SAP is superior in all groups. This shows the superiority of the somatic nervous system during the whole examination process cycle of KVI (Figure).

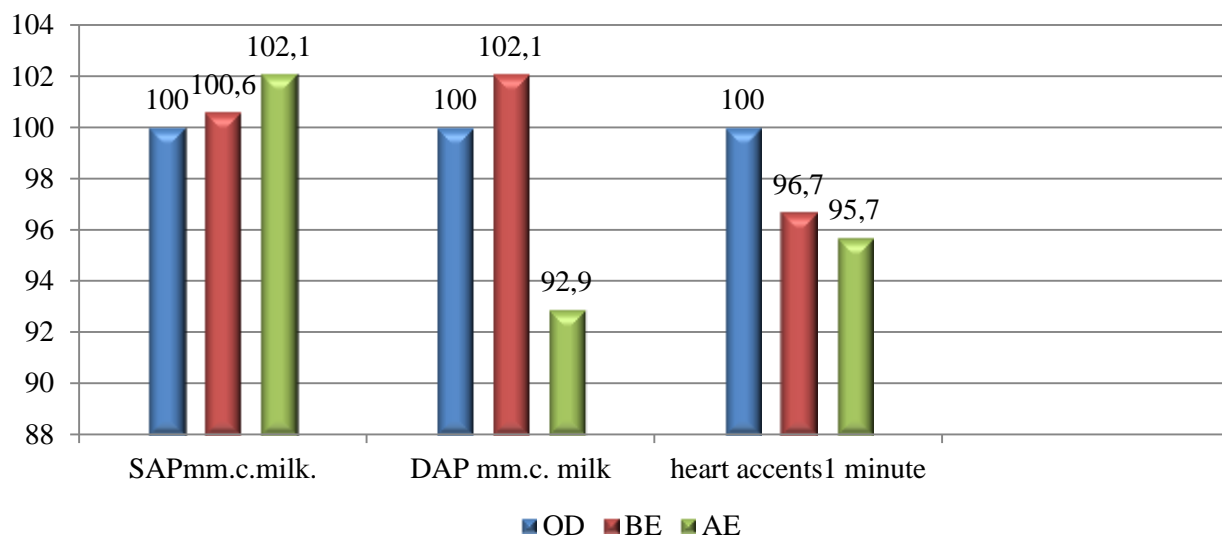


Figure. Comparison of the dynamics of heart rate and blood pressure in 21-year-old students with choleric type (%)

From the results we obtained, it is known that during the examination process, the situational and personal alarm indicators of higher nervous activity in choleric students increased, and the tone of the sympathetic branch of the autonomic nervous system increased sharply. Thus, as a result of this or other effects in choleric students, the increase in the agitation process indicates the exacerbation of KVI in all groups. The obtained results can be used in the optimization of teaching activities, correction of exam stress and protection of students' health. In our previous studies, after the test, it was emphasized that the increase in the levels of situational and personal excitement in students of different ages leads to activations in the amplitude and frequency of EEG rhythms in different departments of the brain [13].

Discussion

The emotional stress of the examination process in the educational system can seriously damage the health of students. So, depending on the type of higher nervous activity in these students, physiological age, adaptability and severity of the examination process can cause psychophysiological changes [1].

Therefore, in order to comprehensively assess the impact of emotional stress on students of different ages and courses, we determined the main hemodynamic indicators of arterial pressure and the number of heart beats in 1 minute. In those students, there are certain differences between temperaments and age periods in the number of BE and AE cardiac contractions, systolic and diastolic arterial pressure, that is, sharp increases and decreases between these indicators are obtained. The dynamics of changes in hemodynamic indicators during the examination period characterizes the tense state of the regulatory mechanisms of the blood-vascular system [8, 10, 11].

Based on the vegetative indicators and the Kerdo index, the advantage of the Somatic nervous system was observed in students, which is the result of how important the exam is for young people, the responsible approach to the exam and the activity of adaptation processes [5].

KVI AE of students proves that this advantage is sympathicotonia. This shows the superiority of the somatic nervous system during the whole IS period. The results of the conducted research show that there are differences in VSS activity in students of different ages. The analysis of the results of the hemodynamic changes that we obtained from the effect of exam stress by groups also shows that KVI is in a state of dominance of sympathetic tone on a normal day and before the exam. The characteristics of the vegetative nervous system have a direct impact on human adaptation [9, 12]. The higher nervous activity of temperament types, the increase in the level of the excitement process caused by these or other effects, indicates the exacerbation of BKI in all groups. An increase in the level of excitement correlates with an increase in the activity indicators of the sympathetic branch of the autonomic nervous system [2]. Therefore, in the teaching process, approaches are recommended according to the nature of the nervous system types of students of different courses. With this, one can prevent these or other neurotic changes that may occur in them. In the studies conducted on students studying in different courses, it was found that under the influence of neuro-emotional stress, psychophysiological changes are higher in students studying in the lower course compared to those studying in the upper course, and this is explained by the relatively poor adaptation of students to the teaching process [4].

Conclusion

Due to the influence of emotional excitement factors arising during the exam process, the heart rate, systolic and diastolic blood pressure levels of 21-year-old choleric-temperament students before and after the exam showed different indicators, depending on the types of nervous system, personal and situational excitement level, and the formation of the ability to adapt to the exam process. The result of the vegetative credo index is sympathicotonia, which indicates that the sympathetic nervous system predominates throughout the examination period.

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