Effect of Exam Stress of 1-4 Year Student on the Human Body

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Abstract

The research was performed by the authors to study the effect of exam stress on the respiratory system of 1-4 year students. The experiment was carried out in the longitudinal regime for two years with the participation of the same students. Healthy students participated in the experiment voluntarily. We surveyed 89 1-4 year students, of which were 30 boys and 59 were young females aged 18-22 years. The survey was conducted during the intersessional period and on the day of the exam. To study the functional state of external respiration in the examined students, a pneumotachometric type spirometer with a SPIRO-SPECTR calibration syringe was used. The measurements were carried out from 9 to noon since during this period of the day the studied parameters are the most stable. The experiment took into account gender characteristics. Two age groups were formed: 18-19 years old (1-2 years of education) and 20-22 years old (3-4 years of education). Analysis of the research results showed that in the time course of learning from 1 to 4 years, students' adaptive capacity of the respiratory system increases, resulting in increased efficiency and effectiveness of regulatory mechanisms.

Keywords: *Longitudinal studies, Psycho-emotional stress, Examination stress, Functionality, Respiratory system.*

Introduction

It is known that the period of high school education is a stressful stage in the life of students. The educational process is characterized by an uneven distribution of loads and their increase during the examination session and this is a test for all students. Students faced with new methods and conditions of study at the university, which are significantly different from the school conditions, and where there is more time spent for self-study at home than in class, do not always cope with such a load.

High mental stress, low physical activity and health culture, perception and processing of a variety of information under time pressure, the mismatch of labour intensity and good rest, especially during sessions, extensive use of computer technology in the teaching process are risk factors for the students. On the one hand, they should immediately join in hard work requiring the use of all their forces, knowledge, and abilities; on the other - overcoming the novelty of educational work in itself requires to strain every nerve.

Difficulties for students in overcoming the new system of training, problems with adaptation are often accompanied by nervous tension and excessive irritability. The stress experienced by students can affect the quality of learning, the acquisition and analysis of knowledge, interfering with academic performance. In turn, difficulties with academic performance also create discomfort, as a result of which the general stress increases, which leads to an increase in the incidence rate in this age group.

One of the emotionally significant situations of appraisal activity, causing pronounced vegetative changes in the situation of passing an exam .The condition of students during the exam period can certainly be considered as stress. Exam stresses take one of the first places among the causes of mental stress of higher school students. The problem of changing the functional state of various body systems during psychoemotional stress is given much attention. Vegetative manifestations during psychoemotional

tension are wide and diverse, but changes in the indices of external respiration are of particular interest. Upon that, various models of stress effects are considered, which are divided into short-term and long-term. The examination situation taken as a stressor model is, according to Levi's classification, a short-term stressor, but the changes in the emotional and physiological state of the body caused by it could be quite significant.

An exam is a condition of the body that is often used to study the reactions of various physiological systems to stress. Breath is considered a sensitive indicator of the psycho-emotional stress state. The literature presents data on changes in the indices of the external respiration system under the action of chronic stress factors, and real-life stressors [1]. In this regard, it is advisable to study the time course of changes in the external respiration indices of students during the examination psycho-emotional stress.

The problem of psycho-emotional stress is particularly relevant for people engaged in mental and intellectual work: teachers, researchers, students in schools and universities. The characteristics of modern living conditions, the rapid pace of technological expansion, the modernization of educational and labour processes, the growth of information and the intellectualization of labour impose increased demands on the body of young students.

However, the body is not always able to adequately respond to strong and prolonged stressful situations, as well as insufficient motor activity, which undoubtedly leads to functional disorders and diseases [2]. An important indicator that reflects the emotional state of the human body is anxiety. This is because anxiety arises in situations related to assessment activities and in subjectively significant situations, such as an exam [3]. On this basis, the taking into account the links between anxiety and the functional state of the external respiration system is extremely important for assessing the adaptive capacity of organism and predicting its response to the social pressure of various origins. However, there is a small amount of information in the literature on the impact of anxiety on the indices of external respiration systems. In modern physiology, there is a large amount of literary data indicating the relationship between the emotional sphere, the individual properties of the psyche and the functional state of the body [4]. One of the emotionally significant situations causing pronounced shifts in vegetative systems is the situation of passing the exam. The condition of students during the exam period can certainly be considered as stress.

The literature presents data on changes in the indices of the external respiration system under the action of chronic stress factors [5], real-life stressors, emotional stress [6], post-traumatic stress [7], mental stress [8], and with the introduction of stress hormones. However, the question of the functioning of the respiratory system under exam stress conditions is not well understood. The purpose of the work is to study the effect of exam stress on the respiratory system of 1-4 year students.

Materials and Methods

The experiment was carried out in the longitudinal regime for two years with the participation of the same students. Healthy students participated in the experiment voluntarily. The main contingent of the survey consisted of 89 1-4 year students of education, of which were 30 young males and 59 young females aged 18-22 years. The survey was conducted during the intersessional period and on the days of the exam.

To study the functional state of external respiration in the examined students, a pneumotachometric type spirometer with a SPIRO-SPECTR syringe was used. The measurements were carried out from 9 to noon since during this period of the day the studied parameters are the most stable. When conducting the study, the following tests were used: "Quiet breathing /VLC" (vital lung capacity), "Forced expiration", "Maximum breathing capacity".

The experiment took into account gender characteristics. Two age groups were formed from 18-19 years (1-2 years of education) and 20-22 years (3-4 years of education) young males and females. The results of the study were processed by the method of variation statistics with the calculation of the arithmetic mean (M), arithmetic means error

(t), the Student's reliability test (X) and the level of probability (P).

Results and Discussion

It is known that the period of high school education is a stressful stage in the life of students. High mental loads, low physical activity and poor culture of health, perception and processing of various information in conditions of time shortage, inadequately full value of rest with regard to work intensity and, especially during periods of sessions, intensive use of computer equipment in the educational process are risk factors that trigger the onset of a psycho-emotional stress (PES). An exam situation refers to short-term stressors, but changes in the emotional and physiological state of the body caused by them are quite significant. An exam is a state of the organism that is often used to study the reactions of various physiological systems to stress.

Exam stress is a fairly convenient and repeatedly reproducible model of emotional stress that occurs with the active participation of the autonomic nervous system, which action is mediated and modified by the type of higher nervous activity, self-esteem level and personal factors. Therefore, the study of the mechanisms for the development and course of examination stress is the tool by which the mechanisms of the human physiological aspect can be uncovered, and an understanding of these mechanisms will make it possible to develop more effective methods for correcting the adverse functional states of a person. According to the research results, it can be noted that the majority of students at the exam were in a rather active state, were ready for the work ahead and had an optimistic attitude. The negative impact of exam stress is primarily reflected in overall well-being and mood. During the examination session, there are significant differences in the level of functioning of the breathing system among students. During the research, it was noted that during an examination session the vital lung capacity (VLC) value decreases at 1-2 year students - young females and males, while increases at 3-4 year students. The decrease in this indicator indicates a limitation of the functional capabilities of the respiratory system and a limitation of the bio energy potential of the organism. With exam stress, respiratory volume increases, and the increase occurs mainly due to a decrease in inspiratory reserve volume (RVi), which can be observed by us at students of all years of education.

Reduced respiratory volume is an indicator of the economization of the respiratory system functions. In our case, the opposite pattern is observed. Consequently, we cannot speak about the economization of the respiratory system functions in the examined group. When analyzing the behaviour of maximum breathing capacity (MBC), it can be seen that 1-2 year students are most exposed to exam stress, and 3-4 year students have an increase in the body's reserve capacity.


Vital lung capacity (VLC) at students
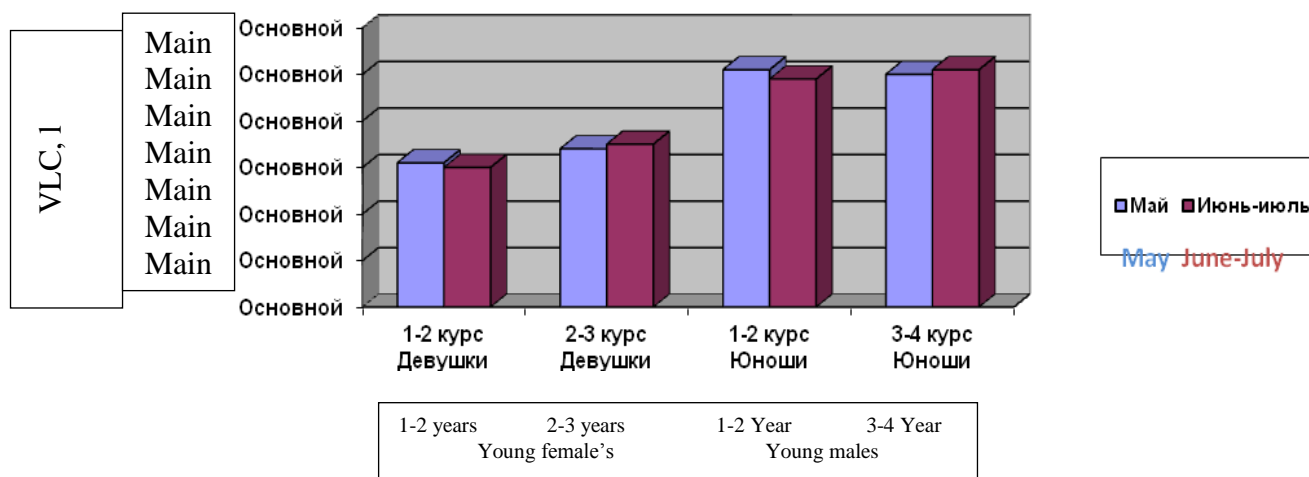
The inspiratory reserve volume determines the capacity of the lungs for additional expansion, the need for which is present with an increase in the body's need for gas exchange. RVi is in direct dependence on changes in respiratory volume (RV). With
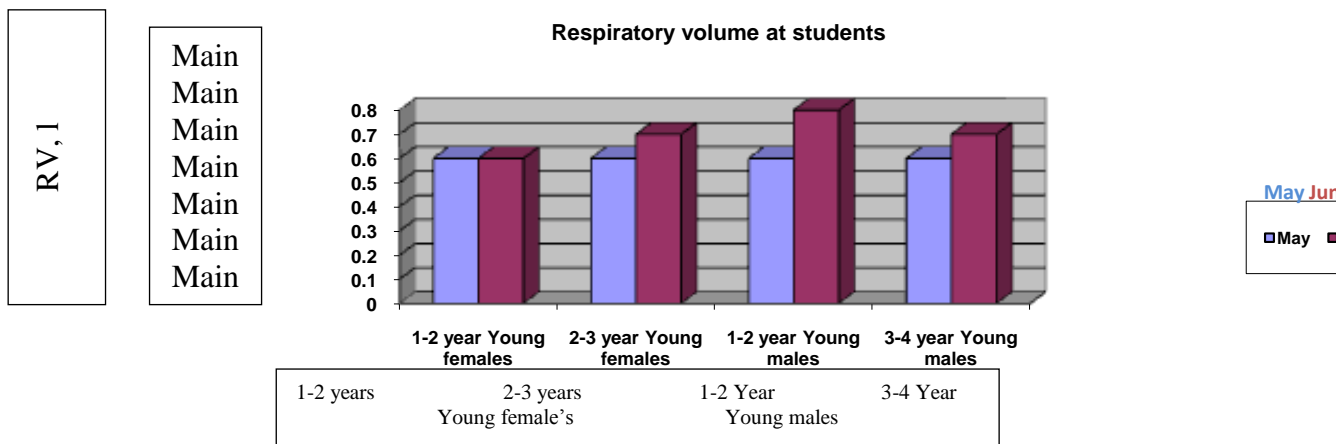
exam stress, the RV increases, and the increase occurs mainly due to a decrease in the RVi, which we can observe in students of all courses. Reduced respiratory volume is an indicator of the economization of the respiratory system functions. In our case, the opposite is true.

**Inspiratory reserve volume (RVi) at students**
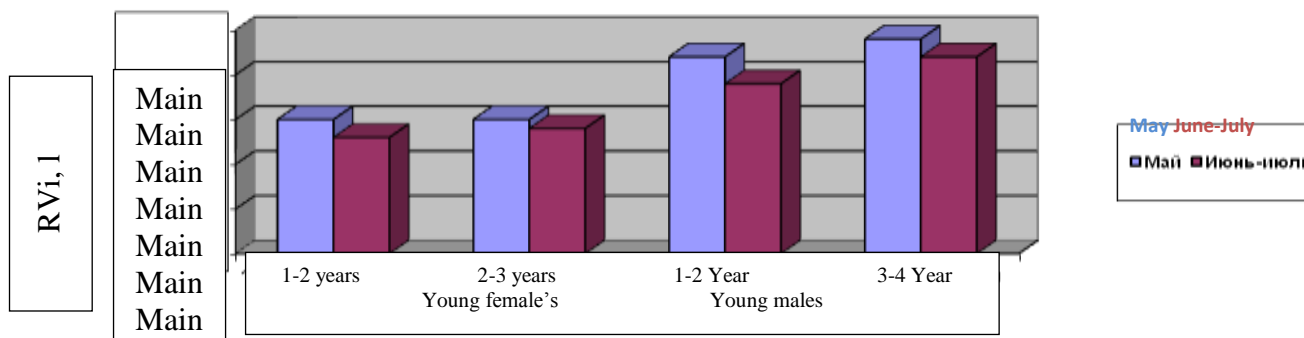
Respiratory volume at students

Maximum breathing capacity is used to characterize the pulmonary reserve. MBC after small loads usually does not change or slightly decreases, but during severe stress, a decrease in MBC can reach 5-10 liters.

When analyzing the dynamics of the MBC, it is clear that 1-2 year students are most exposed to exam stress, and 3-4 courses of students increase the reserve capacity of the organism.

Maximum breathing capacity (MBC) at students
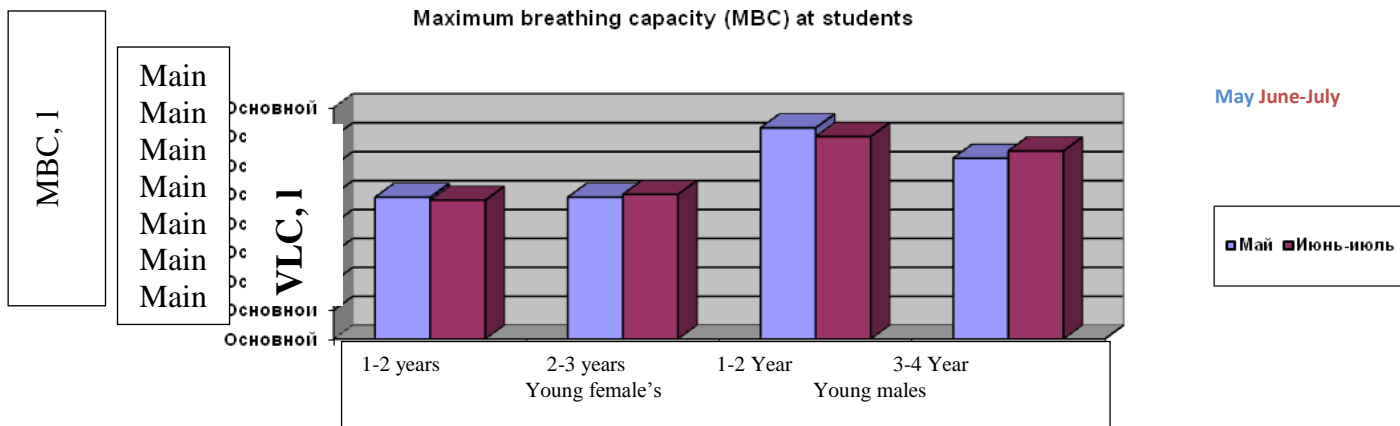
All students during exam stress experience increase in FEV $_1$. The magnitude of respiratory parameters is affected by the degree of fatigue and the state of excitability of the nervous system. 1-4 year students are exposed to exam stress, but mostly 1-2 year students are those who feel exam stress. This allows us to regard this group of students as poorly adapted to the educational process. It is shown that during the examination session

there are significant differences in the level of respiratory functioning in students. The reliability of differences in indications of VLC and RVi for students of all years was revealed. Reliability of differences in respiratory volume (RV) was detected only among 1-2 year students, MBC - only among 3-4 year students - young males, forced breath volume (FEV 1) - among 1-2 year students - young males, and 3-4 year students-young females.

The magnitude of respiratory parameters is influenced by the degree of fatigue and the state of excitability of the nervous system. 1-2-year students are more exposed to exam stress. This allows us to regard this group of students as poorly adapted to the educational process. Thus, in the time course of learning from the 1st to the 4th year, adaptive capabilities of students' respiratory system are enhanced, as a result of which the efficiency and effectiveness of regulatory mechanisms are increased.

Conclusions

1. Longitudinal studies have shown that the functional capabilities of the respiratory system in students from the 1st to the 4th year are being enhanced. At students of 3-4 courses, there is an increase in reserve capacity (of their bodies, resulting in increased efficiency and effectiveness of regulatory mechanisms. In the age-gender groups of 1-2 year students, there was a decrease in adaptive capacity and an increase in fatigue. 1-2-year students are more exposed to exam stress, which leads to maladaptation and failure to adapt [9, 27].

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