Central nervous system state of students in the process for educational activity

Hasanain Riyadh Abdulkadhim and Bashar Sabah Sahib

1. College of Nursing / University of Al-Qadisiyah

*Corresponding author: hasanin.riyadh@qu.edu.iq (Abdulkadhim)

ABSTRACT

The article presents the results of a study of the basic properties of the nervous processes of students of 1-5 courses in Iraq. It is established that under the influence of significant educational and emotional factors, the functional mobility of nervous processes decreases, the adaptive situation worsens, and the state of health progressively worsens. The level of personal and situational anxiety of students in the conditions of various forms of knowledge control is studied. It is shown that the module is a more gentle form in comparison with the exam and test.

Key words: functional state, functional mobility of nervous processes, adaptation, simple visual-motor reaction, tapping test, personal and situational anxiety, various forms of knowledge control, exam stress

INTRODUCTION

The effectiveness of students' adaptation to the learning process in higher education depends on many factors [1] These include the properties of the nervous system (the strength of the nervous processes, the level of functional mobility of the nervous processes [2]. These parameters are among the leading ones that determine the effectiveness of any activity, especially cognitive [3].

In characterizing the properties of nervous processes, functional mobility is important, reflecting the dynamics of cortical processes, the speed of information processing, and the effectiveness of integrative brain activity. The functional mobility of nervous processes characterizes the level of work performance for a particular individual, which provides, along with positive reactions, an emergency switching of actions, a quick alternate change of excitatory and inhibitory processes. This property does not contradict the concept of labiality, although it differs from it, since it is a high-speed reaction of a functioning functional system, and not a specific nervous substrate, reflects the ability of the nervous system to execute a certain number of work cycles per unit time under the action of positive and inhibitory signals.

The indicators characterizing the mobility of the nervous system include a simple visual-motor reaction (MVMR) and a tapping test, the assessment of which for students of 1-5-year courses
was carried out using the psycho physiological software tester "NS-Psycho-Test" (the company "Neurosoft", Ivanovo city).

The time of a simple visual-motor reaction is an integral indicator of the speed of excitation along various elements of the reflex arc. However, the main role is played by stimulation of the central structures, which, according to a number of authors [15], allows us to consider the time of Simple hand-eye motor as a criterion of the excitability and lability of the central nervous system, a fairly adequate indicator of the functional state of the nervous system.

**MATERIALS AND METHODS**

Comparison of the indicators of simple visual-motor reaction of students of the 1-5th courses showed that in third-year students the reaction rate was worse than in first-year students, but by the end of training at the university the latent period of sensorimotor reactions decreases. Obviously, it is precisely in the 3rd year that the negative impact on the student’s organism of such risk factors as nervous overwork and psycho-emotional overstrain, which act simultaneously and take on a cumulative character, is manifested to a greater extent. It is believed that the less time it takes to achieve the desired result, the more perfect the functioning of the nervous system. This indicator is important for dynamic monitoring of the functional state of

Lowering the central nervous system and lengthening the reaction time indicates a decrease in the functional activity of the central nervous system. However, an increase in the transmission rate of the nerve impulse after intense activity does not always indicate the absence of fatigue, because with a weak excitable type of the nervous system, this phenomenon may indicate a disinhibition and imbalance of the processes of excitation and inhibition. A decrease in the rate of sensorimotor response (a clear signal of fatigue) can also be considered not only as a negative reaction to the load, but also mean a more perfect type of nervous system that can economically consume energy, regulate by protective inhibition.

The development and condition of motor skills are closely connected with neuropsychic development, and therefore the intensive functioning of the motor analyzer creates the prerequisites for the active activity of the central nervous system. The maximum speed indicators of a person (quality of speed) in physiology are usually understood as a manifestation of the ability to perform various kinds of actions in a minimum period of time. According to some authors, the maximum rate of movements, changing with fatigue, inhibition, excitation of the nervous system, can serve as an indicator of a person’s functional state [4].

This means that a large group of students have low characteristics, which are characterized by low success in perception and thinking, as well as an average level of ability to operate with spatial objects, concentration and switching attention. The same neurophysiologic mechanisms that provide the functional mobility of nervous processes also take part in the implementation of these mental functions.
RESULTS AND DISCUSSION

The results of our studies showed that in the dynamics of training at the university there is a positive increase in the tapping test. Despite the positive dynamics of the tapping samples in the learning process, their values indicate inertia of the nervous processes in almost all the students examined.

Information about the level of functional mobility of nervous processes is important, primarily, from the point of view of predicting the success of training, the formation of an individual approach to students. As a rule, in individuals with a low level of functional mobility of nervous processes, sympathetic influences predominate. From the standpoint of general physiological concepts, this is due to the higher sensitivity of the weak nervous system, which receives large doses of sensory flux and has more intense stimulation of the sympatho-adrenal system [5]. In the studies of [6, 7] showed that people with low values of the level of functional mobility of nervous processes are predisposed to a more rapid development of signs of fatigue, resulting from the desynchronization of the course of physiological processes.

Litvinova in 2008 obtained convincing data indicating a rather high role of neurodynamic properties in the process of students' adaptation. In particular, it was shown that students with a high level of mobility and strength of nervous processes are characterized by success in learning activities, resistance to stress, and balanced activity of the sympathetic and parasympathetic nervous systems, in contrast to students with low levels of mobility and strength of nervous processes. In addition, an analysis of the available literature showed that in people with a prenosological state of the body, the mobility of nervous processes is primarily reduced, which is also confirmed by our studies.

In the course of the research, it was found that under the influence of a long cumulative effect of educational and emotional factors, the functional mobility of nervous processes significantly decreases the number of various diseases and functional disorders increases. As a result, students are already

By the middle of studying at a university, they need highly regulatory influences, since the tendency and nature of the variability of the data obtained suggests an unfavorable level of health, an aggravation of adaptation already at the 3rd course amid a decrease in the functional capabilities of the nervous system and the organism as a whole.

The negative dynamics of the functional state of third-year students is also confirmed by the data of electroencephalography (EEG), conducted by us on the same contingent of students. EEG allows you to evaluate not only the general effect of the functional state, but also to identify the mechanisms underlying it. The severity of different EEG rhythms and their ratio reflect the activity of the cerebral cortex, subcortical structures of the brain and the nature of their interaction in different functional states and serves as their important integrative indicator. It is the analysis of the functional
The results of an EEG study showed that 16% of the 3rd year students examined did not have physiological disturbances in the bioelectrical activity of the brain, which allows them to be classified as type I functional state, i.e. optimal mobilization of physiological systems providing adequate brain activity with minimal energy consumption. Type II can be attributed to 84% of 3rd year students and to determine their state as a state of dynamic mismatch of varying degrees of severity, when cognitive activity is either not sufficiently effective or success is achieved by excessive energy consumption.

According to the severity of changes in the EEG, three groups can be distinguished: mild, moderate and gross changes in the bioelectric activity of the brain.

The first group includes 68% of students with mild physiological changes in bioelectrical activity of a cerebral nature, which relate to the phenomena of desynchronization and hypersynchronization. Desynchronization is a violation of the modulation of the main rhythm and the transition to more frequent rhythms with lower amplitude. Desynchronization occurs with an increase in the influx of specific impulses from the subcortex, and a larger number of local centers for processing this impulse appear in the cortex.

When considering the issue of desynchronization, it is necessary to take into account the possibility of a flat version of the EEG (EEG without alpha rhythm). The flat version is the norm and occurs in 20% of healthy people. Hypersynchronization can also be physiological and manifests itself normally to an insignificant degree with hyperventilation. With significant hypersynchronization, a distantly synchronized alpha rhythm arises in the anterior parts of the brain with generalization, a significant increase in amplitude, and a lack of modulation. Often waves take on a pointed shape. Hypersynchronization is associated with a violation of cortical-subcortical relationships, significant activation of nonspecific subcortical structures during their dysfunction, and a disturbance in the balance of cortical-subcortical relations in the wakeful state [9].

The second group includes 16% of subjects, they recorded moderate changes in bioelectrical activity of a cerebral nature, which are manifested by the appearance of delta waves of various amplitudes against the alpha rhythm.

A case of epileptiform activity was also recorded, which is assigned to the third group with gross changes in bioelectric activity of a cerebral nature. A typical EEG abscess of a stem nature or diffuse type was recorded.

This implies the importance of taking into account the assessment of the specifics of the activity of the brain, its main functional systems, through which cognitive processes are realized. To ensure maximum efficiency of the learning process, reduce fatigue and eliminate, as far as possible, the growth of various diseases, it is necessary to apply a systematic approach to studying the features of the brain activity.
functional organization of cognitive processes, monitoring indicators characterizing the functional state of the central nervous system.

In this regard, it is of interest to study the state of students' anxiety in the conditions of study at a higher school. It is known that an increased level of students' anxiety negatively affects the functional state of the central nervous system and the body as a whole. A repeated experience of anxiety can cause high sensitivity to stress, difficulties in intellectual activity in stressful situations, somatic and neuropsychiatric deviations [10].

In psychophysiological approaches to the study of anxiety, two of its components are distinguished: personal anxiety, which is a stable property of a person, and situational (reactive) anxiety associated more with the characteristics of a particular situation [11, 17]. High reactive anxiety is associated with decreased attention, and sometimes with impaired fine coordination. In contrast, high personal anxiety can correlate with a tendency to neurotic conflict, with the possibility of the emergence of emotional and neurotic disorders and with a high probability of psychosomatic diseases.

A fairly wide range of situations can cause manifestations of one kind or another of anxiety. For students, as a rule, such a situation is an exam and various forms of knowledge control. Pre-examination anxiety can manifest itself at various systemic levels: endocrine, visceral Psychological. It is characterized by subjectively experienced emotions of tension, anxiety, anxiety, nervousness and is accompanied by activation of the nervous system, increased heart rate, increased sweating, etc.

According to the expectation of an exam and the associated psychological stress can manifest themselves in students in the form of various forms of mental activity: either a specific fear of the examiner or a negative assessment (associated with a low level of knowledge), or in the form of a more diffuse, poorly substantiated uncertain anxiety about the outcome of a future exam, and both of these conditions are accompanied by fairly pronounced vegetative manifestations. In special cases, these phenomena can develop into a neurosis of anxious expectation, especially among students, who already in the premorbid period were characterized by features of anxious suspiciousness and emotional labiality. However, more often, students do not have neuroses, but acute neurotic reactions that have a similar picture, but occur in a more limited time period (hours - days - weeks). Externally, in the exam, these neurotic reactions can be manifested in difficulty in performing the usual function or form of activity (speech, reading, writing, etc.), and on the subjective level, in a feeling of anxious expectation of failure, which takes on a lot of intensity and is accompanied by complete inhibition of the corresponding form of activity or her violation. Researchers of exam stress believe that students with a high level of anxiety are a potentially neurotic group in a state of pre-illness and need special control from the preventative service of the university. [12].
To study the personal and situational anxiety of 3rd and 4th year students of the Faculty of Natural Sciences, the Spielberger test was used, because it is a fairly informative tool to assess the level of students' anxiety and determine their individual sensitivity to stressful effects [13].

As a result of the studies, it was found that among students of both the 3rd and 4th courses there is a fairly large percentage of people with high personal anxiety (Table 1). As a rule, students with a tendency to increased anxiety tend to underestimate their capabilities and abilities, as well as those with a weak type of higher nervous activity (GNI). In addition, indicators of personal and situational anxiety correlate with each other: in people with high indicators of personal anxiety, situational anxiety in similar conditions is manifested to a greater extent.

Table 1: Levels of personal anxiety of students of the 3rd and 4th year

<table>
<thead>
<tr>
<th>Study period</th>
<th>No</th>
<th>High level personal anxiety</th>
<th>with an average level of personal anxiety</th>
<th>low personality anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd year students</td>
<td>37</td>
<td>59,0±4,9</td>
<td>33,3±3,6</td>
<td>7,7±2,3</td>
</tr>
<tr>
<td>4rd year students</td>
<td>31</td>
<td>43,4±3,1</td>
<td>53,3±4,1</td>
<td>3,3±1,3</td>
</tr>
</tbody>
</table>

Note: n - number of observations

Table 2: Levels of situational anxiety of 3rd year students to various forms of knowledge control

<table>
<thead>
<tr>
<th>Study period</th>
<th>No</th>
<th>high level personal anxiety</th>
<th>with an average level of personal anxiety</th>
<th>low personality anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before practical training</td>
<td>37</td>
<td>69,4±4,8</td>
<td>30,6±3,5</td>
<td>0</td>
</tr>
<tr>
<td>To module</td>
<td>22</td>
<td>85,7±4,7</td>
<td>14,3±2,4</td>
<td>0</td>
</tr>
<tr>
<td>Before the exam</td>
<td>10</td>
<td>90,9±5,3</td>
<td>9,1±2,5</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: n - number of observations
Table 3: Levels of situational anxiety of 4th year students to various forms of knowledge control

<table>
<thead>
<tr>
<th>Study period</th>
<th>No</th>
<th>High level personal anxiety</th>
<th>with an average level of personal anxiety</th>
<th>Low personality anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before practical training</td>
<td>31</td>
<td>36,7±3,6</td>
<td>63,3±4,1</td>
<td>0</td>
</tr>
<tr>
<td>To module</td>
<td>23</td>
<td>91,7±6,0</td>
<td>7,7±2,1</td>
<td>0</td>
</tr>
<tr>
<td>Before offset</td>
<td>31</td>
<td>90,3±5,4</td>
<td>8,3±3,0</td>
<td>0</td>
</tr>
<tr>
<td>Before the exam</td>
<td>29</td>
<td>93,1±4,7</td>
<td>6,9±1,7</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: n - number of observations

Most of the 4th year students examined by us have an average level of personal anxiety. The optimal level of anxiety, according to some authors, to some extent contributes to the greatest success of the activity [14]. Only a small proportion of students are resistant to stress - it is 7.7 ± 2.3% in the 3rd year and 3.3 ± 1.3% in the 4th year (Table 1).

Studies of students' situational anxiety, that is, before various forms of knowledge control, showed that prior to practical exercises, where a regular frontal and individual survey was conducted, the percentage of high level of situational anxiety among third-year students reached 69.4%, and among students 4 rate of 30.6%. Before such forms of knowledge control as a module and an exam for 3rd year students, and for 4th year students, a high level of situational anxiety increased to 90% or more before the module, test and exam. In general, under the conditions of various forms of knowledge control, students with low anxiety were not observed (Tables 2, 3). It is quite obvious that any serious form of students' knowledge control is accompanied by a change in the emotional state of the body. This should be considered as an adaptive reaction, as a result of which the body includes protective adaptive mechanisms to the action of more intense influences, mobilizes its gene-forming, energy and metabolic resource. But such a reaction should not be long and strong, as it will lead to significant tension of the central nervous system and to a decrease in mental activity. It should also be noted that students with high personal anxiety need to pay special attention, especially when preparing for passing the module, test and exam. They should use various systems of psychological defense, for example, auto-training, a complex of breathing exercises [15].

In general, an analysis of the results of the study showed that the highest level of situational anxiety was observed among students of the 3rd and 4th year when passing the exam. to a lesser extent, this was expressed when passing the test and when passing the module, and very small emotional shifts were observed during the frontal survey in the practical lesson. This indicates that the functional systems of the body experience a different degree of tension, depending on the forms of students' knowledge control. This form of control as a module, which has been used in recent years in higher education...
institutions, is more sparing in comparison with the exam and set-off. This, obviously, is connected with the different volume of educational material that is submitted to the listed forms of control, as well as the goals that this or that form of control sets. Given the varying degrees of influence of knowledge control on the student’s body, it is necessary in practice to use a combination of different forms of control, bearing in mind the physiological reactions of the functional systems of the body that occur in a collision with an emotionally stressful situation during learning activities that affect the quality of educational activity.

REFERENCE
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