



CODEN [USA]: IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.1304324>Available online at: <http://www.iajps.com>**Research Article****THE STUDY OF NERVOUS TENSION DYNAMICS LEVEL
AMONG STUDENTS DURING EDUCATIONAL WEEK****Andrey A. Tretyakov*, Vladimir V. Drogomeretskiy, Alexander V. Voronkov, Larisa V. Zhilina, Olga V. Selezneva**

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Abstract:

Educational activity at a university is associated with the periodic, sometimes rather long and intensive impact (or impact expectation) of professional, social, environmental factor extreme values, which are accompanied by negative emotions and the overstrain of physical and mental functions. The most characteristic mental state that develops under the influence of these factors is a neuro-emotional tension.

Key words: *neuro-emotional tension, educational process, skin tension, the components of higher mental functions.*

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Please cite this article in press Andrey A. Tretyakov *et al.*, *The Study of Nervous Tension Dynamics Level among Students during Educational Week*, *Indo Am. J. P. Sci*, 2018; 05(06).

INTRODUCTION:

The modern educational process includes significant mental loads [1-3]. As a type of mental work, education is characterized by a number of features: the increasing and the changing volume of tasks, the constant sophistication and the update of information necessary for mastering, limitedness, small time frames allocated for the assimilation of knowledge. Thus, a student must be able to solve specific problems creatively, the potential practical situations in future professional activities. Also, in the process of teaching students have to work with a large number of different information sources by content and volume; they conduct a strict control of mastering quality and the application efficiency of the received knowledge in practice [4-7]. In constantly changing conditions associated with changing situations, the increase of necessary information volume, and other factors, the neuro-emotional tension in the learning process increases, which significantly increases the demands to the students' physical and mental abilities [8, 9].

Proceeding from the mentioned above, we set a goal - to track the level of neuro - emotional stress during a school week. The object of our study was the students of the full-time 3-year department of physical culture faculty from Belgorod State University. The subject

of the study is skin tension and the components of higher mental functions of the central nervous system.

We hypothesized that during a school week the level of neuro - emotional tension will vary depending on the number of classroom and practical classes (in our case, the practical classes in athletics and swimming), as well as at the beginning and at the end of a school week.

STUDY MATERIAL AND METHODS:

Practical classes were conducted on track and field athletics during the 3rd class on Monday, swimming during the 3rd class on Friday. Tuesday and Wednesday combined lectures, seminars and laboratory exercises. Thursday included 3 lectures during the study.

The measurements of students' scores were carried out every day after graduation. The measurement of the skin tension level (ST) was performed by the device which determines the skin galvanic reaction. the components of the higher mental functions (HMF) of the central nervous system (CNS) were determined on the desktop computer complex for psychophysiological studies "KPFK-99 - Psychomat".

Table 1 - Dynamics of GSR index and component change of higher mental functions in CNS of female students at FFK BelSU

Test name	Indicators	Un.	Monday	Tuesday	Wednesday	Thursday	Friday
Simple sensory-motor response	Average latent time	ms	250.33	221	218	231	233
	Average motor time	ms	95.67	71	76	85	98.5
Complex sensory-motor response	Average latent time	ms	289.67	255	257	335	313
	Average motor time	ms	145.67	113	110	103	125
Critical flicker fusion frequency	Critical period	ms	23.44	19.69	19.69	25.31	24.38
	Critical frequency	Hz	43.27	50.79	50.79	39.51	41.09
Static coordination	Frequency of touches	Hz	0.23	0	0	0	0.3
	Average touch time	ms	68.33	0	0	0	143
	Integral value	%	1.47	0	0	0	4.75
Dynamic coordination	Performance time	ms	4671	5615	8388	3781	3822
	Frequency of touches	Hz	3.55	2.85	3.22	3.44	3.73
	Average touch time	ms	145.33	84	140	105	146
	Integral value	%	51.36	23.94	45.06	36.1	50.75
Correction test	Successful replies	%	92	100	100	77	100
	Number of mistakes	pcs	0.67	0	0	2	0
	Average response rate	ms	3162	3876	2425	2854	3125
Luscher test	The amount of anxieties and compensations		1.33	1	3	2	1
	Vegetative factor		1.04	1.1	0.82	1.86	1.09
	Deviation from the autogenic norm		13.33	12	12	12	15
Skin tension	kOm		25	25	14	16	30

Study results and their discussion. In Table 1, we can follow the dynamics of the HMF CNS and SN among the girls during the weekly cycle.

A simple sensorimotor reaction (SSR) was the first one in the series of tests. The average latent time (the time between the presentation of the stimulus to the response time) and the average motor time (the time between the detachment of the probe from the central button to the touch of the upper button by the probe) was determined. The indices made 250.33 ms and 95.67 ms respectively. Such low results in the weekly cycle are characterized, in our opinion, by a retractive character (the beginning of the week). On Wednesday, the indicator of the average latent time reaches the peak of 218 ms, in the following days the indicator will be increased. On the contrary, the average motor time reaches a peak on Tuesday - 71 ms and by the end of the week it makes 98.5 ms.

The studies of a complex sensorimotor reaction (CSMR) include the measurements of the average latent time, the average motor time and the number of errors made during testing. The test was done unmistakably by everyone, therefore this indicator is not presented in the table.

The average latent time in CSMR test was the highest on Thursday and made 335 ms. The measurements on Monday and Friday were also high - 289.67 ms and 313 ms. The lowest results were on Tuesday and Wednesday - 255 and 257 ms. Despite this, the smallest indicator of average motor time was reached on Thursday. High results were observed on Monday - 145.67.

The following table shows the critical flicker fusion frequency (CFFF). CFFF depends on the lability (functional mobility) of the nervous processes, which, in turn, is sensitive to the changes in a person's mental state. The value of CFFF increases as compared to the background, when a person is excited, and decreases with considerable fatigue. W. Naskeg (1961) found that the higher this value before the beginning of a tedious work, the greater its decline after work. At small initial values, the value of CFFF may slightly increase upon the completion of activity. When fatigue and stress is diagnosed, the initial level of CFFF value is essential.

Using this statement and comparing the results it can be concluded that the data of Tuesday and Wednesday confirm female student tension. On Thursday, the critical frequency was 39.51 Hz, which corresponds to fatigue after a lot of mental work. On Monday and Friday, the results are also not high, we

can say that this is the consequence of physical activity after athletics and swimming.

The test "static coordination" is intended for the study of visual-motor coordination and hand tremor in statics. The tremor of hands in static was fixed on Monday, the frequency of touches was 0.23 Hz, and on Friday the frequency of touches was 0.3 Hz. Practical exercises on track and field athletics and swimming have had an impact on the tremor of hands in static. During the classroom studies, the tremor of hands was not fixed.

The studies of visual motor coordination and hand tremor in dynamics were measured using the "dynamic coordination" test. The time of the task performance was determined in the test. The execution time increased from the beginning of the week to the middle of it, Wednesday - 8388 ms. After Wednesday, the time for the task to be performed was sharply reduced. And the shortest time was recorded on Thursday - 3781 ms and Friday - 3822 ms. The frequency of the contacts was determined as follows: the highest indicator was found on Friday - 3.73 Hz, the performance time was the shortest in a weekly cycle, the measurements were taken after swimming lessons. The lowest indicator was fixed on Tuesday - 2.85 Hz, with a relatively average time of the task performance.

In order to study the attention, the visual perception of space, as well as to determine the speed of information processing a visual acuity test was used in the visual analyzer. The test was carried out unmistakably, except for Monday and Thursday. The success rate of responses during these days was 92% and 77%. A low success rate of responses to the average response rate makes 2854 ms. The best success rate and the average response rate was shown on Wednesday - 100% and 2425 ms.

In order to measure the subjective state of students objectively, the Luscher Test was used. It determined the amount of anxiety and compensations, the vegetative factor and the deviation from the autologous norm.

Monday was characterized by a relative high anxiety with the predominance of ergotropic response (excitation).

A high rate of anxiety was shown on Wednesday. And also the state of students was passive one. The deviations from the autologous norm were not detected.

On Thursday, students showed a high degree of excitement, this is indicated by the index of the vegetative coefficient - 1.86. The amount of anxieties is also high and makes 2.

In addition to the measuring of HMF CNS components, we also measured the skin tension - bioelectric activity, fixed on the skin surface, which acts as the component of the orientation reflex, the

emotional reactions of a body associated with the functioning of the sympathetic nervous system.

High indicators of skin resistance were removed on Monday, Tuesday and Friday. After the practical exercises, which had an activating character, an excited state was observed. Wednesday and Thursday were characterized by indicator decrease, which indicates the decrease of activity and the increase of tension.

Table 2 - Dynamics of GSR index and component change of higher mental functions in CNS of male students at FFK BelSU

Test name	Indicators	Un.	Monday	Tuesday	Wednesday	Thursday	Friday
Simple sensory-motor response	Average latent time	ms	261.4	254	253.14	222.33	228.33
	Average motor time	ms	80.2	126.67	107.43	96.83	91.33
Complex sensory-motor response	Average latent time	ms	281.6	288.33	290.86	265.67	273.17
	Average motor time	ms	132.8	169.33	133.43	132.83	139.5
Critical flicker fusion frequency	Critical period	ms	21.56	28.13	21.25	24.19	22.31
	Critical frequency	Hz	46.56	36.58	48.86	42.33	48.29
Static coordination	Frequency of touches	Hz	0.46	0.17	0.29	0.32	0.27
	Average touch time	ms	85.4	28.33	41.14	67	72.17
	Integral value	%	4.57	1.42	2.33	3.1	2.25
Dynamic coordination	Performance time	ms	9733	9631	11348	10216	9197
	Frequency of touches	Hz	3.05	2.64	2.54	2.75	2.46
	Average touch time	ms	140.2	115.33	139.71	127	153.67
	Integral value	%	40.83	29.62	35	34.55	36.92
Correction test	Successful replies	%	92.8	96	98.29	100	96
	Number of mistakes	pcs	0.6	0.33	0.14	0	0.33
	Average response rate	ms	3306	3843	3168	3427	2673
Luscher test	The amount of anxieties and compensations		4	6.33	2.57	5.17	6.17
	Vegetative factor		0.96	1.26	0.78	1.01	0.81
	Deviation from the autogenic norm		19.2	22.67	18.86	23	23.67
Skin tension	kOm		24.8	8.67	13.86	13.33	15.17

The young men passed the same list of tests as the girls. The results of testing are presented in Table 2. The dynamics of HMF CNS indices was presented as follows.

In the SSR test, the average latency time at the beginning of the week was the highest - 261.4 ms, during the week it decreased and by the end of the week it reached the minimum of 228.33 ms. The average motor time at the beginning and at the end of the week was not high, and in the middle of the week it reached high results.

CSR was performed unmistakably. The average latent and the average motor time varied from Monday, increasing by Tuesday and Wednesday. On Friday, these indicators were minimal.

The parameters of CFFF are presented relatively evenly in the weekly cycle. Only on Tuesday the critical frequency was 28.13 Hz.

The tremor in static reached the maximum frequency on Monday - 0.46 Hz and Thursday - 0.32 Hz. The lowest tremor was on Tuesday - 0.17 Hz.

In dynamic coordination, the time of the task performance from the beginning of the week increased, and it decreased by the middle and by the end of the week. The frequency of touches decreased throughout the week evenly.

The success of the answers in the "visual acuity test" was not 100% within a week. Most of the mistakes were made on Monday, Tuesday and Friday. An average response rate was high on Tuesday, the best time was presented on Friday.

The passing of Lusher test showed that the amount of anxiety and compensation is much higher than among the girls. The indicator reached 6.33 units, on Tuesday. The state of the young men was passive throughout the whole week according to the vegetative coefficient.

The level of skin tension, as well as among girls, was high after practical training. But it was high among young men after the track and field athletics.

SUMMARY:

Following the dynamics of GSR and HMF CNS indicators, it can be concluded that the nature and the content of occupations influence the physical and the mental state of students significantly. And also Monday was a day for involvement in addition to the training load. The mid-week reached peak values, characterizing by increased activation of all body systems. The end of the week was characterized by the decline of indicators. And only because of the practical training in swimming, some indicators were of high importance at the end of a school day in a school week. This only proves once again the activating aspect of all functions during the performance of physical exercises.

Discussing the problem of neuro - emotional stress correction, one must consider one important circumstance: the task is not necessarily to reduce but to optimize the level of tension. The founder of the doctrine of the nonspecific adaptive syndrome identified only two of its forms: useful stress (eustress) and malicious stress (distress) [10]. Although the preparation and the passing of exams are accompanied by negative emotions within the traditional educational process, this state of affairs is not the only possible one. Learning can bring joy with a properly organized pedagogical process. Meanwhile, the subjective anxiety experiences during the educational process correspond to the classic description of distress.

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