

## Sleep disorders in the 1<sup>st</sup>-year medical students as the result of the educational stress: Clinical and prophylactic aspects

Victoria.V. Ruzhenkova\*, Victor A. Ruzhenkov, Nina I. Zhernakova, Julia N. Gomeljak

### ABSTRACT

**Aim:** This study aimed to verify the clinical structure of sleep disorders and its relationship to educational stress among the 1<sup>st</sup>-year medical students for developing approaches to primary psychoprophylactics. **Materials and Methods:** A solid sample of 166 Russian-speaking students aged 16–22 years were examined using the medicosociological, psychometric, and clinicopsychopathological methods. **Results:** It was found that the most significant manifestations of educational stress were affective and psychosomatic disorders as well as attention disorders. The majority (98.8%) of students had asthenia, which was moderate and severe in 65% of cases. Anxiety was detected in 64.5% of cases and clinical level of anxiety in 35%. Sleep disorders were detected among 88.6% of the students, and in 92.3% cases, they arise on the base of asthenia. A nightmare was observed in 71.7% of students. A majority of medical students need to reduce night sleep because of high training load and 62.7% of them went to bed after 1:00 am, and 63.8% slept <6 h a day on weekdays. Cluster analysis identifies four groups of sleep disorders, the closest to each other: 1 – presomnia disorders and middle insomnia disorders – the most significant; 2 – postsomnia disorders and nightmares; 3 – somnambulism (neurotic conditioned); and 4 – night terrors and “sleepy paralysis.” **Conclusion:** The most significant factors associated with sleep disorders are asthenia, anxiety, and personality frustration caused by the academic process. Stress management and time management programs have been developed on the base of research and have been implemented in teaching process. These programs include informing students about stress and teaching methods for manage it, teaching planning of time, methods of optimal work with educational literature, informing about a healthy life, the regime of the day, and the features of nutrition. This allows students to learn how to cope with stress and plan their time properly.

**KEY WORDS:** Anxiety, Asthenia, Depression, Educational stress, Medical students, Sleep disorders

### INTRODUCTION

The prevalence of chronic stress among medical students is higher than that of the general population and ranges from 38% to 62%.<sup>[1,2]</sup> The highest prevalence of stress is observed among the 1<sup>st</sup>-year students, which is due to the need to adapt to new conditions in life away from family.<sup>[3-5]</sup> At the same time, social activity or life with parents is associated with lower academic achievement.<sup>[6]</sup>

Learning factors (poor academic performance, arrears, irrational schedules, large training load, conflicts with teachers, lack of educational material, lack of interest

in learning, and frustration in the chosen profession) are the main sources of stress for medical students.<sup>[7]</sup> The high level of educational stress, in turn, leads to emotional burnout,<sup>[8,9]</sup> negatively affects overall health and academic performance,<sup>[10-12]</sup> and contributes to the development of anxiety and depression. According to the study of Oku *et al.*,<sup>[13]</sup> 39% of medical students have “poor mental health status,” and 45%–83% of medical students have suicidal thoughts.<sup>[14,15]</sup>

In the aspect of prevention of educational stress, according to the students themselves, the most useful are social support from peers and teachers, counseling services, and various extracurricular activities.<sup>[16]</sup> The attention is also focused on the need for sessions of individual psychotherapy and trainings aimed at reducing the level of emotional tension and increasing social intelligence.<sup>[17]</sup>

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ISSN: 0974-6943

Department of Psychiatry, Narcology, and Clinical Psychology, Medical Institute, Belgorod State National Research University, Belgorod, Russia

\*Corresponding author: Victoria V. Ruzhenkova, Department of Psychiatry, Narcology, and Clinical Psychology, Medical Institute, Belgorod State National Research University, 85, Pobedy Street, Belgorod - 308015, Russia. E-mail [ruzhenkova@bsu.edu.ru](mailto:ruzhenkova@bsu.edu.ru)

Received on: 22-09-2017; Revised on: 11-10-2017; Accepted on: 06-12-2017

In this regard, the aim of the study was to verify the clinical structure of sleep disorders and its relationship with educational stress in the 1<sup>st</sup>-year medical institutions, to develop approaches to primary psychophylaxis.

## MATERIALS AND METHODS

During the 3<sup>rd</sup> and 4<sup>th</sup> months (November and December) of training at the 1<sup>st</sup> year of the medical institute, we examined a solid sample consisting of 166 Russian-speaking students aged 16–22 (18.0 ± 0.9) years: 38 (22.9%) males and 128 (77.1 %) females.

The main research methods were as follows:

1. Medico-sociological (questionnaire using the author's questionnaire, which includes a block of sociodemographic data, information about the way of life).
2. Psychometric: A test for learning stress by Yu.V. Scherbatyh; perceived stress scale; method of express diagnosis of the level of personal frustration VV Boiko; subjective scale of asthenia assessment - MFI-20; hospital scale of anxiety and depression (HADS); questionnaire Generalized Anxiety Disorder (GAD) «GAD-7».
3. Clinical-psychopathological (collection of subjective anamnesis, clinical interview, and observation).
4. Statistical: Descriptive statistics, correlation (Spearman's rank correlation coefficient) and factor (the principal components method with varimax factor rotation) analysis.

## RESULTS AND DISCUSSIONS

The majority (140, 84.3%) of students entered the medical institute on their own initiative and the rest (26, 15.7%) on the advice of the parents. For the study period, only 63 (38.0%) of the students were 100% convinced of the correctness of the choice of profession; 80–90% - 58 (34.9%) people and 60–70% - 32 (19.3%). The remaining (13, 7.8%) people profession of the doctor attracted 30–50%; they, if there was a choice, would refuse from training.

It was easy to study in 11 (6.6%), experienced minor difficulties in 79 (47.6%), and average difficulties in 67 (40.4%) of students. It was difficult to study in only 9 (5.4%) of students. A weak direct correlation was revealed between the conviction in the correctness of the choice of profession and ease in mastering the study material ( $r = 0.298$ ;  $P = 0.00009$ ).

Preparation for classes and seminars took 2–3 h a day for 30 (18.1%) students, 4–5 h for 83 (50.0%), and more than 6 h for 53 (31.9%). A quarter (40, 24.1%)

of students were thinking about quitting their studies at a medical institute and mastering another profession due to the learning difficulties.

The high training load and the need to assimilate a large amount of information to the classes the next day required a lot of time; as a result, most students reduced night sleep. The duration of sleep during the study (on weekdays) is presented in Chart 1.

Thus, it was found that more than half (63.8%) of students slept inadequately. In addition, the majority (104, 62.7%) of students went to bed after 1:00 am and the rest in 11:00-12:00 p.m.

Factor analysis of the variables that form the learning stress allowed to identify eight significant factors affecting the formation of stress in students in the first course – 69.3% of the variance [Table 1].

It is established that the stress factors for medical students at the beginning of the studies are personal (problems in personal life and shyness), social (living away from parents and problems in the hostel), and educational (lack of textbooks, great workload, strictness of teachers, and biased grades, from the students' point of view).

The factor analysis of the symptoms of stress in the 1<sup>st</sup>-year students revealed four factors explaining 62.2% of the variance [Table 2].

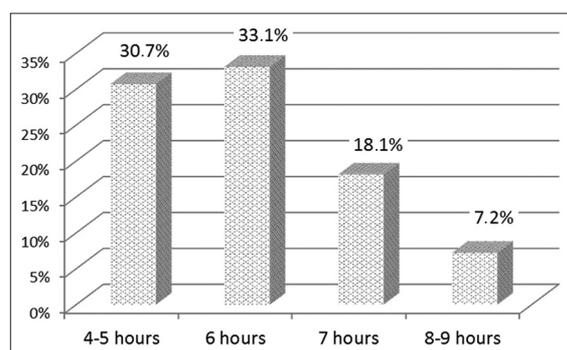


Chart 1: The 1<sup>st</sup>-year students' sleep duration

Table 1: Academic stress factors in the 1<sup>st</sup>-year medical students

Factors	<i>r</i>	% variances
Living far away from parents	0.768	16.6
Problems in personal life	0.803	11.4
Lack of textbooks	0.828	9.7
Great training load	0.818	7.7
A lot of time is required for preparation	0.722	
Strict teachers	0.791	6.7
Non-objective estimates	0.822	6.1
Shyness	0.773	5.6
Problems in the hostel	0.882	5.5

As it can be seen from Table 2, the most significant manifestation of stress was effective and psychosomatic disorders, as well as attention disorders. The clinical structure and factor significance of the symptoms of stress manifestations indicate a high risk of the formation of psychosomatic disorders.

A study of the severity of asthenia with the MFI-20 test found that the total asthenia ( $12.6 \pm 3.3$  points) and decreased activity ( $12.5 \pm 4.0$  points) in the total number of students were qualified as moderate. At the same time, the decrease in motivation ( $9.6 \pm 3.0$  points) was low graded, and the physical ( $10.5 \pm 4.1$  points) and mental ( $10.2 \pm 4.0$  points) asthenia were approaching a moderate degree of severity. Analysis of total asthenia showed that only in 2 (1.2%) cases asthenia was absent, in 56 (33.7%) it was low graded, in 93 (56.0%) it was moderate, and in 15 (9.1%) it was significant.

The method of express diagnosis of personal frustration level V.V. Boyko revealed that 40.4% of cases showed a steady tendency toward frustration (in the remaining 59.6%, the level of frustration was low).

Analysis of the results of the hospital scale of anxiety and depression showed that most students (64.5%) showed anxiety and 35% had a clinical level. More than 20% of the cases showed symptoms of depression, the level of which in 7.2% was qualified as clinical.

In half of cases (82, 49.4%), the symptoms of GAD were revealed: They were easily expressed in 53 (31.9%), moderately in 21 (12.7%), and expressed in 8 (4.8%) people. In 51 (30.1%) cases, panic attacks were observed.

**Table 2: Factors of the manifestation of educational stress in the 1<sup>st</sup>-year medical students**

Factor	r	% variances
Affective disorders		37
Depression	0.734	
Anxiety	0.855	
Loss of confidence	0.780	
Psychosomatic disorders		10.4
Tachycardia	0.833	
Labored breathing	0.834	
Rush	0.768	7.5
Attention disorders		7.3
Distractibility	0.832	
Outside thoughts	0.715	

**Table 3: Correlation dependencies of sleep disorders in medical the 1<sup>st</sup>-year medical students**

Sleep disorders	Factor	r	P=
Presence of sleep disorders	Personality frustration	0.29	0.0002
	Anxiety	0.29	0.0001
	Asthenia	0.31	0.00006
Postsomnia disorders	Asthenia	0.37	0.000001
Nightmares	Asthenia	0.27	0.0005
	Anxiety	0.30	0.0001
Presomnia disorders	Symptoms of generalized anxiety	0.25	0.001

In the overwhelming majority of cases (147, 88.6%), various sleep disorders were recorded. Presumptive disorders were observed in 74 (44.6%) cases, intrasomal disorders in 83 (50%), and postsomatic disorders in 138 (83.1%). Typically, in 46 (27.7%) cases, only one type of sleep disorder was observed, in 57 (34.3%) two species, and in the remaining 44 (26.5%) a combination of pre-, intra- and post-somnolent disorders.

In 144 (92.3%) students, sleep disorders occurred against the background of asthenia.

In 28 (16.9%) patients had a history of seizures: Only 1–2 episodes 7.8% of cases, 3–5 episodes - 7.2%, and more than 10–1.8% of cases.

Nightmares were observed in 119 (71.7%) of students, and night terrors in 26 (15.7%) and were terrible, dreaming with the subject of life threat, accompanied by a significant fear, vegetative sensations, attempts to escape. The content of dreams was more often forgotten.

Decubitus paralysis was observed in 31 (18.7%) people, from 1 to several times a year in 25 (80.6%) students, 1 (9.7%), 1 time a week for two (6.5%), and several times a week in 1 (3.2%) people. The duration of decubitus paralysis from several seconds to several minutes was in 20 (64.5%) cases and from 5 to 20 min in 11 (35.5%) cases. In 12 (38.7%) cases, decubitus paralysis occurred for the 1<sup>st</sup> time under the age of 7 years, in 6 (19.4%) cases from 7 to 16 years, and in the remaining 13 (41.9%) after 16 years of age.

Correlation analysis revealed weak correlation dependencies of sleep disorders with other disorders [Table 3].

It was found that the most significant factors associated with sleep disorders were asthenia, anxiety, and personality frustration associated with the learning process.

For clarity of the clinical structure of sleep disorders in the 1<sup>st</sup>-year medical students, a cluster analysis was performed, which allowed us to identify four groups of sleep disorders that are as close as possible to each other [Figure 1]: (1) Presomnia disorders and middle insomnia disorders – the most significant;

(2) postsomnia disorders and nightmares; (3) somnambulism (neurotic conditioned); and (4) night terrors and “decubitus paralysis.”

Presumptive disorders were largely due to learning stress, which caused asthenia and anxiety, as manifested by a thematic influx of thoughts before falling asleep, anxiety for the past day, and preparation for the upcoming classes. Due to the expressed alarm, they often woke up, often the sleep was superficial, they tossed and turned, and it was observed a “symptom of restless legs.” In a number of cases, there were unpleasant, nightmarish dreams (the threat of life from “monsters”, animals, fictional characters, falling from height, and “to the abyss”), and more often in individuals with signs of residual organic lesion of the central nervous system. Unpleasant dreams were often accompanied by wincing, and students woke up with alarm, and then could not sleep for a long time. In the morning, they woke up not rested, with anxiety, fatigue, and lack of sense of rest.

Decubitus paralysis was manifested by a state of numbness with a sense of fear and the inability to move arms and legs, the sensation of “someone’s ominous presence next to the bed” against a background of incomplete awakening, sometimes, there were indistinct steps, rustling. In a number of cases, the states of stupor were accompanied by dissociative depersonalization phenomena when it seemed that the experiencing state “seemed to come out of its body and observe itself from the outside.”

Based on the research, we developed and implemented stress management and time management programs. The tasks were as follows:

1. Informing students about stress and learning how to overcome and adapt them. In a broader context (ways to resolve conflicts, overcome auto- and hetero-aggressive tendencies, methods of relaxation, etc.), we solve this problem in the framework of the implementation of the second

course of the discipline “Psychological Correction of Crisis States.”

2. Educating students in the proper planning of their time, methods of optimal independent work with educational literature, developing skills of self-presentation, and awareness in the stages of building a career.
3. Informing about healthy lifestyle taking into account biorhythms, day regimen and nutrition characteristics, and destructive methods of fighting stress (in the aspect of preventing addictions).

We solve the last two tasks in the framework of the implementation of the discipline “Introduction to the Specialty” (in the third semester of the 2<sup>nd</sup> year). This allows students to learn how to plan their time, cope with stress, and maintain health.

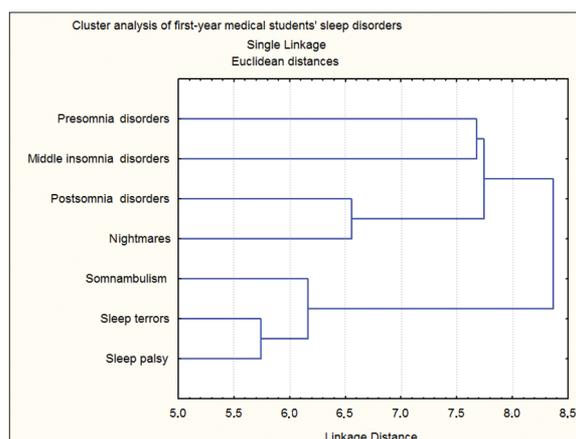
## CONCLUSION

Thus, the study found that the most significant stress factors for the 1<sup>st</sup>-year medical students are personal, social, and educational. The most significant manifestations of stress are manifested in the form of effective and psychosomatic disorders as well as violations of attention. The majority of students (98.8%) had different degrees of asthenia: In 33.7% - low graded, in 56.0% - moderate, and in 9.1% - significant. In 64.5% of cases, freshmen showed anxiety, reaching a clinical level of 35%. The vast majority of students (88.6%) had sleep disorders, in 72.3% of cases in various combinations of presumptive, intrasomal, and postsomnic. A high frequency (92.3%) of the relationship between asthenia with sleep disorders and the correlation relationship of sleep disorders with anxiety, asthenia, and frustration was revealed.

Stress management and time management programs developed on the basis of research and implemented in practice will allow students to learn how to plan their time properly and cope with stress, which in turn will preserve the state of health and increase the level of social functioning.

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**Figure 1:** Cluster analysis of sleep disorders

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