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Research Article

Academical Stress for the First and Second Year Medical Students and Possible Risks to Mental Health

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ABSTRACT

Medical student's activity is one of the strained types of labor in emotional aspects. This affects the level of their mental and physical health. In this study, we conducted a comparative analysis of the educational stress of first and second year medical students. The sample included all Russian-speaking students. The academic stress, stress-resistance, level of anxiety and depression were studied. Methods of descriptive statistics, median, interquartile range, Mann-Whitney criterion, χ^2 criterion with Yates correction for conjugation tables 2x2 and factor analysis (by the principal components method with varimax rotation of the factor) were applied. It is found that the first year medical students have a lower level of stress-resistance than the second-year students. Also they have clinically expressed anxiety (34.9%) are twice as likely, and subclinical (20.5%) and clinical (18.6%) depression. Living far away from their parents, problems in their personal lives, lack of textbooks and a large training load were significant factors of educational stress among first-year students, irrational organization of the learning process, reluctance to learn and everyday problems – for sophomores. Among the manifestations of educational stress, the most pronounced were affective and psychosomatic disorders, as well as disorders of attention and sleep. The predominant ways to overcome stress in the first year students were taking medications, drinking alcohol, smoking, spending time in social networks and computer games. Second-year students overcame the educational stress by idle pastime, taking medications and passivity. The above creates a high risk of the formation of psychosomatic disorders and addictions.

Key words: educational stress, medical students, anxiety, depression, stress-resistance.

1. INTRODUCTION

Medical students have a frequent academic stress (33.8%), and undergraduates are better at coping with it than those who just started to learn [1]. So [2], the highest prevalence of stress was observed during the first three years of training, with a gradual decrease from 58.3% to 56.6% during the fourth one [3] and 25% during the sixth one. At the same time [4], there was a significant increase in the proportion of students with the risk of depression development (39%) during the third year of study as compared to the first year (28.4%). It was suggested that this may be explained by the transition to clinical courses, which are quite a stressful experience for medical students [5]. A greater susceptibility to the development of anxiety and depression was found among females [6,7], especially during the first year of training [8]. According to other data [9], the overall level of anxiety is approximately the same one among male and female students.

The main sources of stress for medical students were represented by learning factors [10, 11], and a high level of stress reduces the satisfaction with life and affects an overall health and academic performance negatively [12,13,14].

Teachers play an important role in teaching strategy development for students. They are often a source of stress for students [14]. The greatest stress among students was caused by the pressure from teachers and families, the competition between students, large amounts of information studied, increased loads before exams, the lack of time for material repetition, the failure to receive anticipated assessments, too long training, the need to work with the corpse material and a rigid schedule of a day, as well as the lack of skills in time planning and self-discipline, the inability to set priorities [15,16].

A high level of educational stress [1,3] leads to the fact that the overwhelming majority of medical students (83%) have suicidal thoughts. Tobacco smoking is one way to relieve psychological stress and combat it [17]. This is confirmed by a study from Melaku L. et al. [2], according to which students with stress were more likely to use psychoactive substances (chewed khat 3 times more often, smoked cigarettes 4.5 times more often and used alcohol 2 times more often). This, in its turn, leads to the development of an addictive behavior and, consequently, aggravates the violation of adaptation and leads to the reduction of interpersonal emotional relations [18].

The support systems of students at the educational institution are of great importance for the prevention of educational stress. It is known that medical students with a higher level of anxiety and depression deny the availability of support systems more often, or have difficulties to its access [19]. At the same time, meeting the individual needs of students and the provision of a safe environment for them are the main elements of a successful self-help program in stressful situations [20]. Thus, medical students emphasize the need for individual psychotherapy sessions and the trainings aimed at emotional stress level reduction and social intelligence increase [21]. Multiple visits to a specialized student counseling center at a high level of psychological stress raise the level of general functioning [16]. According to other data [22], many self-study programs for skills and strategies aimed at students' psychological health and the performance improvement show only a short-term improvement in depression and anxiety.

The mentioned above dictates the need to develop recommendations on academic stress overcoming among the medical students of the 1st - 2nd courses on the basis its prevalence, phenomenological manifestations and conditioning factor study.

2. MATERIALS AND METHODS

During the third month of study, a continuous sample of the first year Russian-language medical students was studied - 166 people at the age from 17 to 22 (18.0 ± 0.9): 38 (22.9%) males and 128 (77.1%) females and the second year students - 96 people at the age from 18 to 23 (19 ± 1.2): 68 (71%) females and 28 (29%) males.

The educational stress test by Yu.V. Shcherbatykh [23], Perceived Stress Scale [24, 25] and the Hospital Alarm and Depression Scale (HADS) [26] were used.

The educational stress test by Yu.V. Shcherbatykh consists of four sections: the assessment of the learning factors on stress degree (20 points), the symptoms of educational stress manifestation (16 points) and the degree of their severity, the ways of stress overcoming (19 points), and the severity of the examination stress (13 points). Each point was rated by "0" (no significance of the sign) - "10" points (maximum significance).

The Perceived Stress Scale (PSS) includes 10 questions pertaining to feelings and thoughts over the past month. The evaluation is carried out on a 5-point scale: from "0" (no indication) to "4" (maximum severity). The total stress-resistance assessment was carried out on a 5-point scale: very poor, poor, satisfactory, good and excellent level of stress-resistance.

The analysis of HADS scale results was carried out by the traditional method [26].

The statistical processing of the database was carried out using of the pack of applied statistical programs Statistica 6. The normality of the signs distribution was determined using the Kolmogorov-Smirnov criterion. With the correct distribution of parametric data, the average values and the mean-square deviations were used within the descriptive statistics framework. When nonparametric data were compared in the framework of descriptive statistics they used the median and interquartile range (Q25-Q75); In

addition, the mean value (M) was indicated to reflect those variablesthe median (Me) or Q25 of which were equal to "0". During the comparison of two independent groups the Mann-Whitney test was used. The comparison of a binary feature frequencies in two disconnected groups was carried out using the criterion χ^2 with the Yates correction for conjugation tables 2x2. Also, the correlation [Spearman's rank correlation coefficient] and the factor analysis (by the principal component method with varimax rotation of the factor) were used.

3. RESULTS AND DISCUSSION

The factor analysis of the variables that develop the educational stress (based on the test by Yu.V. Shcherbatykh) made it possible to identify 8 significant factors (69.3% of dispersion) that affect the development of stress tension among 1 year students and 6 factors (68.2% of dispersion) among the second year students (Table 1).

Table1: Academicals stress-factors in the first and second year medical students

№	Factors	r	% Variances
The First Course			
1	**Living far away from parents**	0.768	**16.6%**
2	**Problems in Personal Life**	0.803	**11.4%**
3	**Lack of textbooks**	0.828	**9.7%**
4	**Great training load**	0.818	**7.7%**
	A lot of time is required for preparation	0.722	
5	**Strict Teachers**	0.791	**6.7%**
	Rudeness of teachers	0.756	
6	**Non-objective estimates**	0.822	**6.1%**
7	**Shyness**	0.773	**5.6%**
8	**Problems in the hostel**	0.882	**5.5%**
The Second Course			
1	**Irrational organization of educational process**		**24.1%**
	Irrational schedule	0.785	
	Too many lessons	0.775	
2	**Unwillingness to learn**	0.880	**11.9%**
	Disappointment in the profession	0.645	
	Problems in Personal Life	0.745	
3	**Boring textbooks**	0.817	**9.5%**
	Lack of textbooks	0.784	
4	**Everyday problems**		**8.9%**
	Lack of money	0.829	
	Difficulties of a mode of day	0.784	
	Irregular eating	0.679	
5	**Educational problems**		**7.4%**
	Strict Teachers	0.678	
	A lot of time to prepare	0.689	
	Fear of the future	0.672	
	Non-objective estimates	0.650	
6	**Problems in the hostel**	0.809	**6.4%**
	Living far away from parents	0.705	

They determined that the most significant factors of educational stress for first-year students were the living away from their parents, the problems in their personal lives, the lack of textbooks, and a large training load. The severity of teachers and "biased assessments" were somewhat less significant. At the same time, the most stressful problems for the 2nd year students were the problems of educational process irrational organization, the reluctance to learn, boring textbooks and everyday problems.

The comparative analysis of educational stress manifestations showed that first-year students, as compared to the second year students, had a more pronounced sense of time lack ($p<0.01$) and headaches ($p<0.003$). The significant symptoms for all students were a weak attention, a subjective feeling of decreased mood, sleep disorders and an increased fatigue.

The factor analysis of learning stress (Table 2) symptom manifestation revealed 4 factors explaining 62.2% of dispersion among first-year students and 3 factors among the second-year students (62.8% of dispersion).

Table 2: Factors of the manifestation of educational stress in the first and second year medical students

№	Factor	r	% Variances
The First Course			
1	**Affective disorders**		**37%**
	Depression	0.734	
	Anxiety	0.855	
	Loss of confidence	0.780	
2	**Psychosomatic disorders**		**10.4%**
	Tachycardia	0.833	
	Labored breathing	0.834	
3	**Rush**	0.768	**7.5%**
4	**Attention disorders**		**7.3%**
	Distractibility	0.832	
	Outside thoughts	0.715	
The Second Course			
1	**Attention disorders**		**43.3%**
	Feeling helpless	0.704	
	Outside thoughts	0.838	
	Distractibility	0.818	
2	**Psychosomatic disorders**		**11.4%**
	Tachycardia	0.843	
	Labored breathing	0.834	
3	**Headache**	0.838	**8.1%**

The most significant manifestation of stress among the first-year students were affective and psychosomatic disorders, as well as the attention disorders. The most significant factors for the second year students were the disorders of attention and psychosomatic symptoms. The clinical structure and the factor significance of stress manifestation symptoms indicate a high risk of psychosomatic disorder development.

The students of the first and the second course overcame stress in various ways, which included the support and advice from parents, social networks and the Internet, the reading of fiction and overeating. The factor analysis concerning the ways to overcome learning stress revealed 8 significant factors explaining 68.2% of dispersion among the first year students and 7 factors (77.6% of dispersion) among the 2nd year students (Table 3).

Table 3: Methods of overcoming stress by the first and second year medical students

№	Factor	r	% Variances
The First Course			
1	**Sport activities**		**15.9%**
	Sport	0.905	
	Pool	0.865	
2	**Nonconstructive pastime**		**12.1%**
	Social networks	0.909	
	the Internet	0.856	
3	**Taking medication**		**9.7%**
	Valerian	0.816	
	Other herbal sedatives	0.779	
4	**Using of psychoactive substances**		**7.2%**
	Alcohol consumption	0.735	
	Smoking	0.828	
5	**Rest**		**6.7%**
	More sleep	0.728	
	Chat with friends	0.715	
6	**Nonconstructive pastime**		**5.8%**
	Watching TV	0.740	
	Computer games	0.736	
8	**Taking tranquilizers**	0.801	**5.7%**
9	**Taking antidepressants**	0.753	**5.1%**
The Second Course			

1	**Nonconstructive pastime**		**18.2%**
	Watching TV	0.652	
	Social networks	0.652	
	the Internet	0.693	
2	**Sport activities**		**14.1%**
	Sport	0.917	
	Pool	0.887	
3	**Taking medication**		**13.7%**
	Valerian	0.821	
	Other herbal sedatives	0.907	
4	**Avoidance of stress (passivity)**		**10.7%**
	Couple omissions	0.910	
	Parenst support	0.902	

Table 3 shows that one of the leading ways to overcome stress among the first year medical students was non-constructive, passive methods, such as taking medicines (20.5% of dispersion), drinking and smoking (7.2% of dispersion), spending time in social networks and the Internet (12.1%) and computer games (5.8%). At the same time, the following constructive ways did not prevail: sports (15.9%), sleep and communication with friends (6.7%). Second-year students overcame the educational stress by idle pastime, the intake of sedatives and passivity. A low factor load was occupied by sports.

The students of the first and the second courses took anti-depressants (3% and 6.3, respectively) and tranquilizers (1.8% and 3.1%, respectively) equally often. However, non-prescription sedatives (the sedative agents of plant origin) were taken by 1st-year students (38.0% of cases) more often ($p < 0.05$) than the second year students (25.0%). More than a third (34%) of students from both courses used alcohol to eliminate stress symptoms and more than 80% of both courses decreased stress using the Internet. This testifies to the high risk chemical and non-chemical dependence development and the consolidation of non-constructive forms of coping with stress.

The first-year students had more pronounced symptoms of exam stress than the second year students. Significant differences were found in the following parameters: difficult breathing ($p < 0.02$), dissatisfaction with inspiration ($p < 0.01$), the sensation of muscle tension, stiffness ($p < 0.002$), muscle tremors ($p < 0.02$) and headaches ($p < 0.01$). Along with this, the students of both courses were anxious with heart palpitations, anxiety, depressed mood and the difficulty of falling asleep within the structure of exam stress.

The factor analysis of pre-examination stress symptoms revealed 4 factors explaining 63.1% of dispersion among the 1st-year students and 3 factors explaining the 66.8% of dispersion among the 2nd year students (Table 4).

Table 4: The factors of pre-examination stress in the first and second year medical students

№	Factor	r	% Variances
The First Course			
1	**Psychosomatic symptoms of the respiratory system**		**33.8%**
	Dissatisfaction with inspiration	0.838	
	Impossibility of inspiration	0.827	
	Labored breathing	0.814	
2	**Affective disorders**		**11.3%**
	Depressed mood	0.745	
	Headache	0.737	
	Anxiety	0.723	
3	**Muscular disorders**		**9.1%**
	Muscle tension	0.703	
	Trembling of muscles	0.782	
4	**Sleeping disorders**		**8.9%**
	Difficulty falling asleep	0.761	
	Unpleasant dreams	0.740	
The Second Course			
1	**Cardiopulmonary psychosomatic symptoms**		**44.2%**

	Interruptions in the work of the heart	0.803	
	Labored breathing	0.852	
	Impossibility of inspiration	0.855	
	Dissatisfaction with inspiration	0.847	
2	**Sleeping disorders**		**12.9%**
	Difficulty falling asleep	0.793	
	Depressed mood	0.776	
	Unpleasant dreams	0.766	
3	**Mixed psychosomatic symptoms**		**9.7%**
	Palpitation	0.710	
	Increased urination	0.786	

Table 4 shows that the most significant manifestations of pre-examination stress among the first-year students were the psychosomatic symptoms affecting the respiratory system, affective disorders, muscle disorders and sleep disorders. For the second year students the most significant factors were psychosomatic symptoms and sleep disorders. The presented data indicate that pre-examination stress creates a high risk of psychosomatic disorder development among the students of the first and the second courses.

The results of the Perceived Stress Scale (Table 5) showed that the first-year students had a "bad" and a "very bad" stress resistance level in 68.1% of cases, and the second year students demonstrated it only in 19.8% of cases. At the same time, satisfactory, good and excellent levels of stress-resistance were inherent in sophomores.

Table 5: Comparative characteristics of the level of stress resistance, anxiety and depression of the first and second year medical students

	The First Course		**The Second Course**		χ^2	p
	n	%	n	%		
The level of stress resistance						
Very bad	9	5.4	-	-	53.4	0.0005
Bad	103	62.7	19	19.8		
Satisfactory	46	27.7	45	46.8	9.0	0.0036
Good	7	4.2	30	31.3	38.4	0.0005
A great	-	-	2	2.1		
Level of anxiety						
No	59	35.5	54	56.3	9.8	0.0026
Subclinical	49	29.5	26	27.1	Differences are not significant	
Clinical	58	34.9	16	16.7	9.1	0.0034
Depression level						
No	132	79.5	81	84.4	Differences are not significant	
Subclinical	22	13.3	12	12.5		
Clinical	12	7.2	3	3.1		

Table 5 shows that the second-year students had no anxiety in most cases (56.3%), while in freshmen had a clinically expressed anxiety in more than a third of cases.

As for depression, the frequency of its occurrence was the same among the students of both the first and the second courses.

4. CONCLUSION

The study showed that the first year medical students had a clinically expressed anxiety in 34.9% of cases, which is twice as likely than among second-year students, and the subclinical and clinical level of depression was 20.5% and 18.6%, respectively. A high level of educational stress is revealed among the students of both courses, while the level of stress resistance is lower during the first year. The first-year students had more pronounced symptoms of exam stress than in the second year students. The most significant factors of educational stress among first-year students were the living away from their parents, the problems in their personal lives, the lack of textbooks and a large training load, while the second year students had the problems with the irrational organization of the

learning process, the reluctance to learn and everyday problems. Among the manifestations of educational stress, the most significant were affective and psychosomatic disorders, as well as the attention disorders. The manifestations of pre-examination stress among the students of both courses were psychosomatic symptoms and sleep disorders. The predominant ways of stress overcoming among the first year students were medications, alcohol, smoking, spending time in social networks (Internet) and computer games. The second-year students overcame the educational stress by idle pastime, the intake of sedatives and passivity. The abovementioned creates a high risk of psychosomatic disorder, chemical and non-chemical dependency development and the consolidation of non-constructive forms to cope with stress.

To prevent the state of social-psychological maladjustment, a high level of anxiety and the risk of suicidal behavior, the development and the implementation of a differentiated stress management program is required that includes the following tasks.

1. Informing students about stress and the learning of methods to overcome and adapt it. In a broader context - training the methods of conflict resolution, the overcoming of auto- and heteroaggressive tendencies and relaxation methods.

2. The training of students to plan their time properly, the teaching of optimal independent work methods with educational literature, the development of self-presentation skills and the awareness during the stages of a career development.

3. The informing about a healthy lifestyle taking into account biorhythms, a day regimen and nutrition characteristics, about the destructive methods of stress reduction (in terms of addiction prevention).

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