

Prevalence of anxiety and depression disorders among medical students one year after the start of the COVID-19 pandemic

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Abstract

Aims. The aim is to study the incidence rate of anxiety and depressive disorders and their relationship with the everyday activity at the H.M. Berbekov Kabardino-Balkarian State University (KBSU) medical faculty students a year after the start of the Covid-19 pandemic. As a part of a cross-sectional observational study, a survey of 425 students at the Faculty of Medicine was conducted. The average age of the surveyed students was 20.9 ± 2.1 years. The Spielberger-Khanin questionnaire, the HADS anxiety and depression scale, as well as a questionnaire specially developed by the authors to clarify some indicators of students' activity were used.

Results. The prevalence of high levels of situational anxiety (SA) was 1.4%, personal anxiety (PA) 30.8%, anxiety 29%, depression 21.6%. High levels of SA were statistically significantly more common among students with higher education ($p = 0.0417$), living in rented apartments ($p = 0.0136$), countryside residents ($p = 0.0005$), with debts ($p = 0.0122$); high levels of PA were identified among students who assessed their living conditions as satisfactory ($p = 0.0001$). Clinically pronounced depression was statistically significantly more common among students with higher education ($p = 0.0258$), who assess their living conditions as good ($p = 0.028$), have debts ($p = 0.0001$), employed ($p = 0.0001$) and practiced low physical activity ($p = 0.0001$). Associative relationships were detected between the levels of SA, PA, anxiety, depression and students' activity parameters included in the study.

Conclusion. The results obtained can be used to improve the academic process and preserve the mental health of the KBSU medical faculty students.

Keywords

Students, Situational anxiety, Personal anxiety, Depression, Anxiety, Pandemic, New coronavirus infection Covid-19

Imprint

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On March 11, 2020, the World Health Organization declared Covid-19 global pandemic. Taking into account the Covid-19 spread, unprecedented social measures have been taken in most countries to control the disease. Educational institutions have had to transit from traditional classroom learning to distance learning or hybrid learning during times of upsurge in Covid-19 and contact learning during times of decline in Covid-19. Such an organization of the educational process made it possible to ensure the continuity of education. However, many questions arose both on the pedagogical aspects of vocational education in the new conditions, and on the new risks to the health of students. Currently, the results of scientific studies concerning the adaptation of students to online learning and the impact of Covid-19 on the mental health of students have been published [1-8]. In our opinion, this problem is especially relevant for students enrolled in medical specialty programs due to the impossibility of their practical training in distance learning [1]. Despite the fact that some studies point to the negative impact of the pandemic and restrictive measures on the mental health of students, the impact of the pandemic on university education and on the health of medical students remains insufficiently studied. In our study, we focused more on studying the prevalence of signs of personal and situational anxiety, anxiety and depression in medical students during the Covid-19 pandemic.

Aims: to study the incidence rate of anxiety and depressive disorders and their relationship with everyday activities at the H.M. Berbekov Kabardino-Balkarian State University (KBSU) medical faculty students a year after the start of the Covid-19 pandemic.

Materials and methods

The study included the following stages: 1) theoretical: analysis of scientific literature and formation of a methodological basis for the study; 2) development of a special questionnaire; 3) conducting research, 3) mathematical statistical analysis.

The study was conducted at the Faculty of Medicine at the KBSU in 2021. A cross-sectional observational study included 425 students (144 males and 281 females) of the specialty “General Medicine” at the Faculty of Medicine, who underwent practical training at clinical bases and training in a contact form and agreed to participate in research. The average age of the surveyed students was 20.9 ± 2.1 years. Socio-demographic characteristics of the surveyed population are presented in Table 1.

The majority of students were not married (93.2%). Only 6.8% of students, among which 24.1% of the males and 75.9% of the females were married ($p < 0.0001$). The main source of income for students (91.1% of females and 55.6% of males, $p < 0.0001$) was the parents’ fund. At the same time, 6% of females and 34% of males ($p < 0.0001$) indicated their earnings as

the main source of income, and 2.8% of the females and 10.4% of the males ($p < 0.01$) other sources of income (scholarship, other relatives’ fund). The leading activity of the students is study. At the same time, in our sample, 8.2% of the females and 23.6% of the males ($p < 0.0001$) combined study with their employment. Moreover, 43.5% of employed females and 38.2% of employed males indicated that they have night shifts at work.

A specially designed questionnaire contained questions to assess marital status, education, employment information, physical activity level, self-assessment of health, academic performance, academic debt, preparation time for classes, class duration, sleep duration, smoking and alcohol consumption. To determine the level of situational anxiety (SA) and personal anxiety (PA), testing was carried out according to the Spielberger-Khanin method [9]. When assessing levels of anxiety, a score of less than 30 was assessed as low anxiety; 31 to 45 moderate anxiety and 46 or more as high anxiety [9]. Anxiety and depression levels were measured using the HADS Anxiety and Depression Scale developed by A.S. Zigmond and R.P. Snaith in

Table 1
Socio-demographic characteristics of the surveyed students

Indicators Abs.		Females		Males	
		Rel.	Abs.	Rel.	Abs.
Marital status	Married	22	7.8	7	4.9
	Not married	259	92.2	137	95.2
Education	Higher	24	8.5	15	10.4
	Vocational secondary	6	2.1	2	1.4
	Secondary	251	89.4	127	88.2
Place of residence	urban	206	73.3	118	82*
	rural	75	26.7	26	18*
Type of residence	Dormitory	11	3.9	26	18*
	Rental apartment	60	21.4	24	16.7
	Own apartment	38	13.5	24	16.7
	With parents	172	61.2	82	56.9
Housing conditions (according to respondents)	Excellent	188	66.9	88	61.1
	Good	78	27.8	48	33.3
	Satisfactory	15	5.3	8	5.6
Source of income	Parents funds	256	91.1	80	55.6****
	Own income	17	6	49	34****
	Other source	8	2.8	15	10.4**
Employment status	Employed	23	8.2	34	23.6****
	Having night shifts (from the number of employees)	10	43.5	13	38.2

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, **** $p < 0.0001$ - statistical significance of differences between males and females

1983 [10]. When assessing the levels of anxiety and depression, a score of less than 8 is regarded as “the absence of significantly expressed symptoms of anxiety and depression”, 8-11 as “subclinically expressed anxiety/depression”, 12 and more “clinically expressed anxiety/depression” [10]. Individuals who smoked at least one cigarette per day were considered smokers. The severity of alcohol consumption was determined by the consumption of pure ethanol in grams per week [11]. Physical activity was assessed according to the Global Questionnaire on Physical Activity recommended by the World Health Organization. The group of people with low physical activity (LPA) included students whose moderate-intensity physical activity was less than 150 minutes per week, or high-intensity physical activity less than 75 minutes per week [12].

Statistical analysis of the data was carried out using STATISTICA 6.0 software (StatSoft Inc, USA). The results are presented as the mean and its standard deviation for continuous variables and as a percentage for categorical variables. Hypotheses about a possible relationship between individual quantitative variables were refined by the method of paired correlation analysis. The results of the correlation analysis were interpreted on the basis of the Spearman criterion, while determining the rank correlation coefficient *r*. The values *p*<0.05 were taken as the critical level of significance when testing statistical hypotheses.

Results and Discussion

The levels of SA and PA of the surveyed students are presented in Table 2.

The average SA values of the surveyed students corresponded to low levels, and the average PA values corresponded to the average levels. The prevalence of high levels of PA and moderate levels of SA among females was higher than among males. Low levels of PA were more common among males than among fe-

males. Noteworthy is the more favorable profile of SA than PA.

When comparing our data with the results of a study conducted earlier at the Faculty of Medicine [13], a high prevalence of high levels of SA was established both among males and in a group of females in a study conducted earlier, when students studied remotely. However, differences in the prevalence of high levels of PA in studies were insignificant [13]. These differences can be explained by a more pronounced negative effect of external factors in the study of Miziev I.A. et al. (2021), which include distance learning, social restrictions, and a short period of time since the start of the pandemic. It is well known that SA is an adaptive mechanism inherent in all people and occurs in a stressful situation, and PA is a constitutional trait of a person associated with a low threshold of excitability of the nervous system.

Discussing the results obtained by us, it is necessary to note the external factors influencing the level of anxiety. Attention to situationally determined factors is due to the fact that they are controlled. Control and modulation of environmental factors make it possible to bring them as close as possible to the needs of an individual in order to create comfort, increase adaptability, and reduce anxiety. The most favorable profile of anxiety among the students we surveyed was apparently due to the fact that we conducted the study a year after the onset of the pandemic, during the period of students' internships and their training in a contact format. Following precautions were kept to avoid increasing incidence: social distancing, wearing of masks, etc. However, students may perceive the reduction in restrictive measures as a return to normal life, and having received more information about the pandemic throughout the year, they may also feel more confident.

We studied the prevalence of SA and PA depending on marital status, living conditions, place of residence,

Table 2
Levels of SA and PA in students

Levels	Situational anxiety			Personal anxiety		
	Males	Females	Total	Males	Females	Total
Average values, points (M±δ)	22.4 ± 8.0	24.2 ± 8.7	23.3±8.4	36.6±9.3	42.4±9.9	39.5±9.6
Low (%)	82.6	77.2	79.1	30.6	9.6****	16.7
Moderate (%)	17.4	26*	19.5	53.5	52	52.5
High (%)	0	2.1	1.4	15.9	38.4****	30.8

Note: * (*p*<0.05), **** (*p*<0.0001) statistical significance of differences between males and females.

source of income, academic performance, work status, sleep duration, smoking, alcohol consumption, NFA (see Table 3 herein).

In the surveyed population, the prevalence of high levels of SA is statistically significantly higher among people with higher education compared to those with secondary education ($p = 0.0417$); among students liv-

ing in rented apartments compared with those living with their parents ($p=0.0136$); among rural residents, compared with urban residents ($p=0.0005$), as well as among students with debts, compared with those without them ($p=0.0122$). High levels of PA were statistically significantly more often recorded in the group of students who rated their living conditions as

Table 3
SA and PA levels depending on students' activity indicators (%)

Indicators low		SA levels (%)			PA levels (%)		
		moderate	high	low	moderate	high	
Family status	married	82.8	13.8	3.4	17.2	58.6	24.1
	not married	78.8	19.9	1.3	16.7	52	31.3
Education	higher	69.3	25.6	5.1	20.5	46.2	33.3
	vocational secondary	75	25	0	0	50	50
	secondary	80.2	18.8	1.0*	16.2	53.5	30.3
Type of residence	dormitory	64	36	0	20	56	24
	own apartment	79	21	0	14.5	58.1	27.4
	with parents	81.5	17.7	0.8	17.3	51.2	31.5
	rental apartment	76.2	19.0	4.8**	5.5	51.2	33.3
Housing conditions	excellent	80.8	17.7	1.8	18.1	52.9	28.9
	good	77.7	22.3	0	15.1	53.2	31.7
	satisfactory	68.2	27.3	4.5	9.0	45.5	45.5*****
Place of residence	countryside	78.1	17.1	4.8	15.8	50.5	33.7
	city	79.4	20.3	0.3***	16.9	53.1	30
Source of income	parents' funds	78.3	20.2	1.5	14.6	51.8	33.6
	Own income	78.8	19.7	1.5	22.7	54.6	22.7
	Other income	91.3	8.7	0	30.5	56.5	13
Academic performance	excellent	93.2	6.2	0.6	18.4	48.7	32.9
	good	79.4	18.8	1.8	16	55.9	28.1
	satisfactory	72.1	27.9	0	17.6	42.7	39.7
Academic debt	yes	75.3	21.4	4.3	17.2	48.4	34.4
	no	80.1	19.3	0.6****	16.6	53.6	29.8
Employment status	Employed	80.7	19.3	0	28.1	47.4	24.6
	Unemployed	78.8	19.6	1.6	15.8	52.4	31.8
Night shifts	yes	68	32	0	28.6	50	21.4
	no	85.3	24.7	0	29.4	47.1	23.5
Sleep duration	Less than 8 h	75.9	22.2	1.9	15.9	50.5	33.6
	8 h and more	84.3	15.1	0.6	17.1	56.3	26.6
Smoking	yes	76	24	0	36.4	36.4	27.2
	no	79.3	19.2	1.5	16.3	52.8	31
Alcohol	yes	77.1	21.3	1.6	31.7	47.6	20.6
	no	79.4	19.2	1.4	14.6	53.0	32.4
Low physical activity	yes	73.4	23.4	3.1	14.0	56.3	30.7
	no	80.1	18.8	1.1	17.2	51.8	31.0

Notes: differences are statistically significant between students, * with higher and secondary education ($p = 0.0417$); ** living in rented apartments and with parents ($p=0.0136$); ***living in the city and the countryside ($p = 0.0005$); ****who have and do not have debts ($p = 0.0122$); *****who rate their living conditions as satisfactory or excellent ($p = 0.0001$).

satisfactory compared to peers who rated their living conditions as excellent ($p=0.0001$).

Thus, among the surveyed students there is a high prevalence of anxiety. Moreover, the most unfavorable situation is in the group of females compared to males. High levels of SA were more common among students with higher education, living in rented apartments, in rural areas and having debts, and high levels of PA were more common among students who rated their living conditions as satisfactory.

When analyzing the results of the survey on the scale of anxiety and depression HADS, it was found that 72% of the students examined by us did not have significantly expressed symptoms of anxiety, and 78.4% had significantly expressed symptoms of depression (see Table 4 herein).

Table 4

Levels of symptoms of anxiety and depression in students according to the HADS scale (%)

Levels	Signs of anxiety			Signs of depression		
	Males	Fe-males	Total	Males	Fe-males	Total
No significant symptoms	77.8	69	72	74.3	80.4	78.4
Subclinical anxiety/depression	14.6	17.1	16.2	16.7	24	15
Clinically significant anxiety/depression	7.6	13.9	11.8	9	13	6.6

The incidence rate of anxiety among the examined students was recorded to be 29% and depression 21.6%. Moreover, signs of subclinically expressed anxiety were found in 16.2% of students, subclinically expressed depression was detected in 15%, clinically expressed anxiety in 11.8% and clinically expressed depression in 6.6%. The gender differences did not reach the level of statistical significance. Some differences in the prevalence of signs of anxiety and depression depending on marital status, housing conditions, place of residence, source of income, academic performance, employment status, sleep duration, smoking, alcohol consumption and LPA are presented in Table 5.

In the population surveyed by us, the prevalence of subclinical depression was higher among the students who smoke compared with non-smokers ($p=0.0032$) and among students with LPA compared with students with the normal level of physical activity ($p=0.0001$). Clinically expressed depression was more common among students with higher education compared with peers with secondary education ($p=0.0258$);

in the group of students who rated their living conditions as good, compared with peers who rate their living conditions as excellent ($p=0.028$); among students with debts compared with those without them ($p=0.0001$); among employed students compared with unemployed ($p=0.0001$); in students with LPA compared with peers with a normal level of physical activity ($p=0.0001$).

In the context of the Covid-19 pandemic, the mental health symptoms are a growing concern around the world. According to a survey of 18,764 students from 14 campuses, conducted from late March to May 2020, more than 50% of American college students are concerned about contracting Covid-19, and about 90% about their personal safety [14]. Students also had a lower level of psychological well-being than before the pandemic [14]. Studies conducted in Chinese colleges show that students are concerned about delays in studies, negative economic consequences, routines and daily activities, and the prevalence of anxiety disorders is 24.9% [5]. Studies of anxiety and depressive symptoms among students showed its high prevalence in Turkey (45%) and Cyprus (anxiety level 64.1% and depression 57.3%) [6,7]. The prevalence of stress among students of medical faculties of the University of Zaragoza (Spain) almost a year after the start of the pandemic was 13.1%, anxiety 71.4% and depression 81%. The presence of stress and anxiety among university students due to Covid-19 almost a year after the start of the pandemic, according to researchers, confirms that psychological support measures for these groups should be the priority [8]. Differences in the prevalence of anxiety and depressive symptoms in different countries may be associated with different rates of the spread of the virus in these countries and various anti-epidemic and social measures.

To assess the impact of high anxiety, the level of anxiety and depression on the indicators included in the study, we conducted a correlation analysis. As presented in Table 6 herein, statistically significant correlations were found between PA and housing conditions, employment, main source of income, preparation time for classes, number of cigarettes smoked, alcohol consumption, rate of alcohol consumption, sports, physical exercises or active leisure activities of high intensity; between SA and housing conditions, sleep duration, academic performance, rate of alcohol consumption.

Table 5

Levels of anxiety and depression depending on the students activity indicators (%)

Indicators No signs		Anxiety			Depression		
		Subclinical level	Clinical level	No signs	Subclinical level	Clinical level	
Marital status	married	96.6	0	3.4	79.3	13.8	6.9
	not married	70.2	17.4	12.4	78.3	15.2	6.6
Education	higher	64.1	15.4	20.5	59	25.6	15.4***
	Vocational secondary	50	37.5	12.5	87.5	12.5	0
	secondary	73.3	15.9	10.8	78.5	15.8	5.7
Type of residence	dormitory	72	12	16	80	16	4
	Own apartment	67.8	17.7	14.5	71	17.7	11.3
	With parents	73.6	16.2	10.2	80.3	13	6.7
	Rental apartment	70.2	16.7	13.1	77.4	19	3.6
Housing conditions	excellent	74.3	15.9	9.8	81.5	13.8	4.7****
	good	69	15.9	15.1	73	15.9	11.1
	satisfactory	63.6	22.7	13.6	72.7	22.7	4.6
Place of residence	rural	75.3	18.8	5.9	77.2	13.9	8.9
	urban	71	15.4	13.6	78.7	15.4	5.9
Source of income	parents' funds	69.9	17.6	12.5	80.4	15.4	4.2
	Own income	74.2	15.2	10.6	66.7	13.6	19.7
	Other income	95.7	0	4.3	82.6	13	4.4
Academic performance	excellent	71	13.2	15.8	78.9	13.2	7.9
	good	71.2	17.4	11.4	78.2	15.8	6
	satisfactory	76.5	14.7	8.8	79.4	13.2	7.4
Academic debts	yes	68.8	15.1	16.1	74.2	16.1	9.7*****
	no	72.9	16.6	10.5	83.5	15.5	1
Employment status	employed	73.7	15.8	10.5	68.4	10.5	21.1*****
	unemployed	71.7	16.3	12	79.9	15.8	4.3
Night shifts	yes	78.3	13	8.7	82.6	4.3	13.1
	no	70.5	17.7	11.8	58.8	14.7	26.5
Sleep duration	Less than 8 h	68.5	18	13.5	77.4	15	7.5
	8 h and more	78	13.2	8.8	79.9	15.1	5
Smoking	yes	56	24	20	48	36*	16
	no	73	15.8	11.2	80.2	13.8	6
Alcohol	yes	68.9	18	13.1	65.6	22.9	11.5
	no	72.5	15.9	11.6	80.5	13.7	5.8
Low physical activity	yes	66.7	21.6	11.7	63.4	19.7**	16.9**
	no	72	16.9	11.1	93.8	4.6	1.6

Notes: differences are statistically significant between students, *smokers and non-smokers ($p = 0.0032$); ** with low and normal physical activity ($p=0.0001$); *** with higher and secondary education ($p = 0.0258$); ****estimating their living conditions as good and excellent ($p = 0.028$); *****who have and do not have debts ($p = 0.0001$); *****employed and unemployed ($p = 0.0001$).

Table 6

Correlations between the levels of anxiety and depression with some of the studied indicators ($p < 0.05$)

Indicator	Anxiety	Depression	Personal anxiety	Situational anxiety
Sleep duration	0.16	-	-	-0.10
Housing conditions	0.11	0.17	0.11	0.14
Employment	-	-	0,12	-

Indicator	Anxiety	Depression	Personal anxiety	Situational anxiety
Source of income	-0.15	-	-0.16	-
Preparation time for classes (hours)	-	-	0.14	-
Academic performance	-	-	-	0.10
Smoking	-	-0.10	-	-
Number of cigarettes smoked per day	0.55	-	0.52	-
Smoker index	0.38	-	-	-
Alcohol consumption	-	-	0.10	-
Rate of drinking	-	-	0.27	0.31
Engaging in sports, exercise or high-intensity leisure activities	-	-	0.12	-
Number of days per week of moderate-intensity sports, exercise or leisure activities	-	-0.17	-	-
Volume of fortified wine typically drunk per day	-0.28	-	-	-

Statistically significant correlations were also detected between the level of anxiety and housing conditions, main source of income, sleep duration, number of cigarettes smoked, smoker's index, volume of fortified wine usually consumed per day; between the level of depression and living conditions, current smoking and the number of days per week of sports, exercise or moderate-intensity leisure activities. Despite the fact that correlations do not indicate a causal relationship, we can talk about the possibility of the influence of the factors we identified on the levels of anxiety and depression. Relationships between anxiety and depressive symptoms and employment status, factors of educational activity have been identified in other studies [8,13]. Some of these factors are quite flexible and easily controllable. Rational modulation and control of them can reduce the level of anxiety, as well as manifestations of anxiety and depression. Recommendations on the organization of sports or physical exercises, on the rational distribution of time for preparing for classes and ensuring sufficient sleep, quitting smoking and drinking alcohol for the students examined by us can be useful.

Conclusion

Thus, in the surveyed population of students a year after the onset of the Covid-19 pandemic, an unfavorable situation was revealed in terms of the prevalence of anxiety and depressive symptoms. It

has been identified that the prevalence of high levels of PA and moderate levels of SA among females is higher than among males. High levels of SA were more common among students with higher education, living in rented apartments, in rural areas and having debts, and high levels of PA in the group of students who assess their living conditions as satisfactory. Clinically pronounced depression was more common among students with higher education, LPA, who assess their living conditions as good, have debts and combine study with work. Associative relationships were detected between the levels of SA, PA, anxiety, depression and parameters of students' everyday activity included in the study. The results obtained by us can be used to improve the academic process, as well as to preserve the mental health of students at KBSU.

Statement on ethical issues

Research involving people and/or animals is in full compliance with current national and international ethical standards.

Conflict of interest

None declared.

Author contributions

The authors read the ICMJE criteria for authorship and approved the final manuscript.

References

1. Camargo CP, et al. Online learning and COVID-19: a meta-synthesis analysis. *Clin. 2020*;75:e2286. <https://doi.org/10.6061/clinics/2020/e2286>.
2. Alsoufi A, et al. Impact of the COVID-19 pandemic on medical education: medical students' knowledge, attitudes, and practices regarding electronic learning. *PLoS One. 2020*;15:e0242905. <https://doi.org/10.1371/journal.pone.0242905>.
3. Wathélet M, et al. Factors associated with mental health disorders among university students in France confined during the COVID19 pandemic. *JAMA Net Open. 2020*;3:e2025591. <https://doi.org/10.1001/jamanetworkopen.2020.25591>
4. Huckins JF, et al. Mental health and behavior of college students during the early phases of the COVID-19 pandemic: longitudinal smartphone and ecological momentary assessment study. *J Med Int Res. 2020*;22:e20185. doi: 10.2196/20185
5. Cao W, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res. 2020*;287:112934. doi: 10.1016/j.psychres.2020.112934.
6. Özdin S, Bayrak Özdin Ş. Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender. *Int. J. Soc. Psychiatry. 2020*;66:504–511. doi: 10.1177/0020764020927051.
7. Solomou I, Constantinidou F. Prevalence and predictors of anxiety and depression symptoms during the COVID-19 pandemic and compliance with precautionary measures: age and sex matter. *Int. J. Environ. Res. Public Health. 2020*;17:4924. doi: 10.3390/ijerph17144924.
8. Marcén-Román Y, et al. Stress Perceived by University Health Sciences Students, 1 Year after COVID-19 Pandemic. *Int. J. Environ Res Public Health. 2021*; 18(10): 5233. doi: 10.3390/ijerph18105233.
9. Khanin YL. A brief guide to the use of the scale of reactive personal anxiety by Ch. D. Spielberger / Y. L. Khanin. - Leningrad: LNIIFK, 1976. 40 p. [in Russian]
10. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand. 1983*; 67: 361-70.
11. Balanova YA, Imaeva AE, Kontsevaya AV, et al. Epidemiological monitoring of risk factors for chronic non-communicable diseases in practical healthcare at the regional level. Guidelines edited by S.A. Boytsova. Moscow, 2016; 111 p. [in Russian]
12. Global guidelines on physical activity for public health. Geneva: WHO 2010; 58. [in Russian]
13. Miziev IA, et al. Peculiarities of lifestyle and mental health of students on distant education during novel coronavirus infection endemic (Covid-19). *Drugs and Cell Therapies in Hematology (ISSN: 2281-4876).2021*;10 (1): 2595-600.
14. The impact of Covid-19 on college student well-being. Healthy Minds Network (2020). Available online at: https://healthymindsnetwork.org/wp-content/uploads/2020/07/Healthy_Minds_NCHA_COVID_Survey_Report_FINAL.pdf (accessed June, 6, 2021).