

LEVELS OF ANXIETY AND DEPRESSION IN SECOND YEAR MEDICAL STUDENTS DURING COVID-19 PANDEMIC SPRING LOCKDOWN IN SKOPJE, NORTH MACEDONIA

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(Original scientific paper)

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Abstract

The aim of the study was to assess levels of anxiety, depression and perceived stress in second year medical students during Covid -19 pandemic spring lockdown in 2020. A cohort of 280 second year medical students, aged 18-20 years, from Medical Faculty, University "Ss. Cyril and Methodius", in Skopje, received questionnaires containing biographic issues, Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI) and Perceived Stress Scale (PSS) by e-mail. The response rate was 60 percent. One hundred sixty eight students (41 males and 127 females) completed and returned the questionnaires. Mean values of acquired BDI scores were 10.1 ± 7.6 . Mean values for BAI were 15.7 ± 11.3 points. Mean values of acquired PSS scores were 19.5 ± 7.5 . Using an arbitrarily defined BDI cutoff point of 21 or greater. Twelve percent of students showed depression accompanied by high anxiety and stress and consequent use of benzodiazepines. Female students showed higher anxiety, depression and levels of stress compared to males. Thirty nine percent of all students had depressive symptoms and 77% of all perceived stress. Almost 75% percent of female second year medical students showed anxiety symptoms, almost half of them showed depressive symptoms and 80% reported moderate to high levels of stress. The prevalence of high anxiety was 22 % in females, while the prevalence of depression was 12%, Seventeen percent of females showed high levels of stress. Continuous pastoral and psychological support as mandatory part of medical education is necessary, especially during major health crisis.

Key words: *medical students, anxiety, depression, stress, COVID -19*

Introduction

Since March 11th 2020, when World Health Organization (WHO) has declared COVID - 19 pandemic, the new SARS –CoV-2 contagious diseases has grown into a severe global health crisis without a clear and certain outcome and a serious economic and social challenge with definite impact on societies. The restrictive Public Health Measures, such as total lockdown, quarantine, restrictions of movement and lock down of universities and other institutions have been ordered by most countries during first months of pandemic (spring 2020). They showed evident efficiency in the containment of the virus and insufficiently investigated further effects on society (such as psychological impact). Similar measures are being taken during autumn 2020 as a result of the "pandemic second wave", which is characterized by increasingly high number of ill and dead patients and a severe pressure on health systems all over the world, especially in Europe and USA.

Medical students are recognized as an at-risk group for developing anxiety disorders with significantly larger rates than the general population, even under normal circumstances. The global prevalence rate of anxiety among medical students was 33.8% reported by Quek et al, 2019, based on their meta-analysis study (Quek et al, 2019). However, in an absence of data on the prevalence of anxiety in general population in our country, our earlier study on the prevalence of high anxiety and depression among university students in North Macedonia showed that there was no significant difference between university students in early stages of education. A portion of medical, dentistry and law students (20%, 11,3% and 16% respectively) suffered from high anxiety levels (BAI >25), while over 10% of them suffered from depression (BDI >20)

regardless of study curriculum. University students (especially females) in early stages of education were more prone to high anxiety and depression (Mancevska & Pluncevic - Gligoroska, 2014). The second year is one of the most challenging in Medical faculties curricula all over the world. It refers to medical clerkship and preclinical courses. Academic burden along with financial and personal problems have been identified as risk-factors associated with high anxiety and depression in second-year medical students (Mancevska et al, 2008). During COVID - 19 pandemic a drastic change in medical education happened abruptly. Traditional face-to face courses and patient bed-side teaching were ordered to be replaced with distant online learning from home. This triggered immediate and forced shift in medical students' lives and their learning strategies and techniques, while academic challenges of the "second year" did not change.

Higher rates of anxiety and depression in general population and non-medical college population during COVID - 19 pandemic are reported. This is underpinned by Salari and al, (2020) who performed a recent meta-analysis. They reported a prevalence of anxiety of 31.9% among the general population during the COVID-19 pandemic. The prevalence of stress in 5 studies with a total sample size of 9074 was obtained as 29.6% , and the prevalence of depression in 14 studies with a sample size of 44,531 people as 33.7% (Salari et al, 2020). In recent studies, the prevalence of anxiety and depression and stress during COVID-19 pandemic was shown to be higher in women than in men. (Moghanibashi-Mansourieh 2020; Ahmed et al., 2020; Zhou et al., 2020).

COVID-19 pandemic has impact on anxiety levels among university students with increased levels of anxiety in non-medical students and decreased ones in medical students after introduction of online learning. (Saddik et al., 2020). However, Saraswathi et al., (2020) report on negative effects of COVID - 19 pandemic on mental health of undergraduate medical students with increased prevalence of anxiety and levels of stress and unaltered prevalence of depression (Saraswathi et al., 2020). Lasheras and al., (2020) report from their meta-analysis study that the prevalence of anxiety in medical students is similar to that prior to the pandemic (28,9%) but correlates with several specific COVID-related stressors (Lasheras et al., 2020).

To our best knowledge until now, there are no available data regarding psychological impact of COVID - 19 pandemic on mental wellbeing in university students (including medical students) in our country. It is of great importance that such data should be obtained. This information is necessary in order to identify individuals prone to psychological disorders from different layers of population. The prevalence of high anxiety, depression and high levels of stress in medical students, who are future health care workers and seem to be a valuable support to health system during COVID - 19 pandemic, is also very important. It should be used to plan strategies and appropriate psychological interventions with an aim to improve individual mental health and to build resilience for the needs of further management of this and future similar public health issues.

The aim of the study was to assess levels of anxiety, depression, perceived stress and substance use habits in second year medical students during COVID -19 pandemic spring lockdown in 2020.

Materials and Methods

The study was performed at the Student Counseling Service within the Institute of Physiology and Anthropology, Medical Faculty, "Ss. Cyril and Methodius" University in Skopje during May 2020. A cohort of 280 second year medical students, aged 18-20 years, from Medical Faculty, University "Ss. Cyril and Methodius", in Skopje, received questionnaires containing biographic info and information of subjects' substance use habits (alcohol, nicotine, illicit drugs and benzodiazepines) by e-mail. Macedonian versions of the following self-rating psychological instruments: the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI) and Perceived Stress Scale (PSS) were included. The response rate was 60 percent. One hundred sixty eight students (41 males and 127 females) gave informed consent to participate and completed and returned the questionnaires.

Beck Anxiety Inventory consists of 21 questions related to various behavioral, emotional, cognitive and physiological symptoms of anxiety. The intensity of perceived anxiety for every question in BAI is scored from 0 to 3, with 0 representing the least serious and 3 the most serious symptoms. It is a short, simple and very popular tool which is used as a pre-screen for presence of an anxiety disorder in both clinical and non-clinical population. It has excellent internal consistency ($\alpha = 0.92$) and high test-retest reliability (Leyfer et al., 2006). The sum of all items is calculated at the end. Scores of BAI from 0-7 were ranked as "normal anxiety level"; 8-25 as "moderate"; and 26-63 as "high anxiety".

The degree of depressive symptoms was measured by the 21-item-revised form of Beck Depression Inventory (36). The BDI statements for each question are ranked from 0 to 3, with 0 representing the absence of symptom and 3 the most serious symptoms. The description of the symptoms includes mood change, social withdrawal, hopelessness, irritability, cognitions such as guilt or feelings of being punished, suicidal intentions, as well as physical symptoms such as fatigue, weight loss and lack of interest in sex. It is a simple, highly sensitive and one of the most widely used instruments for the evaluation of depressive symptoms in clinical as well as non-clinical population. It has excellent internal consistency ($\alpha = 0.86$). Similarly to BAI, the sum of all items was calculated at the end. Scores of BDI < 10 indicate “absence of depressive symptoms”, BDI scores from 11-20 indicate “mild depressive symptoms”, while BDI scores from 21-30 indicate “moderate depressive symptoms”. BDI scores higher than 31 indicate “clinically manifest depressive episode”. (10).

The Perceives stress scale was introduced by Cohen and al, in 1983 (Cohen et al., 1983). It consists of ten questions; scoring by 5-point Likert scale (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Fairly often, and 4 = Always) is done. The scores of the four positively stated items 4, 5, 7, and 8 are reversed (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0) and then add up the scores for each item to get a total. Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress (linear relation). Stress was stratified as follows: scores range from 0 to 13 indicated low-stress level, scores range from 14 to 26 indicated moderate stress level, scores range from 27 to 40 indicated high-stress level. (Seedhom et al., 2019)

Students who reported high scores on psychological instruments received feedback (by e-mail) with an advice how to reduce their anxiety levels and depression. Five students with depression and high anxiety visited the Counseling service in person and received one hour of counseling per person with an advice for prolonged therapy and management of situation.

For statistical evaluation of the data, SPSS 16 software (SPSS Inc., Chicago, IL) was used. The results are represented by mean values and their standard deviations as measures of central tendency; the analysis was performed with the Student t test, Pearson coefficient of correlation and chi-square test. The level of significance was $p < 0.05$.

Results

The prevalence of substance use (alcohol, nicotine, benzodiazepines and illicit drugs) in female and male participants in our study can be seen on table 1. There was no gender difference regarding all indicated substances ($p > 0.05$). Forty seven percent of all participants reported that they drank alcohol during “past fortnight” while the order for lockdown of restaurants was in power.

Table 1. Alcohol, nicotine, sedative-hypnotics and illicit drug use among second year medical students during COVID - 19 pandemic spring lockdown

<i>Variables</i>	<i>Subjects</i>	<i>Females</i> <i>n=127 (%)</i>	<i>Male</i> <i>n=32 (%)</i>	
Alcohol				
never used		37 (29.1)	9 (28.1)	(chi square = 0.035; df=2; N= 159; p= 0.985)
past year		30 (23.6)	8 (25)	
past fortnight		60 (47.2)	15 (46.9)	
Nicotine				
smokers		22 (17.3)	8 (25)	(chi square = 0.9841; df=1; N= 159; p= 0.32')
Benzodiazepines				
never used		101 (79.5)	26 (81.2)	(chi square = 1.5406; df=2; N= 159; p= 0.4628)
past year		16 (12.6)	2 (6.3)	
past fortnight		10 (7.9)	4 (12.5)	
Illicit drug use				
ever used		3 (2.4)	2 (6.2)	(chi square = 1.268; df=1; N= 159; p= 0.260)

Mean value of BAI scores in second year medical students was 15.7 ± 11.3 with obtained minimal BAI score = 0 and maximal BAI scores = 51. Mean value of BDI scores was 10.1 ± 7.6 with obtained minimal

BDI score = 0 and maximal BDI=31. Mean value of obtained scores on PSS scale were 19.5 ± 7.5 with minimal PSS score =0 and maximal PSS=32. (fig1)

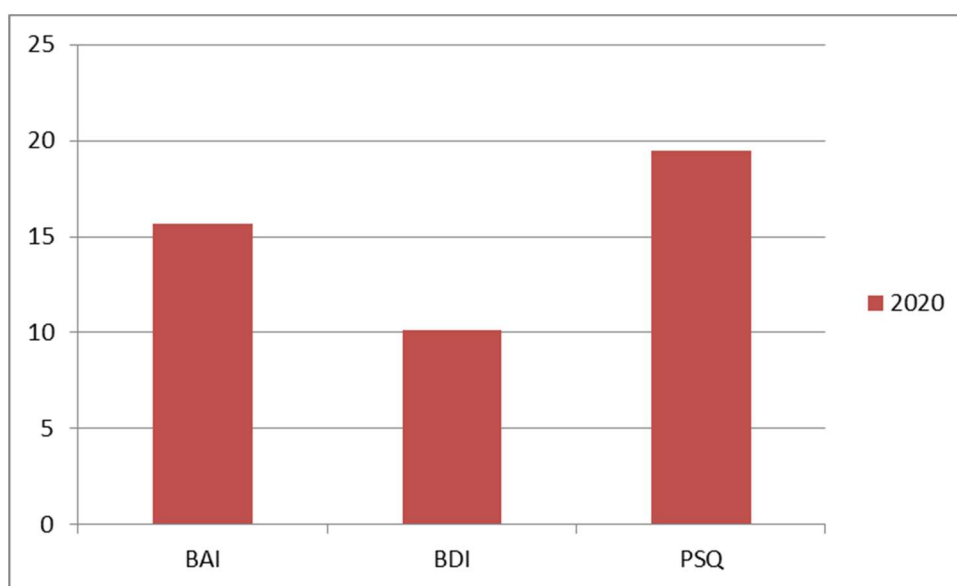


Figure1. Mean BAI, BDI and PSS scores obtained in second year medical students during COVID - 19 spring lockdown

As can be seen from table 2, there was statistically significant difference between female and male students within our sample regarding all three measured parameters of anxiety, depression and levels of stress ($p < 0.05$). Female students obtained higher mean values on all three instruments.

Table 2. Mean values and standard deviations of BAI, BDI and PSS scores obtained in female and male second year medical students during COVID – 19 spring lockdown

Subjects	M2 2020 Females N=127	Males N=41	T-test
Variables			
Mean BAI scores	17.6 ± 11.7	9.7 ± 7.4	$p < 0.005$
Mean BDI scores	11 ± 7.8	7.4 ± 6.2	$p = 0.008$
Mean PSS scores	20.2 ± 7.6	17.1 ± 6.8	$p = 0.022$

The distribution of all second year medical students regarding gender and based on obtained individual BAI, BDI and PSS scores is shown in table 3. As can be seen only thirty two female students (25.2%) reported normal anxiety levels, compared to 45.5% male students. Almost 75% of females were ranked moderate to high anxiety ($BAI > 7$). Seventy percent of all second year medical students had anxiety. Twenty eight female students showed high anxiety levels ($BAI > 25$) compared to none of their male peers (chi square = 5.1813; $df=1$; $N= 160$; $p= 0.0228$).

Seventy female students (55.1%) did not show any signs of depression compared to eighty two percent of their male peers. Sixteen females showed considerable symptoms of depression ($BDI > 20$) and two of them reported very high BDI scores which are equivalent to clinically manifest depression ($BDI > 30$). Only nine percent of males showed considerable depressive symptoms (chi square = 8.475; $df=2$; $N= 160$; $p= 0.014$). None of students reported suicidal intention. Twelve percent of all students (16 females and 3 males) showed considerable depressive symptoms, by scoring in mild or severely depressed range (mean BDI = 24.3 ± 3.7). Mean values of BAI scores in these students were 30.3 ± 13.1 . Fifteen of depressed students showed severe levels of anxiety symptoms ($BAI > 35$). Mean values of PSS scores were 29 ± 4.9 . All fifteen used benzodiazepines during previous fortnight in order to cope with anxiety, high stress and depression.

Regarding individually acquired PSS scores only 19.7% of female students showed low levels of stress compared to 37.5% of their male peers. Over eighty percent of them showed moderate to high levels of stress compared to 62.5% of their male peers (chi square = 5.751; $df=2$; $N= 159$; $p= 0.056$). However the

difference was not statistically significant. There was a strong positive correlation between the degree of depressive symptoms and the levels of anxiety and perceived stress ($r=0.731$ and $r=0.709$) respectively. (table 3)

Table 3. Distribution of second year medical students based on the obtained individual BAI, BDI and PSS scores during COVID - 19 pandemic spring 2020 lockdown

Variables	Subjects	Females N (%)	Males N (%)
BAI scores*			
0-7	Normal anxiety	32 (25.2)	15 (45.5)
8-25	Moderate anxiety	67 (52.8)	18 (54.5)
>25	High anxiety	28 (22)	0
BDI scores*			
0-10	No depression	70 (55.1)	27 (81.8)
11-20	Mild depression	41 (32.3)	3 (9.1)
21-30	Moderate depression	14 (11)	3 (9.1)
>30	Clinically manifest depression	2 (1.6)	0
PSS scores			
0-13	Low stress	25 (19.7)	12 (37.5)
14-26	Moderate stress	80 (63)	18 (56.2)
27-40	High stress	22 (17.3)	2(6.3)

*Chi square; $p<0.05$

Discussion

Results obtained in our study, to our best knowledge, represent the first results regarding substance use habits, levels of anxiety, depression and levels of perceived stress among medical students during COVID - 19 pandemic in our country. Seventy percent of second year medical students had anxiety. Thirty nine percent of all students had depressive symptoms and 77% of all perceived stress. Almost 75% percent of female second year medical students showed anxiety symptoms, almost half of them showed depressive symptoms and 80% reported moderate to high levels of stress. The prevalence of high anxiety was 22 % in females, while the prevalence of depression was 12%, Seventeen percent of females showed high levels of stress.

These results are in accordance with our previous results on the prevalence of high anxiety and depression in university students. The prevalence of high anxiety in university students ranged from 11.3% in second year dentistry students to 20% among first year medical students. The prevalence of high anxiety in second year medical students was 15% (Mancevska & Pluncevic-Gligoroska 2014). The prevalence of anxiety in our sample (70%) was almost two times higher than the findings of Quek et al., (2019), who estimated the global prevalence rate of anxiety among medical students to be of 33.8% based on their meta-analysis study (Quek et al., 2019). However, Lasheras and al., (2020) report, based on their meta-analysis study, that the prevalence of anxiety in medical students during COVID - 19 pandemic is similar to that prior to the pandemic (28,9%) but correlates with several specific COVID-related stressors (Lasheras et al., 2020).

Studies of anxiety employ different instruments to measure anxiety. Beck Anxiety Inventory (BAI) is a measure of current psychopathology expressed in the individual during a short period of time (during last week). In non-clinical samples it reveals the development of sub-clinical anxiety symptoms of short duration which are insufficient to be diagnosed as an anxiety disorder. On the other hand, in clinical samples it is a widely-used instrument for the assessment of the treatment of anxiety disorders (Leyfer et al., 2006). Nakhostin Ansari et al., (2020) also used BAI in their study during COVID - 19 pandemic and reported 38,1% prevalence of mild to severe anxiety in students who were in clerkship (first two years of study) compared to 70% in our sample. However, they reported 16.7% prevalence of moderate to severe anxiety, while in our sample the prevalence of high anxiety in all students was 17.5%. (Nakhostin-Ansari et al., 2020). Fifty two percent of students in our sample scored within the range of moderate anxiety levels.

Within student counseling services, students with high levels of anxiety ($BAI>25$) should be submitted to a psychiatric interview and afterwards they should carefully be monitored and treated with different modalities of psychotherapy combined with carefully monitored pharmacotherapy, if it is necessary. Such high levels of anxiety are often accompanied with frequent panic attacks and different types of social

anxiety (fear of exams, fear of public speaking) with negative effects on academic performance. If these levels of anxiety persist during longer period of time they could progress in clinically manifest anxiety disorder and depression. Unsubscribed long-term use of benzodiazepines which is common in subjects with high anxiety can easily lead to benzodiazepine addiction.

University students (especially females) in early stages of education are more prone to high anxiety and depression ((Mancevska & Pluncevic-Gligoroska 2014). Our findings on higher rates of anxiety, depression and high stress levels in female students are in accordance with the results from different epidemiological studies which show that women are more prone to psychological distress and anxiety disorders. A broad range of relevant factors, including biological influences (several structural or functional gender differences in anxiety-relevant brain regions, such as the prefrontal cortex, hippocampus, and extended amygdala complex, different serotonergic circuits and hormonal fluctuations), behavioral and cognitive factors, as well as environmental factors have been proposed as underlying reasons for this findings (Donner & Lowry 2013).

The prevalence of depressive symptoms in our study was 39%. It was higher than the prevalence of depression in 27.5% in Iranian medical clerks Twelve percent of all students in our sample showed BDI scores >20, compared to 10.8% in Iranian medical clerks obtained during COVID - 19 pandemic with BDI (Nakhostin-Ansari et al., 2020). Furthermore, Bartoszek and al., (2020) report on the prevalence of 23% of depression in healthcare workers and 33.7 % in general population. (Bartoszek et al., 2020).

The prevalence of depression among medical students before COVID - 19 pandemic was persistently higher compared to general population, with global prevalence of 27.2% reported by Rotenstein and al., (2016). In their meta-analysis study they estimated depression or depressive symptom prevalence from data extracted from 167 cross-sectional studies (n = 116 628) and 16 longitudinal studies (n = 5728) from 43 countries. All but 1 study used self-report instruments. They report that the overall pooled crude prevalence of depression or depressive symptoms was 27.2% (37 933/122 356 individuals; 95% CI, 24.7% to 29.9%, I² = 98.9%) and that summary prevalence estimated ranged across assessment modalities from 9.3% to 55.9%. According to this study, depressive symptom prevalence remained relatively constant over the period studied (baseline survey year range of 1982-2015; slope, 0.2% increase per year [95% CI, -0.2% to 0.7%]) (Rotenstein et al., 2016).

The prevalence of depressive symptoms in female students in our study was significantly higher compared to their male peers. Forty three percent showed mild to moderate depressive symptoms, while 1.6% showed severe depressive symptoms (BDI>30), compared to 18% of male students who showed mild to moderate depression. Gender effect on depression in medical students is not a consistent finding, perhaps due to different methodology adopted in different studies and different socio-cultural settings. (Kumar et al., 2017).

Twelve percent of students in our sample showed moderate to severe depression accompanied by high levels of anxiety and perceived stress. Fifteen of them used benzodiazepines to cope with their symptoms. High anxiety has been identified to be a risk factor for depression in medical students (Mancevska et al., 2008). Medical students show high levels of resilience which has been shown to prevent from development of anxiety disorders as well as depression. Home confinement and living with parents and social support have been addressed as a protective factor for anxiety during COVID - 19 pandemic (Lasheras et al., 2020). Nevertheless, students who show manifest depression and high anxiety and stress during COVID - 19 pandemic lockdown should receive strong pastoral support by faculty and be advised and encouraged to seek professional help and treatment.

Eighty percent of students in our study perceived moderate to high stress during COVID - 19 pandemic lockdown. There was no difference between female and male students. To our best knowledge, these are first data on levels of perceived stress in university students in our country. They are in accordance with the results from different studies that report high prevalence of high levels of perceived stress among university students in Middle East and Asia within a range of 50 to 92%, with highest prevalence in medical students (Seedham et al., 2019). It is possible that observed variation in results may be due to cultural differences, differences in sociodemographic background of participants, differences in the health-care system, and the tools used for measurement in these studies.

One of the limitations of our study is its cross-sectional design, which does not provide baseline data on measured parameters to be compared with. The response rate of 60% could also affect the results. Nevertheless, data obtained in this study are valuable baseline data for further investigation of mental health in medical students during COVID-19 pandemic. These data should be used in order to identify individuals

prone to psychological disorders among healthcare professionals. The prevalence of high anxiety, depression and high levels of stress in medical students, who are future health care workers and seem to be a valuable support to health system during COVID - 19 pandemic is important and should be used to plan strategies and appropriate psychological interventions with an aim to improve individual mental health and to build resilience for the needs of management of future similar public health issues.

Conclusion

The prevalence of anxiety, depression and high levels of stress in junior medical students, particularly in females was very high. Twelve percent of students showed depression accompanied by high anxiety and stress and consequent use of benzodiazepines. Continuous pastoral and psychological support as mandatory part of medical education is necessary, especially during major health crisis.

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