

## PREVALENCE OF DEPRESSIVE SYMPTOMS IN MEDICAL STUDENTS

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Depression, anxiety and stress symptoms are common in medical students. The objective of the paper was to assess and to compare the prevalence of depressive symptoms in the first and fourth year medical students. Methods. The cross-sectional study based on the Patient Health Questionnaire-9 (PHQ-9) was done.

The response rate was 83% (331 of 400). Overall, 48% of the students (both first and fourth year) had symptoms of depression. The average PHQ-9 score in first year students was significantly higher than in fourth year students,  $6.75 \pm 4.60$  vs.  $5.03 \pm 4.67$ ,  $p < 0.05$ . The most prevalent were mild depressive symptoms and they were observed in almost every third medical student. The female students had significantly higher average PHQ-9 score compared with the male students  $6.37 \pm 4.88$  vs.  $4.89 \pm 4.27$ ,  $p < 0.01$ . The significant negative correlation between depressive symptoms in medical students and their everyday achievement was observed ( $\rho = 0.610$ ;  $p < 0.001$ ).

More than a half of all the examined students did not have signs of depression and 48% of them did. Depressive symptoms were more prevalent in the first year students than in the fourth year students and also among the female compared with the male students. Depressive symptoms had a significantly negative impact on daily activities of the students. During medical studies students experience high levels of stress and they should be screened for the symptoms of depression.

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**Key words:** depressive symptoms, prevalence, medical students, PHQ-9 questionnaire

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### Introduction

It is well known that depression, anxiety and stress symptoms are common in medical students (1, 2). Stress and depression during the medical school may predict later mental health problems in physicians (2, 3, 4) and the stress that began in medical school tends to continue throughout the years of practicing medicine.

According to the results of the study from 2016, medical students in the United States of America (the USA) have two to five times more prevalence of depression than the general population; their depression prevalence ranged from 9% to 56%.

The authors determined that 27% of medical students had depression or symptoms of depression (5).

The percentage of medical students with depression or depressive symptoms ranged from 20% in Europe to 31.8% in the Middle East. Medical students in the North America had the second highest prevalence at 30.3% (6).

Depression of medical students is associated with poorer quality of life, impaired academic productivity and an increased usage of some medicines like benzodiazepines, the use of alcohol, tobacco, illicit substances, and self-harming behavior to help cope with negative affects (7, 8).

In the study of Mackenzie (2011), depression was associated with a number of health issues such as unwanted sexual experiences, and other forms of victimization or violence (8). Furthermore, increased severity of depression is associated with suicidal ideation and suicide attempts (9, 10). Cross-country, cross-ethnic and cross-cultural differences may contribute to depression prevalence (11).

In general, depression is one of the most prevalent mental disorders (12), but it is hard to document real prevalence of depression among medical students. To our best knowledge, only a few similar studies among medical students in Serbia have been conducted to date.

The objective of the paper was to determine and compare the prevalence of depression among the first and fourth year medical students at the Faculty of Medicine, University of Niš.

## Method

The cross-sectional study based on the Patient Health Questionnaire-9 (PHQ-9) was carried out. All first and fourth year medical students of the Integrated Medical Studies at the Faculty of Medicine in Niš were involved in the study. The study was conducted from October to November 2016.

The city of Niš is the third largest University City in Serbia. It is the centre of the Nišava's region and the population of the region makes 5.1% in comparison to the population of the central Serbia (the population figures from the middle of 2016). The Faculty of Medicine of the University of Niš is the only Faculty of Medicine in the city of Niš and it is the state Faculty of Medicine. No private faculty of medicine exists either in the city of Niš or in the southeast of Serbia. Integrated Medical Studies are perceived as being prestigious among pupils of high schools. Integrated Medical Studies last for six study years at the Faculty of Medicine in Niš.

Each year, pupils with the best marks from the fourth year high schools from the city of Niš and from other parts of southeast Serbia try to pass an entrance exam and become students at the Faculty of Medicine in Niš.

This study is a part of an internal project at the Faculty of Medicine in Niš which is called: "The quality of life and the prevalence of depression among university students at the University of Niš". The Number of the project is 28/2016 and this project is approved by the Council of the Faculty of Medicine in Niš and the Ethical Committee of the Faculty of Medicine in Niš and the data presented in this paper are the first findings.

All participants were given the self-administrated Patient Health Questionnaire (PHQ-9). The total of 400 questionnaires (Serbian version of anonymous, validated PHQ-9) was distributed. Sixty-nine questionnaires were incomplete and we decided not to include them in the study.

### *The PHQ-9 Questionnaire*

Depression is a common mental disorder, characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-esteem, disturbed sleep or appetite, feelings of tiredness and poor concentration (12).

The PHQ-9 questionnaire is short and self-completed and it is a validated tool used to screen for depression based on the standard Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition) (13).

As described in the Diagnostic and Statistical Manual of Mental Disorders, 5<sup>th</sup> edition (DSM) (13) the hallmark of major depressive disorder (MDD) is the occurrence of depressed mood (dysphoria) and loss of interest for the activities that were rather

pleasurable in the past (anhedonia) for a duration of at least two weeks.

The PHQ-9 questionnaire has 9 items which, on the Likert scale, are designed to establish the diagnosis of depression in accordance with the criteria of the DSM-V. The PHQ-9 as a Measure of Depression severity ranges from 0 to 27, because each of the 9 items can be scored from 0 ("not at all") to 3 ("nearly every day") (14, 15).

The PHQ-9 is a self-administrated and can be used either as a diagnostic test to make a probable diagnosis of MDD or as a continuous measure with scores ranging from 0 to 27 and cut off points of 5, 10, 15 and 20 representing mild, moderate, moderately severe and severe levels of depressive symptoms. MDD should be considered in individuals who endorse  $\geq 5$  of the 9 symptoms as present "more than half the days" (the 9<sup>th</sup> item counts if endorsed "several days") and one of the first two symptoms (depressed mood or loss of interest) is endorsed (16).

The PHQ-9 has been used in the student population of the city of Niš with good reliability (Cronbach coefficient  $\alpha = 0.828$ ). Cronbach's highest reliability was in the second question "feel depressed" (Cronbach coefficient  $\alpha = 0.756$ ), the sixth question "low self-esteem" (0.796) and the first question "anhedonia" (Cronbach coefficient  $\alpha = 0.807$ ).

## Statistical analysis

Quantitative analyses were performed using SPSS 18.0 statistical software package (SPSS Inc, Chicago, Illinois).

Cronbach coefficient  $\alpha$  test was used for testing the reliability of the PHQ-9 questionnaire for the examined population. For scoring the average PHQ-9 score, the Student's t-test was used. Chi square test ( $\chi^2$ ) and the Pearson's correlation coefficient were calculated. The difference was considered statistically significant when the p-value was below 0.05.

## Results

The total number of students who completed the PHQ-9 questionnaire was 331 (112 males and 219 females). The response rate was 83% (331 of 400). There were 161 first year students (48 males and 113 females) and 170 fourth year students (64 males and 106 females). The average age of first year students was  $19.08 \pm 0.47$  (ranged 18-21) and the average age of fourth year students was  $22.22 \pm 1.07$  (ranged 21-30).

The fourth year students were statistically significantly older than the first year students ( $t = 34.05$ ;  $p = 0.00$ ) (Table 1).

There was not statistically significant difference in the structure by gender and by the year of study ( $\chi^2 = 2.266$ ;  $p = 0.132$ ).

The average PHQ-9 score in the first year students was significantly higher  $6.75 \pm 4.60$  vs.  $5.03 \pm 4.67$ ,  $p < 0.05$ , than in the fourth year students. There were more fourth year students with the PHQ-9 score of 0-4 than first year students, which means that they did not have signs of depression, 106

(62.4%) vs. 66 (41%). The determined difference was statistically significant ( $\chi^2 = 15.13$ ,  $p = 0.0001$ ; 95% CI 10.3 to 31.9).

There was statistically significant difference in the prevalence of depressive symptoms of various grades between the students of the first and of the fourth year ( $\chi^2 = 15.370$ ;  $p < 0.001$ ).

There were more first year than fourth year students with PHQ-9 score of 5-9 (mild depressive symptoms) 57 (35.4%) vs. 41% (24.1%) and it was statistically significant ( $\chi^2 = 5.052$ ,  $p = 0.02$ ). It was determined that there were more first year students with score of 10-14 (moderate depressive symp-

toms, 38 (23.6%) than fourth year students 23 (13.5%). The difference was significant statistically ( $\chi^2 = 5.598$ ,  $p = 0.01$ ).

The PHQ-9 score of 15-19 (moderate severe depressive symptoms) had 8 (4.9%) of the first year students and 6 (3.9%) of the fourth year students. The difference was not statistically significant ( $\chi^2 = 0.197$ ,  $p = 0.65$ ). The highest PHQ-9 score 20-27 (severe depressive symptoms) had the equal number of the first and fourth year students: 3 (1.8%) vs. 3 (1.8%).

**Table 1.** Characteristics of the examined medical students

Variable		n	(%)	test	p-value
Sex	Male	112	(33.8)		
	Female	219	(66.2)		
Age	$\bar{x} \pm SD$				
First year students	19.08 $\pm$ 0.47			t = 34.05	p = 0.00
Fourth year students	22.22 $\pm$ 1.07				
Structure by gender					
First year	Male	48	(29.8)	$\chi^2 = 2.266$ ;	p = 0.132
	Female	113	(80.2)		
Fourth year	Male	64	(37.6)		
	Female	106	(62.4)		
Average PHQ-9 score	$\bar{x} \pm SD$				
First year students	6.75 $\pm$ 4.60				p < 0.05
Fourth year students	5.03 $\pm$ 4.67				

**Table 2.** Distribution of the medical students by various grades of depression according to the PHQ-9 score and by the year of studying

PHQ-9 Total score	Total N = 331		First year students N = 161		Fourth year students N = 170		p-value <sup>1</sup>
0-4	172	52.0	66	41.0	106	62.4	p < 0.001
5-9	98	29.6	57	35.4	41	24.1	p = 0.02
10-14	41	12.4	27	16.8	14	8.2	p = 0.01
15-19	14	4.2	8	4.9	6	3.5	p = 0.65
20-27	6	1.8	3	1.9	3	1.8	nonsignificant

<sup>1</sup>Chi-squared test

According to the data presented in Table 2, there were more first year than fourth year students with PHQ-9 score of 5-9 (mild depressive symptoms) 57 (35.4%) vs. 41% (24.1%) and it was statistically significant ( $\chi^2 = 5.052$ ,  $p = 0.02$ ).

There were more first year students with score of 10-14 (moderate depressive symptoms), 38 (23.6%) than fourth year students 23 (13.5%). The difference was significant statistically ( $\chi^2 = 5.598$ ,  $p = 0.01$ ).

The PHQ-9 score of 15-19 (moderate severe depressive symptoms) had 8 (4.9%) first year students and 6 (3.9%) fourth year students. Difference was not statistically significant ( $\chi^2 = 0.197$ ,  $p = 0.65$ ).

The highest PHQ-9 score 20-27 (severe depressive symptoms) had the equal number of the first and fourth year students 3 (1.9%) vs. 3 (1.8%).

According to the results showed in Table 3, there were significantly more females 71 (32.4%) than males 27 (24.1%) with PHQ-9 score of 5-9. The difference was not statistically significant ( $\chi^2 = 2.443$ ,  $p = 0.1$ , 95% CI -2.5 to 18.3).

**Table 3.** Distribution of medical students according to the total PHQ-9 score and by gender

PHQ-9 Total score	Total N = 331		Male N = 112		Female N = 219		p-value <sup>1</sup>
	Number	%	Number	%	Number	%	
<b>0-4</b>	172	52.0	69	61.6	103	47.0	p < 0.001
<b>5-9</b>	98	29.6	27	24.1	71	32.4	p = 0.11
<b>10-14</b>	41	12.4	14	12.5	27	12.3	p = 0.95
<b>15-19</b>	14	4.2	0	0.00	14	6.4	-
<b>20-27</b>	6	1.8	2	1.8	4	1.8	non-significant

<sup>1</sup>Chi-squared test

It was determined that the PHQ-9 score of 10-14 (moderate depressive symptoms) had 27 (12.3%) female and 14 (12.5%) male students. There was not a statistically significant difference ( $\chi^2 = 0.003$ ,  $p = 0.95$ , 95% CI -7.2 to 8.7) in the prevalence of moderate depressive symptoms between females and males.

Only 14 (4.2%) female students had PHQ-9 score of 15-19, which means that only the female students had moderate severe depressive symptoms.

The highest PHQ-9 score of 20-27 had 6 (1.8%) medical students (2 males and 4 females), which means that they had severe depressive symptoms.

The female students had significantly higher PHQ-9 score compared with the male students  $6.37 \pm 4.88$  vs.  $4.89 \pm 4.27$ , ( $p < 0.01$ ).

The distribution of the medical students according to the PHQ-9 score by gender and by study year is presented in Table 4.

**Table 4.** Distribution of medical students according to the total PHQ-9 score, by gender and the year of studying

PHQ-9 Total score	First year		Fourth year	
	Male Number	Female %	Male Number	Female %
<b>0-4</b>	22 (13.7)	46 (28.5)	47 (27.6)	57 (33.5)
<b>5-9</b>	14 (8.7)	43 (26.7)	13 (7.6)	28 (16.4)
<b>10-14</b>	10 (6.2)	16 (9.9)	3 (1.8)	11 (6.5)
<b>15-19</b>	0 (0.0)	8 (4.9)	0 (0.0)	6 (3.5)
<b>20-27</b>	0 (0.0)	2 (1.2)	2 (1.2)	2 (1.2)

There were significantly less first year male students compared with fourth year male students

who did not have depressive symptoms ( $\chi^2 = 6.57$ ,  $p = 0.01$ ; 95% CI 2.7 to 24.8).

It was found that the first year male students had more mild depressive symptoms than the fourth year male students (7.6% vs. 8.7%) but the observed difference was not statistically significant ( $\chi^2 = 0.090$ ,  $p = 0.8$ ; 95% CI -6.86 to 9.1). Moderate depressive symptoms were significantly more common in the first year male students compared with the fourth year male students ( $\chi^2 = 4.21$ ,  $p = 0.04$ ; 95% CI -0.2 to 9.5).

Male students from both the first and fourth year did not have moderate severe depressive symptoms by PHQ-score. Symptoms of severe depression were observed only in 2 (1.2%) fourth year male students.

There were more fourth year female than first year female students (33.5% vs. 28.5%) with PHQ-9 score of 0-4. The difference was not statistically significant ( $\chi^2 = 0.96$ ,  $p = 0.3$ ; -5.3 to 15.2). The first year female students had more mild depressive symptoms than the fourth year female students (26.7% vs. 16.4%). The determined difference was statistically significant ( $\chi^2 = 5.19$ ,  $p = 0.02$ ; 95% CI 1.0 to 19.4).

The fourth year female students had less moderate severe depressive symptoms (3.5% vs. 4.9%), and the difference was not statistically significant ( $\chi^2 = 0.40$ ,  $p = 0.5$ ). An equal percentage of female students from the fourth and from the first year had severe depression (1.2% vs. 1.2%).

There was a statistically significant negative correlation between the PHQ-9 score and an add item, which was related to the everyday functioning ( $\rho = 0.610$ ;  $p < 0.001$ ).

## Discussion

In our study, nearly half of the medical students had depressive symptoms of various grades based on the PHQ-9 score. The most prevalent were mild depressive symptoms and they were observed in almost every third medical student (first year 35.4% vs. fourth year 24.1%). The first year medical students had significantly higher prevalence of depressive symptoms compared with the fourth year students (62.4% vs. 41%). Depressive symptoms were more common in the female (53% vs. 38.4%) than in the male medical students.

In our study, the prevalence of depression was 48% and it was higher than the global prevalence among medical students. According to the recent study, a global prevalence of depression among medical students of 28.0% was determined.

The prevalence of depressive symptoms in Brazilian medical students was 41.3% (17), and depressive and anxiety symptoms were more prevalent among female medical students than in male medical students (17).

In a study conducted in Pakistan, the prevalence of depression of 35.1% was determined (18). The study conducted in Katmandu, Nepal in 2016, determined the depression prevalence of 29.9% (19). At the Malaysia Medical University, the prevalence of depression was of 41.9% (20).

A study from Lithuania found that 14% of medical students have symptoms of depression and these depressive symptoms were associated with higher vulnerability to stress (21).

According to the results of a study from South Korea, prevalence of major depression among the first year medical students was 6.5% and this was significantly higher among female students compared with males (22).

A study in India found the overall prevalence of provisionally diagnosed depressive and major depressive disorders among medical students was 39.9% (23). A study from Katmandu in 2012, found the prevalence of depression of 29.8%. Depression was more prevalent in females with significantly higher rates among female and first year medical students (24).

In the study of Quince et al. (2012), Cambridge medical students do not have a higher prevalence of depression than students in general or comparable nonstudent members of the general population. They determined that the prevalence of depression among Cambridge medical students varied from 2.2% to 14.8% (25).

In our study, the prevalence of mild and moderate depression was more often present among the first year students than among the fourth year students. Moderate severe and severe depression were significantly more often present in the female students than in the male students.

In this study, the prevalence of moderate severe depression was 14% and it was determined only in female students.

The first year students had the higher PHQ-9 score if compared with the fourth year students. The male fourth year students had two times less depression than the male first year students.

According to the presented results, the female students had significantly higher PHQ-9 score compared with the male students. The prevalence of depression among the female was 53% and in male medical students was 38.4%. Depression was significantly associated with the female gender. Similar findings had Nagasa et al. (2017) in Cameroon (26).

Each year a larger number of female than male students enroll in the Integrated Medical Studies at the Faculty of Medicine in Niš. The proportion of females in the Faculty of Medicine and in the medical profession in the city of Niš and in the whole Serbia has increased in the recent years (27). The same process exists in many countries of the world. In Texas, in the USA, this process is well investigated and it is described as feminization - the increase in the number of female workers in the medical profession (28).

In the study of Eisenber (2007), females were more likely to screen positive for major depression and the prevalence of overall positive screens for depression was identical by gender among undergraduates and slightly higher for females among graduate students (9).

Students in Oman showed no significant difference in the rate of depression between males and females (29). In the study of Niemi (2006), the gender did not turn out to be a significant factor in the stress reporting (30).

In our study, the statistically significant negative correlation between the depressive symptoms among the medical students and everyday achievement was determined.

Eisenberg (2007) suggested that students with depression may not experience severe academic impairment if they are still interested and able to engage in typical activities, but could still be experiencing elevated depressive symptomatology (9).

Results from a study among American and Canadian medical students data regarding the causes of student distress and its impact on academic performance, dropout rates, and professional development are limited (5, 6).

According to the results of a two year longitudinal study involving American students, depression was associated with the increased risk of course dropout and lower grade point average (GPA); each additional point on the depression measure by PHQ-9 was associated with 0.31% increased risk of dropout, while a 15 point increase was associated with a 0.17 point decrease in GPA scores (31).

#### *The limitations of the study*

There were several limitations of the study. Only the first and fourth year students were involved in the study, not students from all six study years. The study was conducted based on self-assessment of depression not based on clinical diagnosis. The study was done at the beginning of a new academic year, which could be a stressful academic period for

medical students of both examined study years. Only medical students were examined, and because of that, the results cannot be generalized.

#### *The strength of the study*

The high response rate supports the validity of our results. This is the first study of prevalence of depression based on the PHQ-9 questionnaire in the student population in the city of Niš.

#### **Conclusion**

Symptoms of depression were prevalent in medical students. About 48% of all examined medical students had depressive symptoms of various grades. Symptoms of depression were significantly more prevalent in the first year than in the fourth year students and in female compared with male medical students. Depressive symptoms had a significantly negative impact on students' daily activities. Because medical students experience high levels of stress during their studies they should be screened for symptoms of depression.

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## PREVALENCIJA SIMPTOMA DEPRESIJE KOD STUDENATA MEDICINE

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Simptomi depresije, anksioznosti i stresa često su zastupljeni kod studenata medicine i prediktori su depresije u zreloom dobu.

Rad je imao za cilj da utvrdi prevalenciju depresivnih simptoma kod studenata prve i četvrte godine medicine. Primenjena je studija prevalencije kojom su bili obuhvaćeni svi studenti prve i četvrte godine integrisanih studija medicine Medicinskog fakulteta u Nišu. Kao instrument istraživanja primenjen je anonimni upitnik the Patient Health Questionnaire-9 (PHQ-9). Izračunavani su Studentov t-test i Pirsonov koeficijent korelacije.

Od 400 distribuiranih upitnika, kompletno popunjen bio je 331 upitnik i samo su oni uvršteni u analizu (83%). Kod 48% studenata bili su prisutni depresivni simptomi. Studenti prve godine imali su statistički veći prosečni PHQ-9 skor u upitniku od studenata četvrte godine ( $6,75 \pm 4,60$  prema  $5,03 \pm 4,67$ ;  $p < 0,05$ ). Svaki treći student imao je blage depresivne simptome. Studentkinje su imale statistički veći prosečni PHQ-9 skor od studenata ( $6,37 \pm 4,88$  prema  $4,89 \pm 4,27$ ;  $p < 0,01$ ). Postoji statistički značajna negativna korelacija između depresivnih simptoma i obavljanja svakodnevnih aktivnosti ( $\rho = 0,610$ ;  $p < 0,001$ ).

Više od polovine studenata medicine nije imalo depresivne simptome, ali je 48% imalo depresivne simptome različite težine. Depresivni simptomi bili su zastupljeniji kod studenata prve godine u odnosu na studente četvrte godine i bili su značajno zastupljeniji kod studentkinja nego kod studenata. Depresivni simptomi imali su značajan negativan uticaj na obavljanje svakodnevnih aktivnosti studenata. Studenti medicine izloženi su velikom stresu tokom studiranja i u cilju sprečavanja pojave depresivne simptomatologije trebalo bi uvesti skrining depresije u sklopu sistematskih pregleda studenata.

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