Bratisl Lek Listy 2008; 109 (12)
568 – 572

CLINICAL STUDY

Depression, anxiety and substance use in medical students in the Republic of Macedonia

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Abstract: *Objectives:* To determine the prevalence of depressive and high trait anxiety symptoms and substance use, including alcohol and nicotine, in first-year and second-year medical students in Skopje University Medical School, Republic of Macedonia.
Background: It is important to investigate medical students because they are under significant pressure during early years of medical education, a period during which the attitudes and behaviors of physicians develop.
Methods: A cross-sectional survey in classroom settings, using an anonymous self-administered questionnaire, was performed in 354 participants (181 first-year, 118 females and 63 males and 173 second-year medical students, 116 females and 57 males) aged 18 to 23 years. The Beck Depression Inventory (BDI) and Taylor Manifest Anxiety Scale (TMAS) were used to determine depressive and high trait anxiety symptoms. BDI scores 17 or higher were categorized as depressive and TMAS scores 16 or higher as high anxiety symptoms. A Student t-test was used for continuous data analysis.
Results: Out of all participants 10.4 % had BDI score 17 or higher and 65.5 % had TMAS score 16 or higher. Alcohol was the most frequently used substance in both groups. Smoking prevalence was 25 %. Benzodiazepines (diazepam, alprazolam) use was 13.1 %. Illicit drug use was rare (1.1 % in freshmen and 3.6 % in juniors) in both groups.
Conclusions: High frequency of manifest high anxiety symptoms and depressive symptoms and benzodiazepine use among Macedonian junior medical students should be taken seriously and a student counseling service offering mental health assistance is necessary *(Tab. 3, Ref. 23)*. Full Text (Free, PDF) *www.bmj.sk*.
Key words: depression, anxiety, substance use, medical students.

Depression, anxiety disorders and substance abuse, with their onset during adolescence, are among leading causes of mental and physical health impairment worldwide (1). The appearance of depressive symptoms has been related to low socioeconomic status and substance abuse in adolescents (2, 3). Several studies have demonstrated that substance use (alcohol consumption, tobacco-smoking and illicit drug use) in university students is widespread. The majority of the studies treating these issues are from US and UK and only a few from developing countries (4, 5, 6, 7).

Medical education and medical profession are among the most demanding and most stressful ones, with a huge influence on general population lifestyles and behaviors, due to their essential role in health care and prevention of above-mentioned health problems. It is, therefore, important to examine mental health and lifestyles of today's medical students since they are tomorrow's health care professionals. High rates of depression, high anxiety and other psychiatric symptoms have been well documented in medical students, with highest intensity of symptoms during the earliest years of medical training (8–14). Increasing number of reports suggest that substance abuse among medical students and physicians has not been regarded as a significant problem (4–7). To our knowledge, no data are available on the prevalence of depressive and high anxiety symptoms and substance use in medical students in Macedonia. This information is badly needed.

The aim of the study was to determine the prevalence of depressive and high anxiety symptoms and the prevalence of substance use including nicotine, alcohol, prescription drugs and illicit drugs at the early stage of medical education in medical students in Skopje University Medical School, the only medical school in the Republic of Macedonia.

Methods

All medical students who entered the first and the second year of training in 2007–2008 in Skopje, Macedonia were eligible for the study. We used a self-administered questionnaire which consisted of questions on sociodemographic variables and substance (alcohol, nicotine, sedative-hypnotics, illicit drugs) use

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Tab. 1. Description of the sample and association of depressive and anxiety symptoms with sociodemographic characteristics and substance use in medical students (n=354).

Variables	No (% of students)	BDI scores* (mean±SD)	Percentage of students with depressive symptoms†	TMAS scores* (mean±SD)	Percentage of students with high anxiety symptoms†
Total	354 (100)	8.3±7.4	10.4	18.9±7.7	65.5
Gender					
male	120 (33.9)	8.1±8.9	11.7	16.8±7.1**	55**
female	234 (66.1)	8.3±6.2	8.9	19.8±7.7	69.2
Family income‡					
lowest	44 (12.4)	10.5±9.2	13.9	21.3±8.1	77.3
low	81 (22.9)	9.4±7.2	12.3	19.5±7.9	69.9
middle	118 (33.3)	8 ±7.8	12.7	17.8±7.2	58.5
high	60 (16.9)	7.8±6.6	5	19.2±7.4	63.3
do not know	51 (14.4)	-	-	-	-
Study year					
first	181 (51.1)	8.2±7.8	11.6	17.9±6.9**	62.4
second	173 (48.9)	8.5±7.1	8.6	19.8±8.3	69.3
Alcohol					
never used	161 (45.4)	8.7±7.4	10.3	18.9±7.5	65.8
ever used	189 (53.4)	7.8±6.9	10.0	18.7±7.8	63.5
past year	36 (10.2)	7.5±5.5	10.0	18.1±6.3	63.9
past month	153 (43.2)	7.9±7.2	10.4	18.9±8.2	61.4
no response	4	-	-	-	-
Nicotine					
never used	265 (74.8)	8.1±6.8	10.0	18.5±7.4	63.2
ever used	89 (25.1)	9.2±8.9	10.1	20.0±8.4	70.8
Sedative-hypnotics					
never used	306 (86.9)	8.0±7.3**	9.1	18.2±7.5**	61.8
ever used	46 (13.1)	10.9±7.8	17.4	23.5±7.5	84.9
past year	26 (7.4)	9.0±6.0	3.8	21.9±6.7	84.6
past month	20 (5.7)	13.5±9.3	35.0	25.6±8.1	85.0

*Abbreviations: BDI – Beck Depression Inventory; TMAS –Taylor Manifest Anxiety Scale
†BDI scores were dichotomized using 17 as the cut-off point. TMAS scores were dichotomized using 16 as cut-off point. These columns show the percentage of people with BDI scores 17 or higher, and TMAS scores 16 or higher.
‡Classification: income per month: lowest = 10 000 denars; low = 20 000den; middle = 40 000den; high = over 40 000den.
** $p<0.05$

and abuse. The questions about alcohol, sedative-hypnotics and illicit drugs were rated as: "never used", "used last year" and "used this month". Smoking habits were described as the number of cigarettes smoked per day.

The degree of depressive symptoms was measured by the Macedonian version of the 21-item-revised form of Beck Depression Inventory (15). This instrument is well-validated and has firm cut-offs that are strongly predictive of clinical impairment. The BDI statements were ranked from 0 to 3, with 0 representing the least serious and 3 the most serious symptoms. Following the example of Gulec et al (2003) and Bostanci et al (2005) we categorized BDI ≥17 as depressive. Also we used the BDI scores ≥21 as a well established criterion for moderate depression.

The level of manifest anxiety was measured by the Macedonian version of Taylor Manifest Anxiety Scale (TMAS) (16). TMAS is an anxiety subscale within Minnesota Multiphasic Personality Inventory (MMPI), which measures the subject's feeling of anxiety as a personality trait and its physiological concomitants. Gardos and al (1968) have defined three levels of manifest anxiety: TMAS scores of 9 and lower indicate low anxiety, TMAS scores between 10 and 15 indicate moderate anxiety and TMAS scores of 16 and higher show high manifest anxiety level (17). We used these criteria in our study. High TMAS scores imply higher susceptibility to state anxiety during stressful life events (18).

The participating students gave written informed consent and completed the questionnaire anonymously using code names in their classroom during lesson time in October 2007. Students who were absent from the classroom on the study day or did not agree to participate in the survey were excluded. Validation of the responses by objective means was not undertaken.

The chi-square method was used for the analysis of categorical variables and the Student t-test and one-way ANOVA for continuous ones. A p-value of ≤0.05 for two-tailed test was considered significant.

Tab. 2. Family income, mean BDI scores and mean TMAS scores in first-year and second-year medical students.

Variables	First-year students n=181		Second-year students n=173	
Family income	BDI scores* (mean±SD)	TMAS scores*(mean±SD)	BDI scores* (mean±SD)	TMAS scores*(mean±SD)
Lowest	7.34±6.0**	18.25±6.6**	14.2±10.9	24.9±8.2
Low	9.11±6.9	18.5±7.2	9.7±7.6	20.3±8.4
Middle	8.5±7.1	18.35±6.1	7.1±6.8	19.9±9.2
High	9.0±9.1	20.0±7.7	7.0±4.3	18.8±7.3

*Abbreviations: BDI – Beck Depression Inventory; TMAS – Taylor Manifest Anxiety Scale
**p<0.05 (difference between first-year and second-year students)

Results

The number of students who entered the first and the second year of medical courses at the University of Skopje in 2007 was 250 and 200, respectively; 187 and 184 subjects completed the questionnaire, for an overall response rate of 75 and 92 %. Six students from first year and 11 students from second year were excluded from data analysis because of incompletely filled questionnaires.

The age difference was 18.8±0.9 vs 19.8±0.6 years (mean±SD; p<0.01). The percentage of females among first year students (65.2 %) was non-significantly lower (p=0.7) than that among second year students (67 %).

Table 1 presents the association of depressive symptoms with sociodemographic factors and substance use. The mean BDI score in medical students was 8.3±7.4, with a range between 0 and 49, and median =7. Out of all participants 10.4 % (n=36) had a BDI score 17 or higher. The prevalence of depressive symptoms among first-year students was 11.6 % (n=25) vs 8.6 % (n=15) in the second-year students (chi^2, p=0.12). Seven percent of all students (n=25) met criteria for moderate depression (BDI score ≥21).

As can be seen in Table 1, the mean TMAS score in medical students was 18.9±7.7, with a range between 1 and 43, and median =18. Out of all participants 65.5 % (n=233) had a TMAS score 16 or higher. The prevalence of high trait anxiety symptoms in female students was 69.2 % (n=162) vs 55 % (n=66) in male students (chi^2, p=0.008). The mean TMAS score in female students was higher than the one in male students (p<0.05). The second year students have a higher mean TMAS score than the first year students (p<0.05), and a higher prevalence of high trait anxiety symptoms (p=0.157).

Out of all students with low socioeconomic status, 13.9 % (n=6) and 77.3 % (n=34) showed depressive and high trait anxiety symptoms, respectively. Only one student from first year students with lowest socioeconomic status (n=24) showed BDI score 17 or higher. Five second-year students (25 %) with lowest family income showed depressive symptoms. Twelve (18.7 %) of 64 first-year students with middle family income had BDI scores 17 or higher vs three second-year students (5.5 %) out of 54 with middle family income. No one from the second-year students with high family income had a BDI score 17 or higher (Tab. 2).

Tab. 3. Alcohol, cigarette smoking, sedative-hypnotics and illicit drug use among first-year and second-year medical students.

Variables	First year students n=181 (%)	Second year students n=173 (%)
Gender		
male	34.8	33
female	65.2	67
Alcohol		
ever used	52.5	56.7
past year	11.6	8.7
past month	41.1	45.1
no response	–	2.7
Nicotine		
ever used	20.9	29.1
Sedative-hypnotics		
ever used	13.8	12.4
past year	7.2	7.5
past month	6.7	4.7
Illicit drug use		
ever used	1.1	3.1

** p<0.05 (there is no significance between groups)

Among first year students, 20 % were students from abroad who gave information on high family income and had BDI score 17 or higher.

Table 3 presents substance use in medical students. Alcohol was the most frequently used substance. 52.5 % of the first year students and 56.7 % of the second year students reported that they have used alcohol (p=0.6), while 41.4 % of the first year and 45.1 % of the second year students responded that they had used alcohol during this month. The students were categorized into three groups based on the frequency of alcohol intake. BDI (ANOVA, F=0.39, p=0.76) and TMAS scores did not differ between groups (ANOVA F=0.52, p=0.67)

Tobacco smoking prevalence in first year students was 20.9 % vs 29.1 % in second year students (p=0.07). Mean BDI and TMAS scores in tobacco smokers were non-significantly higher than those in tobacco non-smokers (p=0.122).

Benzodiazepines (alprazolam and diazepam) were the most frequently used sedative-hypnotics. Out of all participants 13.1 % (n=46) reported that they have used sedatives during the last

year (n=26), or during last month (n=20). In addition, 6.7 % (n=12) of first year students and 4.7 % (n=8) of second year students reported that they have used benzodiazepines during last month. The Pearson coefficient of correlation between BDI scores and the time of sedative use (last week, this week) was r= 0.453, p<0.05, and between TMAS scores and sedative use was r=0.478, p<0.05. Among the students who have used sedatives, 35 % (n=7) had BDI scores 17 or higher and 85 % (n=17) had TMAS scores 16 or higher.

The use of illicit substances was rare in both groups (1.1 % in first year students and 3.1 % in second year students) with cannabis being the most commonly used substance.

Discussion

The results represent the first empirical data on the prevalence of depressive and high trait anxiety symptoms and substance use among Macedonian medical students during early stages of their education.

The findings of depressive symptoms prevalence of 10.4 % and high trait anxiety symptoms of 65.5 % were consistent with the reports on higher prevalence of depressive (5–35 %) and high anxiety symptoms (45–70 %) among medical students worldwide compared to general population (8–14). There was no gender difference on the BDI scores, although there was a higher prevalence of depressive symptoms among men. Previous reports on gender differences and depressive symptoms indicated that women had higher levels of depression and anxiety on the onset of medical education (8, 9, 10). Recently, Levine et al (2006) and Smith et al (2007) reported no gender differences on these issues (11, 19). In our study women had significantly higher TMAS scores and significantly higher prevalence of high trait anxiety symptoms. This is in accordance with other reports of higher TMAS scores in women (18, 20). Quarter and Laxer (1969) suggested that there is a stable pattern for higher TMAS scores in females, probably due to different response patterns between males and females (20). Also, other reports based on different measures of anxiety underscore on higher anxiety scores in female medical students (5, 8, 9, 10, 12). The concept of high trait anxiety refers to a habitual tendency to be anxious over a long period of time, which implies a higher vulnerability and development of state anxiety during stressful life events. High anxiety as a personal trait during a chronic stress exposure could be a very solid basis for the development of clinically manifested anxiety disorder, since the stress coping mechanisms (psychological as well as physiological) have already been overused and burned-out. The life time prevalence of any anxiety disorder is 18.5 % for women, vs 10.4 % for men. We have to monitor female medical students with high trait anxiety levels carefully during their education in order to prevent the development of a clinically manifested anxiety disorder.

Several studies report that entering medicald students show low prevalence (0.5–2 %) of depressive symptoms (BDI ≥21) (11, 19) and low anxiety symptoms (8, 9, 11, 12, 19). The increment of depressive symptoms reaches a peak of intensity during the second year (8, 9, 10, 11) and the third year (19), while anxiety reaches it's peak in the fifth year of the training (4, 22). In our study, out of all of first-year students who were surveyed during the first month of their education 11.6 % had depressive symptoms (BDI ≥17) and 62.4 % showed high trait anxiety symptoms (TMAS ≥16). Seven percent showed symptoms of moderate depression (BDI ≥21). Second-year students showed lower prevalence of depressive symptoms (8.6 %), with 6.9 % of them meeting criteria for moderate depression and an increase of high trait anxiety symptoms. These results suggest that medical students in Macedonia suffer from high psychological distress even on the onset of education as well as during the second year of training.

In the present study students with lowest family income had highest BDI and TMAS scores and highest prevalence of depressive and high anxiety symptoms, which is in agreement with other reports (2, 3). However, first-year students with high family income showed higher prevalence of depressive symptoms and higher trait anxiety than second-year students. It is possible that depressive symptoms in these students may not be related to economic status, but to other factors like homesickness, adaptation to new educational atmosphere, and difficulties in relationships with new friends.

The present findings on substance use indicate that alcohol was the most commonly used substance, followed by nicotine and benzodiazepines which is consistent with other studies (4–9). The prevalence of the use of illegal substances was negligible compared to that in the developed countries (4), but similar to the reports from Turkey (21, 23).

The drinking rates among Macedonian junior medical students were lower than the ones reported by other authors (4, 5, 6). The smoking rates of junior medical students in Skopje (25 %) were similar to those in medical students in neighboring countries, Albania (14.1 %), Turkey (39.8 %), Serbia (30 %) and Italy (40 % in men) (5, 6, 7, 21, 23). The levels of anxiety and depression in smokers were non-significantly higher in smokers then in non-smokers. Other authors have reported a positive correlation between smoking and depressive symptoms (21). There was a non-significant increase in rates of alcohol drinking, smoking and illicit drugs use in second-year students. Our findings are in accordance with other studies which suggest that medical education does not prevent or reduce substance use, which increases over time.

Benzodiazepines were the most frequently used prescribed drugs in junior medical students in our sample. For this class of drugs, 13.1 % have reported that they have used sedative-hypnotics. Most of the students who reported that they have used these drugs during the current month showed high levels of trait anxiety and depressive symptoms. Sedative-hypnotic use was higher in first-year students in our study. This is a high prevalence compared to the data from other authors who report that junior students did not use these drugs (4, 5, 6).

Substance use is considered to be part of the youth culture today and it appears that medical students are no exceptions. However, substance use in medical students should be of con-

cern, especially when it is concurrent with high trait anxiety and depressive symptoms in junior medical students. The benzodiazepine use in first-year students must be taken very seriously, knowing that uncontrolled and long-term use of these easily available drugs could lead to addiction and additional use of illicit drugs, with serious consequences on the health and professional engagement of these young people.

A limitation of this study is its cross-sectional character, which does not allow inference about causal associations between the variable studies. However, it still provides important information about emotional states and lifestyles in medical students at a specific (early) point in their carrier. Though inchoate, this study is a start in the establishment of an international and cross-cultural data base about mental health and lifestyles in first-year medical students prospectively during their medical education. In this way, preventive education and therapeutic programs can be designed to promote the personal development of each student. A better-prepared physician with well established personal balance between her/his professional role in modeling the public health and her/his own mental and physical wellbeing should be one of the priorities of every medical school.

Conclusion

The Republic of Macedonia is actively transforming and improving its higher educational system, including medical education, to become congruent with the European high education system. Our data strongly suggest that a student counseling service which offers mental health assistance should be established as an important part of the medical school facilities in Macedonia.

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Received February 25, 2008.
Accepted October 27, 2008.