DOES DEPRESSION AMONG MEDICAL STUDENTS LEAD TO OBESITY

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Abstract

Background: The good state of a student's mental health is important for their academic success. Sometimes the burden of the harsh exams and factors like pressure from parents can lead to depression. One of the most common methods to overcome depression is through excessive food intake. This study aims to find out whether depression leads to bad nutritional habits and obesity, among first- and second year university students.

Methods: A sample of 171 students from Medical University of Plovdiv was investigated with a self-report questionnaire, which included demographic information and Zung self-rating depression scale.

Results: The prevalence of depression among the medical students was 64%. Gender did not affect the degree of depression ($\chi 2 = 5.58$, df = 3, r = 0.133), although female students have higher levels of mild and moderate depression, and there is severe depression at 3.5 % of women. There was no statistically significant difference in BMI levels among students with different levels of depression ($p = 0.196$), but there was one between the group with moderate and severe depression ($p = 0.034$). Students with big financial burden, study-induced stress and dissatisfaction with the achieved results showed to be more depressed. Those who live alone or in dormitories showed higher depression scores.

Conclusions: Multiple factors may contribute to depression. Therefore, academic staffs should take measures to reduce stress among medical students and to provide psychological support for students to cope with these problems.

Keywords: *Medical students, Depression, Obesity*

Introduction

Studies show that depression is one of the most common health problems among students [1]. Medical students seem to be more prone to develop depression. The percentage of medical students suffering from depression is significantly higher than the rest of the population or students from other specialties [2]. Some of the stressors that contribute to depression are academic pressure, financial worries, lack of sleep, as well as factors interfering with personal life [3]. Therefore, there is no doubt that medical training is a stressful process that can contribute to depression and anxiety [4]. The main feature of depression is the loss of well-being, which manifests itself in numerous symptoms, such as sleep disturbance, poor concentration, lack of self-care, anxiety and lack of interest in everyday experiences [1].

According to WHO guidelines, obesity is indicated by a body mass index (BMI) ≥ 30 kg/m2. It is widely regarded as a major global pandemic. The worldwide prevalence of overweight and obesity has doubled since 1980 to an extent that nearly a third of the world's population is now classified as overweight or obese [5]. It has been increasing globally among different age groups and among young people [7], and more than 1.9 billion adults, 18 years and older, were overweight and of these over 650 million were obese [8]. It is associated with a number of comorbidities such as increased cardiovascular diseases and diabetes [6, 9]. Obesity has debilitating effects on both physical and mental health and also leads to lower life expectancy and quality of life [10]. It is associated with various lifestyle factors, biological, psychosocial and familial factors [11].

Studies show that there is a bidirectional relationship between depression and obesity, which means that the presence of one increases the risk for developing the other. There are various mechanisms by which the relationship between the two conditions can be explained. Some of them are: Hyperactivation of the hypothalamic-pituitary-adrenal axis (HPA axis); dopaminergic

reward system; Immuno-inflammatory activation; leptin–melanocortin pathway [12]. In this study the main focus is on the dopaminergic reward system.

Materials and Methods

Participants

This is a questionnaire-based descriptive study that was conducted during the year 2022. All students from the Medical University-Plovdiv had the right to participate in the study and no exclusion criteria were set. In the research participated 171 second-year students from various studied majors. The research was conducted voluntary and participants were informed about the purpose of the study. Questionnaires were submitted anonymously to assured confidentiality.

Instruments

The self-report questionnaire used in this study consisted of two sections, namely: demographic information and Zung self-rating depression scale (Zung SDS).

Demographic information

The demographic section was designed to collect the general characteristics of medical students, including: gender, age, height, weight, specialty, course of study, satisfaction with the chosen major and with achieved results, financial burden during the study, experiencing of stress caused by studying or at workplace, employment pressure, whether they are the only child in the family, family characteristics, expectations of parents or family members, physical exercise, sleep quality, presence of chronic disease, use of psychoactive substances, satisfaction of relationship with lovers and classmates or friends.

The Zung self-rating depression scale (Zung SDS)

Zung SDS is a 20-item scale evaluating mood symptoms in the past 7 days. Each item is assessed on a Likert scale from 1 to 4 depending on how frequently the symptoms occurred throughout the previous week. After calculating the results, the Standard score is classified as: less than 40, no depression; 41–47, minimal to mild depression; 48–55, moderate depression, greater than 55, severe depression. A Bulgarian version of the SDS was used in the survey, which has been confirmed and validated in previous studies. [13]

Evaluation of obesity

In the study, we used body mass index to identify overweight among survey participants. Body mass index (BMI) is a statistical index, which estimates a person's body fat by utilizing their height and weight. The calculation of this index is done by taking a person's weight, in kilograms, divided by their height, in meters squared, or BMI = weight (kg)/ height^2 (m^2). This index is used to define a person as underweight, normal weight or overweight. According to the WHO criteria obesity is defined by a BMI $\geq$ 30 kg/m^2.

Statistical analysis

Analyses done during the study were performed using SPSS 21.0 statistical software package. All statistical tests were two-sided ($p<0.05$). All demographic data were analyzed and presented as number (N) and percentage (%). Using appropriate statistical tests, we compared obesity and depression severity, as well as the causes leading to depression.

Results and Discussion

Demographic characteristics of participants who took part in the study are shown in Table 1. Among the 171 medical students who participated in this research, 61 (35.7%) were males, while 110 (64.3%) were females. Their age ranged from 18 to 48 (21.02±3.4, mean ± SD). The respondents are sophomores from various majors, with the most significant share of the participants being awarded to students of: 46.2% medicine, 27.5% pharmacy, 16.4% dentistry, 6.4% medical laboratory technician, 3.5% medical assistant. The prevalence of depression symptoms among the medical students in the study was 64% (SDS index score $\geq$ 41). The

prevalence of each category for depression was 36% with no depression, 36% with minimal to mild depression, 25% with moderate depression and 3% severe depression (Table 1).

Table 1

Obesity and state of depression

The comparison between state of depression and level of obesity can be seen in Table 2. With the present study, we found no statistically significant difference in BMI levels among students with different levels of depression (p=0.196), but between the group with moderate (22.60±3.68 kg/m^2) and severe depression (19.25±2.36 kg/m^2) there was such one (p=0.034).

On the other hand, between mild (22.30±4.38 kg/m^2) and severe depression (19.25±2.36 kg/m^2) there was a tendency for statistical significance (p=0.086). Also, in the severe depression group we found a significant decrease in the average BMI values and also an increase in values that correspond to anorexia (Table 2).

Table 2

Factors that may lead to depression

Gender did not influence the degree of depression ($\chi 2$=5.58, df = 3, p=0.133), although the graph shows that female students had higher levels of mild and moderate depression, and there was severe depression at 3.5 % of women. 100% of students with major depression were female. Only 15.2% of women and 20.5% of men were without depression (Fig. 1).

Fig. 1

Satisfaction with the student's major shows a statistically significant relationship with the levels of depression ($\chi 2$=18.6, df = 9, p=0.029). The largest percentage of students without depression are satisfied with their major (40%), but surprisingly 100% of those with severe depression are also in this group of satisfied students, implying that other factors may contribute to the level of depression.

Satisfaction with the results achieved showed a strong statistically significant relationship with the levels of depression among students ($\chi 2$=31.8, df = 9, p<0.0001). Quite naturally, the highest percentage of students, 49.4%, were those who were satisfied and without evidence of depression, but the remaining half, although satisfied, felt depressed as well. Again, the reason is complex here.

Stress during study at Medical Universities is obviously very high and statistically significant in relation to depression ($\chi 2$=39.4, df = 9, p<0.0001). Of the most stressed students, only 20.7% were without depression, the rest had varying degrees of depression.

Experiencing financial burden during the study had a significant association with the level of depression ($\chi 2$=19.5, df = 9, p=0.021). Only 29.4% of students who were in financial difficulties were without depression, the remaining high percentage had various levels of depression.

Sleep quality is also a determining indicator of the presence of depression among students ($\chi 2$=42.5, df = 6, p<0.0001). Of the students with unsatisfactory sleep quality, only 6.3% had no evidence of depression, all others felt depressed. And approximately (47.6%) of those with rather good sleep quality were without depression.

Discussion

The following results shows that, for a lot of the students at the Medical University-Plovdiv the academic burden have a significant negative impact on their mental health and for some of them even on their physical health. The values of mild, moderate and severe depression were prevalent in a large amount of the students (64%), which is similar to the results obtained in other countries. In China research done in 2020 by Shao et al. [14], concluded that 57.5% of the medical students from Chongqing Medical and Pharmaceutical College had symptoms of depression. A study conducted in Malaysia found out that medical students there had low level of depression (33%) and most of them reported that this impacted their quality of life [15]. One

major event that had a big negative impact on students' mental health is the COVID-19 pandemic. A study done in April 2020 amid the height of the COVID pandemic concluded that there was a 70% increase in depression compared to previous years [16]. Depression rates among students tend to have regional values and that vary drastically. Higher rates can be found in the Middle East and lower ones in Europe [17].

It seems like there are a lot of problems with the state of the mental health of our future healthcare workers. With depression rates this high, some form of coping is necessary. Medical students prefer to cope with adaptive methods (e.g. positive reframing, emotional support) rather than maladaptive (e.g. substance abuse, behavioral disengagement). Females tend to be more emotional and wanting to give up, while males tend to face their problems by for example taking someone's advice [18]. Other popular ways of coping include support seeking, active coping, sports and many others [19]. Some people turn to religion. The presence of depression among these people is lower than average (17.4%) [20].

In the discussion was mentioned the effect of mental status on the student's mental health, but what about their physical one? A survey made in 2016 at a medical university in Pakistan concluded that high rates of obesity vary among the students with gender (30.5% for males and 16% for females), although it's not directly dependent on the mental health of the medical students, but rather on high calorie intake followed by low physical activity [21]. There were similar rates of obesity among students at a medical college in India [22]. Similar research done in two medical colleges in Pakistan concluded shockingly high rates of obesity among males at 47.7%. The rates for females were similar to rates from other medical schools [23].

Unfortunately, there is not enough data to show whether there is a correlation between depression and obesity among medical students. However, there is evidence showing that obese teens and adolescents are more likely to suffer from depression and anxiety than non-obese ones [24]. The results of this research shows that a high BMI could be used as a marker for a bad mental state [25].

With the high level of depression and obesity among medical students in mind, unfortunately we cannot conclude that there is a correlation between the two. Further study needs to be conducted to establish if medical students are actively using food to cope with their depression, which can potentially lead to obesity.

Conclusions

Depression is a serious mental health disorder that often remains hidden and suppressed by people. There is a solution to this problem, as long as it is discovered in time. Multiple factors are related to depression. Therefore, academic staff should take measures to reduce stress among medical students and to provide psychological support for students to cope with these problems. Some measures that may improve students' mental health include: expanding social relationships (e.g. live contact), organization of entertainment initiatives, educational consulting and presence of psychological support.

Statement for potential conflicts of interest

Authors disclose no potential conflict of interest.

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Legends to figures

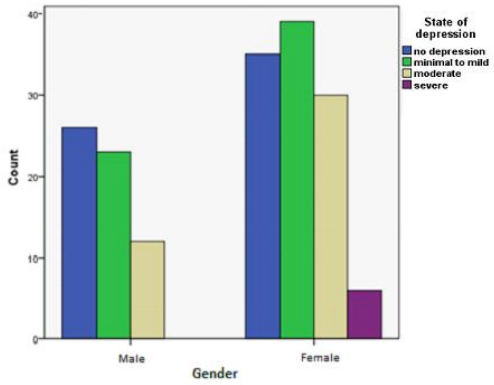
1. *Table 1. Demographic results.*

Questions:	Answers	n (%)
Are you satisfied with your major?	Yes	n=130 (76%)
	Rather yes	n=30 (17.5%)
	Rather no	n=9 (5.3%)
	No	n=2 (1.2%)
Are you experiencing stress from studying?	Yes	n=92 (53.8%)
	Rather yes	n=54 (31.6%)
	Rather no	n=19 (11.1%)
	No	n=6 (3.5%)
Are you experiencing a financial burden during your studies?	Yes	n=34 (19.9%)
	Rather yes	n=42 (24.6%)
	Rather no	n=64 (37.4%)
	No	n=31 (18.1%)
Are you satisfied with the results achieved at the university?	Yes	n=79 (46.2%)
	Rather yes	n=58 (33.9%)
	Rather no	n=24 (14%)
	No	n=10 (5.8%)
Do you work?	Yes	n=32 (18.7%)
	No	n=139 (81.3%)
Is the work you do mentally taxing you?	Yes	n=11 (6.4%)
	Rather yes	n=20 (11.7%)
	Rather no	n=20 (11.7%)
	No	n=9 (5.3%)
	I don't work	n=111 (64.9%)
How do you live?	Separately	n=21 (12.3%)
	In student dormitories	n=58 (33.9%)
	With friends	n=13 (7.6%)
	With the family	n=79 (46.2%)
Are you an only child in the family?	Yes	n=51 (29.8%)
	No	n=120 (70.2%)
Peculiarities of the family:	Nuclear	n=119 (69.6%)
	Multigenerational family	n=26 (15.2%)
	One parent family	n=20 (11.7%)
	Cohabitation	n=6 (3.5%)
Expectations of parents (family members):	Big ones	n=85 (49.7%)
	General	n=85 (49.7%)
	Little ones	n=1 (0.6%)
Physical activity:	None or very rarely	n=12 (7%)
	Sometimes	n=66 (38.6%)
	Often	n=46 (26.9%)
	Very often	n=47 (27.5%)
What is the quality of your sleep?	Good	n=34 (19.9%)
	Rather good	n=69 (40.3%)
	Rather unsatisfactory	n=52 (30.4%)
	Unsatisfactory	n=16 (9.4%)
Do you use psychoactive substances?	Yes	n=2 (1.2%)
	No	n=169 (98.8%)
Do you suffer from chronic diseases?	Yes	n=19 (11.1%)
	No	n=152 (88.9%)
Do you take medication?	Yes	n=23 (13.5%)
	No	n=148 (86.5%)
Are you satisfied with your romantic relationship?	Yes	n=66 (38.6%)
	Rather yes	n=27 (15.8%)
	Rather no	n=4 (2.3%)
	No	n=3 (1.8%)
	I'm not in a relationship	n=71 (41.5%)
Are you satisfied with your relationship with friends and colleagues?	Yes	n=87 (50.9%)
	Rather yes	n=66 (38.6%)
	Rather no	n=13 (7.6%)
	No	n=5 (2.9%)
State of depression:	No	n=61 (35.7%)
	Minimal to mild	n=62 (36.3%)
	Moderate	n=42 (24.6%)
	Severe	n=6 (3.5%)

2. *Table 2. Results for state of depression and obesity.*

	mean±SD	median	95% CI	min	max	SEM
BMI for the whole group	22.13±4.14	21.45	21.51	15.43	41.98	0.32
BMI without depression	21.92±4.29	21.16	20.82	15.99	41.98	0.55
BMI with mild depression	22.30±4.38	21.59	21.19	15.43	39.79	0.56
BMI with moderate depression	22.60±3.68	21.67	21.45	17.01	31.75	0.56
BMI with severe depression	19.25±2.36	21.72	16.78	15.43	22.04	0.96

3. *Figure 1. Factors that may lead to depression.*
    a) *Influence of gender on state of depression*
    b) Influence of satisfaction with the major on state of depression.
    c) Influence of satisfaction with the achieved results on state of depression.
    d) Influence of stress during study on state of depression.
    e) *Influence of financial burden during the study on state of depression.*
    f) *Influence of sleep quality on state of depression.*



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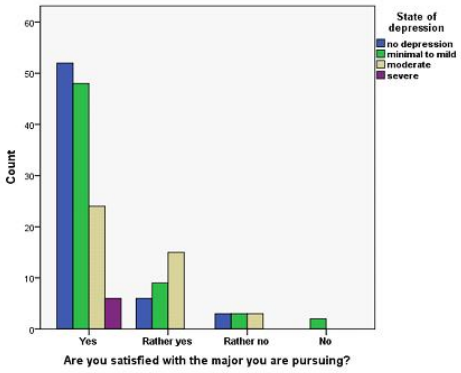

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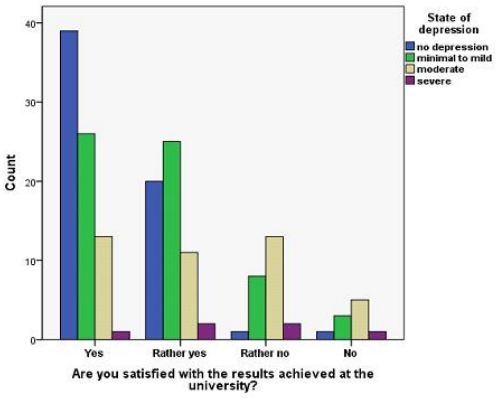

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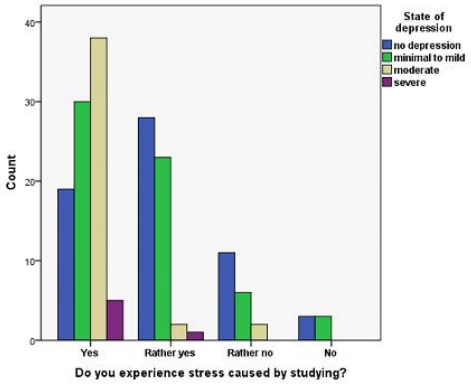

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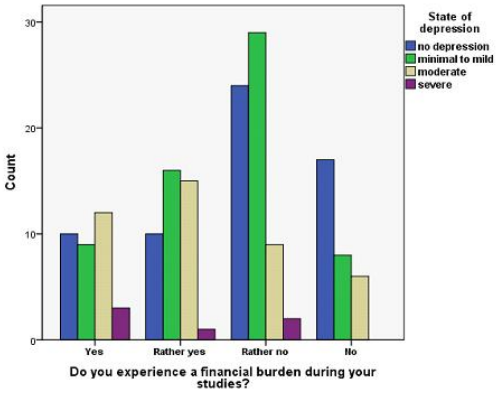

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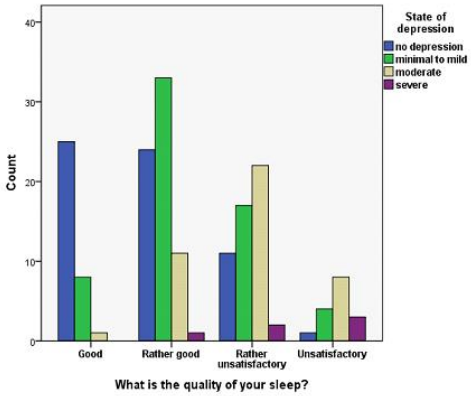

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