Depression among medical students in Alexandria, Egypt

Wafaa Ihab Hafez Elsawy[1], Aida Aly Reda Sherif[2], Medhat Salah El Din Attia[3], Nessrin Ahmed El- Nimr[2]

1. Technical Officer, Mental Health and Substance Abuse Unit- UHC\Non Communicable diseases Department, World Health Organization (Regional Office for the Eastern Mediterranean), Cairo, Egypt
2. Department of Epidemiology, High Institute of Public Health, Alexandria University, Egypt Address: High Institute of Public Health, 165 El-Horreya Ave. El-Hadara, Alexandria, Egypt
3. Department of Family Health (Mental Health), High Institute of Public Health, Alexandria University, Egypt Address: High Institute of Public Health, 165 El-Horreya Ave. El-Hadara, Alexandria, Egypt

Author details:
Wafaa Ihab Hafez Elsawy: Mobile: +201001453502, Email: elsawyw@who.int, wafaa_elsawy@hotmail.com; Aida Aly Reda Sherif: Mobile: +201001219912, Email: aidareda@gmail.com; Medhat Salah El Din Attia: Mobile: +201001634421, Email: mattia22@hotmail.com; Nessrin Ahmed El- Nimr: Mobile: +201005051138, Email: dr.elnimr@gmail.com, n.elnimr@alexu.edu.eg

Abstract

Background: Depression is a common illness worldwide with high rate among medical students. The objectives were to estimate the prevalence of depression among medical students in Alexandria, and identify its correlates.

Methods: A cross-sectional study design was used. The study was conducted at the Faculty of Medicine, Alexandria University. Using a systematic random sampling technique, 390 students attending 4th, 5th, and 6th academic years were included. Data was collected using the Arabic version of the BDI-II and a predesigned structured self-administered questionnaire, including questions about the students' personal and social characteristics and academic environment.

Results: Moderate and severe depression accounted for 27.9% and 17.2%, respectively. Logistic regression analysis results showed that the independent predictors for moderate and severe depression were female gender, the presence of mental illness, not having someone to talk to when under stress, experiencing stressful life event(s) during the previous 6 months, not being satisfied with the socioeconomic level, reporting that the surrounding environment is not suitable for studying, not specifying a grade to achieve, and extreme dissatisfaction with the student's result.

Conclusion: Prevalence of moderate and severe depression was high among medical students, calling for actions to help those students and to prevent new cases.

Keywords: BDI-II; depression; determinants; medical students; prevalence.

Corresponding author:
Nessrin Ahmed El- Nimr,
Department of Epidemiology,
High Institute of Public Health,
Alexandria University, Egypt
Address: High Institute of Public Health,
165 El-Horreya Ave. El-Hadara, Alexandria, Egypt
Mobile: +201005051138
ORCID ID: 0000-0003-1976-4847
Email: dr.elnimr@gmail.com,
n.elnimr@alexu.edu.eg

Introduction

Depression is a common illness worldwide and its burden is on the rise.[1, 2] The proportion of the global population with depression in 2015 was estimated by the World Health Organization (WHO) to be 4.4%. The WHO ranked depression as the single largest contributor to global disability (7.5% of all years lived with disability in 2015), with more than 80% of the disease burden occurred in low and middle income countries. In Egypt (2015), the prevalence of depression was estimated to be 3.5%. [1]

High rates of depression and psychological morbidity

were reported among medical students as compared to the general population. [3] In 2013, a systemic review reported that the prevalence rates of depression among medical students ranged from 10% to 85% with a weighted mean prevalence of 30.6%. [4] From 2009 to 2014, studies reported that the prevalence of depression among medical and university students in the UAE, Saudi Arabia and Oman ranged from 22.2% to 48.2%. [5-9]

Several studies were conducted in Egypt. In 2010, Amr and El Gillany reported that 28.3% of medical students, from all six academic years, in Mansoura University had depressive symptomatology.[10] In Alexandria (2015), the prevalence of depression among first academic year medical and pharmaceutical students was reported to be 57.9% and 51.1%, respectively.[11] Depression was detected in 60% of medical students in the 1st to 4th academic years as reported by a study carried out in Al-Fayoum (2017).[12]

Medical students are considered a vulnerable group because they have to deal with stressors specific to medical education in addition to normal everyday life stressors. Medical education is perceived as stressful due to academic demands, frequent exams, time pressure, too much work load in the form of big content and wide scope syllabus that needs to be covered, increased psychological pressure, getting behind in work and inability to cope.[13-16] Other factors include stigma associated with poor academic performance, and pressures due to competitive nature of medical education in students with excellent academic performance.[17] Also, some students might be moving away from family home, losing the adult supervision and the traditional social and financial support for the first time in their lives.[18, 19]

Depression has a massive impact on the student's quality of life. On the personal level, it causes college dropout, impaired ability to work efficiently, deterioration in relationships, substance abuse, attrition from the profession and increased suicidal tendency.[20] Suicide occurs throughout the lifespan and was the second leading cause of death among 15-29 year olds globally in 2015.[1] Depression adversely affects patient care, relationship with the staff members and eventually the culture of the medical profession.[20]

Although the prevalence of depression among medical students was studied in Alexandria, Egypt [11] but the results related to the 1st year medical students were

alarming and calling for further studies among the senior students. The aim of this study was to estimate the prevalence of depression and to identify its correlates among medical students in Alexandria during 4th, 5th and 6th years of study.

Methods

The study was conducted from May 2016 till August 2016 among medical students at the Faculty of Medicine, Alexandria University, Egypt. A cross-sectional design was used. Students (both males and females) from the 4th, 5th and 6th academic years, currently studying in Alexandria University for at least six months were included in the study. The sample size was calculated using Epi-Info 7 based on a prevalence of depression among medical students of 57.9%, [11] and a confidence limit of 5%. The minimum required sample size at 95% confidence level was 374, and was rounded to 390.

A multistage stratified random sampling technique was used. Students were 1st classified according to their academic year. An equal number of students was selected from the 4th, 5th and 6th academic years (130 students from each year) with equal numbers of males and females (65 each). From each academic year, students were selected from the departments in which they were studying. Students of the 4th academic year were selected from the Community medicine, ENT, and Ophthalmology Departments, and 6th year students were selected from Internal Medicine and General Surgery Departments. Students of 5th academic year were selected from Pediatrics Department only as students from the other Departments were having exams. Clinical rounds or practical sections were randomly selected and a systematic random sampling technique was used to select the students from these settings.

Two structured self-administered questionnaires were used. The 1st was prepared to collect data from students about their socio-demographic characteristics, personal habits, living conditions, history of chronic diseases, history and family history of mental illness(es), academic environment, and perspective of the students towards lectures and exams. The 2nd was the Arabic version of the Beck Depression Inventory-2nd edition (BDI-II)[21] which is a validated tool. The BDI-II is a screening tool used to assess the intensity of depressive symptoms. It consists of 21 items on a 4-point scale from 0 to 3. Scoring is achieved by adding the highest ratings for all 21 items. Scores of 0–13 indicate minimal depression,

14–19 indicate mild depression, 20–28 indicate moderate depression and 29–63 indicate severe depression.

Statistical analysis

Data entry was performed using Statistical Package for the Social Sciences (SPSS) version 23, followed by processing and analysis. Categorical data were expressed as number and percentage, and quantitative data was presented by mean (X) and standard deviation (SD). Chi - square (X^2) test was used for analysis of categorical data, and whenever X^2 was not valid, Monte Carlo Exact Probability (MCP) was used for RxC tables. Level of significance was set as p value <0.05. Binary logistic regression models were used to show the predictive model of BDI based on the values of the independent variables (predictors). Independent variables were chosen based on their significance in the bivariate analysis. While gender was not a significant factor, it was still added in both models, since depression varies between genders.[1]

Results

Figure 1 illustrates that 32.6% and 22.3% of students had minimal and mild depression, respectively, while moderate and severe depression represented 27.9%, and 17.2%, respectively.
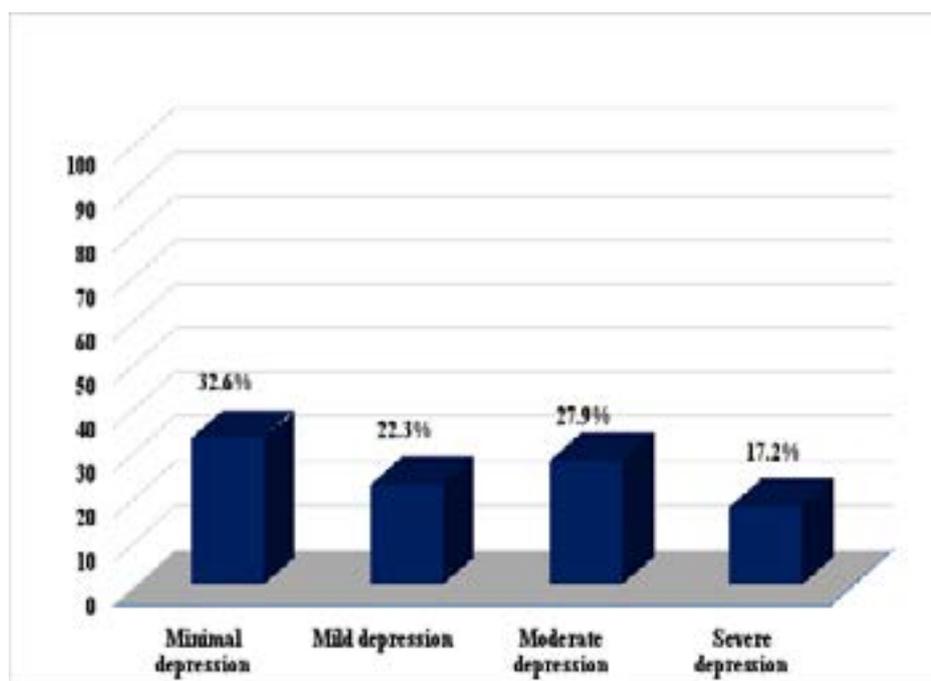

Figure 1: Level of depression among medical students according to BDI-II score (Alexandria, 2016)

Table 1 shows that the prevalence of moderate and severe depression decreased by the increase in students' age. Nearly half (50.8%) of female students had moderate and severe depression, versus 39.5% of the male students. The lowest percent of moderate and severe depressed was among married students (25%). All students who lived with their relatives had moderate and severe depression, while the lowest percent (42.7%) of moderate and severe depression was noticed among students who had a private residence. Lower percentage of moderate and severe depression was noticed among students with the highest crowding index (11.1%). Moderate and severe depression were more common among students using public transportation (46.4%), not practicing any sports (49.4%), and who did not have a hobby (51.1%). About 39% of students who smoked cigarettes had moderate and severe depression compared to 45.8% of those who did not. Moderate and severe depression were noticed among 54.2% of the students who reported substance abuse compared to 44.5% of those who did not. The association between each of these factors and the level of depression was not statistically significant.

Table 1. Distribution of medical students according to their personal and demographic characteristics, and their level of depression (Alexandria, 2016)

Personal and demographic characteristics	Level of depression		X^2 (p value)
	Minimal and mild (n=214)	Moderate and severe (n=176)	
	No. (%)	No. (%)	
Age			
- 20-	20 (48.8)	21(51.2)	X^2=4.102
- 22-	134 (54.5)	112 (45.5)	$p_{(MC)}$=0.248
- 24-	53 (55.8)	42 (44.2)	
- 26-27	7 (87.5)	1 (12.5)	
Sex			
- Male	118 (60.5)	77 (39.5)	X^2=5.524
- Female	96 (49.2)	99 (50.8)	p=0.19
Marital status			
- Single	187 (55.3)	151 (44.7)	X^2=1.143
- Engaged	24 (50.0)	24 (50.0)	$p_{(MC)}$=0.601
- Married	3 (75.0)	1 (25.0)	
Residence			
- Family home	108 (51.9)	100 (48.1)	X^2=5.964
- At a relative	0 (0.0)	3 (100.0)	$p_{(MC)}$=0.100
- University dorms	59 (60.8)	38 (39.2)	
- Private residence	47 (57.3)	35 (42.7)	
Crowding index			
- <1	36 (57.1)	27 (42.9)	X^2=4.593
- 1–<3	170 (53.5)	148 (46.5)	$p_{(MC)}$=0.103
- 3+	8 (88.9)	1 (11.1)	
Transportation			
- Own car	42 (60.9)	27 (39.1)	X^2=1.218
- Public transportation	172 (53.6)	149 (46.4)	p=0.270
Practicing sports			
- Yes	82 (63.3)	47 (36.4)	X^2=5.884
- No	132 (50.6)	129 (49.4)	p=0.15
Hobbies			
- Yes	170 (56.7)	130 (43.4)	X^2=1.691
- No	44 (48.9)	46 (51.1)	p=0.193
Smoking cigarettes			
- Yes	22 (61.1)	14 (38.9)	X^2=0.624
- No	192 (54.2)	162 (45.8)	p=0.430
Substance abuse			
- Yes	11 (45.8)	13 (54.2)	X^2=0.844
- No	203 (55.5)	163 (44.5)	p=0.358
Presence of chronic diseases			
- Yes	43 (47.8)	47 (52.2)	X^2=2.378
- No	71 (57.0)	129 (43.0)	p= 0.123
Presence of mental illness(es)			
- Yes	66 (35.9)	118 (64.1)	X^2=50.796*
- No	148 (71.8)	58 (28.2)	p= 0.000
Family history of mental illness(es)			
- Yes	41 (41.4)	58 (58.6)	X^2=9.704*
- No	173 (59.5)	118 (40.5)	p= 0.002

MC, P value based on Mont Carlo exact probability   * Significant (p < 0.05)

The table also shows that the prevalence of moderate and severe depression was higher among students who reported having chronic diseases (52.2%), among students who reported having mental illness(es) (64.1%) and among students who reported having a family history of mental illness(es) (58.6%). The association between the presence of mental illness(es), family history of mental illness(es) and the level of depression was statistically significant.

Table 2 illustrates that the prevalence of moderate and severe depressive symptoms was higher among students not having any close friends (63.9%), not hav-

ing someone to talk to when under stress (52.9%), experiencing stressful life event(s) during the previous 6 months (54.9%), and not being satisfied with their socioeconomic level (61.4%). The association between each of these factors and the level of depression was statistically significant.

Table 2. Distribution of medical students according to their social life, academic environment, and their level of depression (Alexandria, 2016)

Social life and academic environment	Level of depression		X^2 (p value)
	Minimal and mild (n=214)	Moderate and Severe (n=176)	
	No. (%)	No. (%)	
Social life			
Presence of close friends			
- Yes	201 (56.8)	153 (43.2)	X^2=5.637*
- No	13 (36.1)	23 (63.9)	p=0.018
Presence of someone to talk to when under stress			
- Yes	157 (58.4)	112 (41.6)	X^2=4.271*
- No	57 (47.1)	64 (52.9)	p=0.039
Experiencing any stressful life events during the previous 6 months			
- Yes	105 (45.1)	128 (54.9)	X^2=22.482*
- No	109 (69.4)	48 (30.6)	p=0.000
Satisfaction with socioeconomic level			
- Yes	192 (57.7)	141 (42.3)	X^2=7.141*
- No	22 (38.6)	35 (61.4)	p=0.008
Academic environment			
Students' satisfaction with their results			
- Extremely satisfied	44 (64.7)	24 (35.3)	
- Satisfied	73 (58.4)	52 (41.6)	
- Indifferent	39 (60.0)	26 (40.0)	X^2=13.556*
- dissatisfied	41 (50.0)	41 (50.0)	$p_{(MC)}$= 0.007
- Extremely dissatisfied	17 (34.0)	33 (66.0)	
Grade achieved during the last academic year			
- Excellent	58 (58.6)	41 (41.4)	
- Very good	88 (57.1)	66 (42.9)	
- Good	52 (50.0)	52 (50.0)	X^2=2.657
- Fair	10 (45.5)	12 (54.5)	$p_{(MC)}$= 0.623
- Failed	6 (54.5)	5 (45.5)	
Specifying a grade to achieve this year			
- Yes	155 (58.7)	109 (41.3)	X^2=4.867*
- No	59 (46.8)	67 (53.2)	p= 0.027
Regularly attending lectures			
- Yes	65 (60.7)	42 (39.3)	X^2=9.263*
- Sometimes	63 (44.7)	78 (55.3)	$p_{(MC)}$= 0.011
- No	86 (60.6)	56 (39.4)	
Surrounding environment help the student to study			
- Yes	156 (62.7)	93 (37.3)	X^2=16.830*
- No	58 (41.1)	83 (58.9)	p= 0.000
Studying medicine gives the opportunity to balance between the students' social and academic life			
- Strongly agree	8 (88.9)	1 (11.1)	
- Agree	18 (75.0)	6 (25.0)	
- Neutral	11 (61.1)	7 (38.9)	X^2=20.582*
- disagree	69 (65.7)	36 (34.3)	$P_{(MC)}$= 0.000
- Strongly disagree	108 (46.2)	126 (53.8)	
The gap period between exams is sufficient			
- Strongly agree	6 (66.7)	3 (33.3)	
- Agree	76 (68.5)	35 (31.5)	
- Neutral	17 (58.6)	12 (41.4)	X^2=14.107*
- Disagree	71 (46.7)	81 (53.3)	$p_{(MC)}$= 0.005
- Strongly disagree	44 (49.4)	45 (50.6)	
Oral and clinical exams are being held with transparency			
- Strongly agree	12 (75.0)	4 (25.0)	
- Agree	27 (56.2)	21 (43.8)	
- Neutral	29 (56.9)	22 (43.1)	X^2=7.424
- Disagree	63 (61.2)	40 (38.8)	$P_{(MC)}$= 0.115
- Strongly disagree	83 (48.3)	89 (51.7)	

MC, P value based on Mont Carlo exact probability   * Significant (p < 0.05)

It is also clear from table 2 that the higher the students' dissatisfaction with their results the higher the prevalence of moderate and severe depressive symptoms (66%). The proportion of students with moderate and severe depression increased with the decrease in the grades achieved during the last academic year. The association was not statistically significant.

The relation between the grades achieved during the previous academic year and the level of depression was tested among males and females. Among males, the prevalence of moderate and severe depression was 33% among those with excellent or very good score, 48.6% among those with good or fair score and 37.5% among those who failed. Among females, the prevalence of moderate and severe depression increased with the decrease in the score achieved (49.6% among those with excellent and very good scores, 53.8% among those with good or fair scores and 66.7% among those who failed). The assciation was statistically significant.

Higher prevalence was also noticed among students not specifying a grade to achieve for the current year (53.2%) (Table 2). Students who regularly attended lectures and those who did not regularly attend lectures had a lower prevalence of moderate and severe depressive symptoms (about 39% each) compared to those who sometimes did (55.3%). The prevalence of moderate and severe depressive symptoms was higher among students who reported that their surrounding environment being unsuitable for studying (58.9%), students strongly disagreeing that studying medicine gives them opportunity to balance between their social and academic life (53.8%), and students disagreeing and strongly disagreeing that the gap between exams was sufficient (53.3% and 50.6%, respectively). The association between each of these factors and the level of depression was statistically significant.

Table 3 shows the results of two logistic regression analysis models of the factors affecting the level of depression. Social and medical factors were used to build the 1st model, while the factors related to the academic environment were used to build the 2nd model. Gender was used as an independent factor in both models. In model 1, the social and medical factors that significantly affected the level of depression were the presence of mental illness(es) (OR=3.8, CI=2.4-6.01), experiencing stressful life events during the previous 6 months (OR=2.1, CI=1.3-3.3), dissatisfaction with the socioeconomic level (OR=2.1, CI=1.1-3.9), and not having someone to talk to when under stress (OR=1.7, CI=1.00-2.74). Gender was not found to be a significant predictor in this model. The model correctly classified 69.7% of cases.

Table 3. Logistic regression analysis of the factors associated with the level of depression among medical students as the dependent variable with social and medical factors (model 1) and academic environment factors (model 2) as independent variables (Alexandria, 2016)

Independent variables	Coefficient B	p. value	Odds ratio	95% confidence interval	Classification accuracy of the model
Model 1: Medical and social factors					
Suffering from mental illness (Yes)	1.33	0.000	3.8*	2.4-6.01	
Experiencing stressful life events during the previous 6 months (Yes)	0.73	0.002	2.1*	1.3-3.3	69.7%
Satisfaction with the socioeconomic level (No)	0.72	0.033	2.1*	1.1-3.9	
Having someone to talk to when under stress (No)	0.51	0.049	1.7*	1.0-2.74	
Constant	-2.1	0.000			
Model 2: Personal and academic environment factors					
Student's satisfaction with their result (Extremely dissatisfied)	1.24	0.004	3.5*	1.48-8.09	
Surrounding environment helps the student study (No)	0.72	0.003	2.1*	1.28-3.27	68.5%
Specifying a grade to achieve this year (No)	0.54	0.032	1.7*	1.05-2.82	
Gender (Female)	0.52	0.034	1.7*	1.04-2.71	
Constant	-3.25	0.017			

* Significant (p<0.05)

In model 2, four variables were found to be significantly affecting the level of depression among medical students. These variables were extreme dissatisfaction with the student's result for the previous academic year (OR=3.5, CI=1.48-8.09), strongly disagreeing that the surrounding environment was suitable for studying (OR=2.1, CI=1.28-3.27), not specifying a grade to achieve this year (OR=1.7, CI=1.05-2.82), and finally, being a female (OR=1.7, CI=1.04-2.71). The model correctly classified 68.5% of the cases.

Discussion

The burden of mental disorders continues to grow with significant impacts on health and major social, human rights and economic consequences in all countries of the world.[22] In addition to the everyday stresses that contribute to the development of depression, medical students are more prone to depression than the general population due to the presence of additional academic, personal life, and social factors.[13-17]

The present study showed that moderate and severe depression was detected in 45.1% of the sample. Nearly similar findings were reported from India, 2010 and 2015 (49.1% and 51.3%, respectively),[23, 24] Saudi Arabia, 2012 (48.2%) 7 and Brazil, 2012 (40.5%).[25] Higher figures were reported in Pakistan, 2017 (75.5%) [26] and in Brazil, 2016 (58.7%).[27] On the other hand, the prevalence in the current work was noticeably higher than that reported in other studies, in which the reported prevalence of depression among medical students ranged from 12.9% to 38.2%.[4, 5, 8, 28-30] A meta-analysis (2016) by Puthran and colleagues reported that the global prevalence of depression among medical students was 28% and ranged between 24.2%-32.1%. The highest rate was noticed among medical students in the Middle East (31.8% and ranged from 26.3%-37.9%).[31] The present finding was also much higher than these figures. In Egypt (2010), lower prevalence was reported among medical students in Mansoura University (28.3%),[10] while higher figures were reported in Al-Menoufeya, 2014 (63.6%),[32] in Alexandria, 2015 (57.9%),[11] and in Fayoum, 2017 (60.2%).[12]

This wide discrepancy between the reported rates of depression might be attributed to using different scales for screening for depression or depressive symptomatology, differences in the study population characteristics (year of study, gender and students' nationality) or inherent differences between the populations of different countries, due to differences in economic status, political instability, cultural differences, traditions and educational systems.

The current study reported higher prevalence of moderate and severe depression among females than males and a significantly higher prevalence among females who failed compared to males who failed. This finding was in accordance with those reported in the meta-analysis in 2016 where the global prevalence of depression among medical students was higher among females.[31] A similar finding was also reported in several studies.[10-12,17,24,28,33] On the contrary, other studies reported higher prevalence among male students.[4,32,34,35] Studies that reported gender difference suggested that this discrepancy is multifactorial, including biological, sociocultural, or variable combinations of both.[33]

The current study demonstrated that the prevalence of moderate and severe depression decreased with the increase in the students' age and the advance in academic year, which is in accordance with several studies.[5,8,10, 24,33,36] This trend was also reported by Puthran et al (2016) who found a gradually decreasing prevalence from 1st to final year students.[31] Comparing the prevalence of depression among the first three years medical students in Alexandria University in 2015 (57.9%)[11] to the current finding supports the observation that depression rate among medical students tends to decrease with the increase in the academic year. This decrease can be explained by either their advance in age; becoming more mature, a gradual adaptation to the academic environment and that the stress of new study environment and introduction of taking more responsibility for their learning and shift from the traditional spoon feeding teaching methodology, all start to fade gradually through the years of their study. In contrast, Ngasa et al., (Cameroon, 2017) found that being a student at the clinical level was significantly associated with depression.[28] Other studies supported this finding.[17, 37]

In contrary to literature, the current study shows that students who live with their families, or with their relatives had higher rates of moderate and severe depression, compared to those who lived in university dorms, however, this result was statistically insignificant. Possible explanations include the absence of parental authority and by the fact that the present data was not stratified by gender. Fawzy et al., reported high frequencies of psychological stress among those living in uni-

versity campus, and attributed that to the poor quality of accommodation, and missing the family support in general.[33]

There was a significant relation between the high prevalence of moderate and severe depression and students' social life factors, which might impose an additional stress on the students, adding to the stress and load of medical education.

A significant association was noticed between the increase in the prevalence of moderate and severe depression and the students' dissatisfaction with their results, and not specifying a grade to achieve this year. In accordance with the current study, Fawzy and Hamed (Egypt, 2017) reported that those with lower academic achievement degrees (good/fair) had higher scores of subscales of Depression Anxiety and Stress Scale (DASS) compared to those with higher academic achievement degrees. They suggested that in Egypt, undergraduate medical students are under stress because if they had poor grades there is a high possibility of having their postgraduate training outside the residency programs offered by medical schools in Egyptian universities, which increases the risk of a probable poor career and unequal job opportunities.[33] Also, Ibrahim et al., reported that students who had academic failure had significantly higher rate of depression.[35]

Another significant association was detected between moderate and severe depression and if the surrounding environment helped the students study and among students who reported that oral and clinical exams were not being held with transparency. This shows how much effect the surrounding environment has on the students' academic achievement and gives an alarming sign to the quality of the relationship between professors and students, and their willingness to give the optimum teaching experience. Similarly, Ibrahim et al., reported that students who felt that there is no cooperation in the faculty were about two-times more prone to depression compared to others.[35]

The significant association found between the level of depression and the students' opinion if studying medicine gives them the opportunity to balance between their social and academic life, and the students' opinion if the gap between exams was found sufficient suggests that medical school curriculum can play an important role in increasing the prevalence of depressive and anxiety symptoms in students.

The logistic regression analysis revealed that several personal, social and academic environment factors were independent predictors of moderate and severe depression. These findings might be attributed to the nature of the disease, being multi-factorial, and that the medical student is more prone to be affected by every day stressors, in addition to the stressors imposed on them due to the nature of medical education. This multifactorial nature of the diseases was noticed in other studies, similarly reporting several independent predictors for depression.[10, 12, 35]

Limitations of the study
The study was conducted among medical students in a single faculty, with no comparison with students of other faculties or between students in public universities and private ones, and students in other faculties of medicine through the country. Other risk factors that might be associated with depression, including body mass index, nationality and sleeping pattern, were not tested. Since a cross sectional design was used, the study does not establish a cause and effect relationship.

Conclusion
Moderate and severe depression showed a high prevalence among medical students in Alexandria University. Female gender, the presence of mental illness, not having someone to talk to when under stress, experiencing stressful life event(s) during the previous 6 months, not being satisfied with the socioeconomic level, reporting that the surrounding environment is not suitable for studying, not specifying a grade to achieve, and extreme dissatisfaction with the student's result were the independent predictors for moderate and severe depression. The presence mental health services for university students and medical students in particular is important. Also, establishing stress management courses early from the start of the medical education should be a priority. Efforts of professors in charge of preparing the exams should be directed towards making the oral and clinical exams to be held with more transparency, where all students should receive equal chances. Resources should be directed towards the renovation of university dorms and providing halls suitable for studying. Raising awareness regarding depression and other mental health problems among university students is important to help students seek professional help when needed. Screening for psychiatric disorders in general, and depression in particular should be included in the general checkup the students receive before joining the faculty, and on regular basis (at the start of new academic year and at the end of each academic year).

Ethical considerations
The researchers obtained the approval of the Ethics Committee of the High Institute of Public Health and Ethics Committee of the Faculty of Medicine, Alexandria University for conducting the research, and complied with the International Guidelines for Research Ethics. Informed verbal consent was obtained from the students after explaining the aims of the study, voluntary participation and confidentiality of data was assured.

Conflict of interest
The authors declare that they have no conflict of interest.

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