Mohammed *et al.*
Middle East Current Psychiatry (2022) 29:66
https://doi.org/10.1186/s43045-022-00231-y

Middle East Current Psychiatry

RESEARCH Open Access

Depressive symptoms and its correlates among medical students in Upper Egypt

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Abstract

Background: Medical students are at high risk of developing depressive symptoms rather than their age-matched group as medical education is stressful and medical students have psychological and academic stressors. The study aimed to estimate the prevalence of depressive symptoms and the most important correlates associated with it among Assiut University Medical Students in the academic year 2019–2020. It is a cross sectional study conducted among 766 medical students at Assiut University in the academic year 2019–2020, screening for depressive symptoms was by patient health questionnaire-9 (PHQ-9).

Results: The mean age of students was 21.27 ± 1.9, 55.5% of them have depressive symptoms. Female students had statistically significantly higher percent of depressive symptoms compared with males (58.9% vs 51.2%), there was statistically significant lower mean socio-economic score among students having depressive symptoms compared to students with no depressive symptoms (5.73 ± 2.46 and 6.22 ± 2.5 respectively). Students having depressive symptoms had higher mean scores of stresses. The multivariable regression revealed that younger age of the students (OR = 0.797; $p < 0.001$), having a chronic disease (OR = 3.174; $P = 0.024$), lower life satisfaction score (OR = 0.908; $p < 0.001$), students with higher medical stress score (OR = 3.596, $P < 0.001$), and high sense of control score (OR = 2.323; $p < 0.001$) were the significant correlates of depressive symptoms among medical students.

Conclusions: Female gender, low socio-economic status, having chronic disease, presence of family history of either mental illness or depressive symptoms, low satisfaction with life, higher total medical stressors, and low sense of control were the most important correlates of depressive symptoms among medical students.

Keywords: Depression, Medical students, PHQ-9, MSSQ, Sense of control

Background

Depression is a common mental disorder, where people with depression are characterized by sadness, loss of interest or pleasure, hopelessness, helplessness, worthlessness feelings of guilt, disturbed sleep, or appetite (loss of appetite/overeating), feelings of tiredness, and poor concentration. Depression can be long lasting or recurrent, substantially impairing a person's ability to function at work or school, or cope with daily life, affecting performance of job, routine activities, and productivity of the affected individual [1].

University students are a special group of the population enduring a critical transitory period in which they are going from adolescence to adulthood, and it can be one of the most stressful times in a person's life. Medical education is stressful, and medical students have psychological and academic stressors during their evolution from insecure students to young knowledgeable physicians [2, 3].

In Egypt, the prevalence of depressive symptoms among medical students was 55.3% in Assiut University [4], 63.6% in Menoufiya [5], 57.9% in Alexandria [3], 60.8% in Fayoum [6], 59.2% in Mansoura [7] and 42.9% et al.-Azhar University [8]. In Arab countries prevalence

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of depressive symptoms among medical students was 30.9% in Umm Al-Qura University, Saudi Arabia [9] while in Sudan International University, it was 67% [10].

Various risk factors for depression among university students have been identified such as lower socioeconomic status [11, 12], poor academic performance, poor life satisfaction [13, 14], life stressors [15], academic pressure, rising parents' and teachers' expectations, hindrances to goal achievement, favoritism, vastness of the curriculum, demanding workloads [16, 17], overweight or obesity [6, 13] and family history of psychiatric disorders [2].

Sense of control means having a feeling of autonomy, choosing how you spend your time, doing your own work in your own way. The more you perceive yourself to be in control, the better you feel. Sense of control is independently associated with depression. Depressive symptoms are being more common in those who feel there is little they can do to change important things in their lives and who has little control over their futures. On the other hand, less depression among respondents who feel that they can get what they want through their own efforts [18].

Medical students are the future physicians and depression not only affect student's health but also their academic achievements at different points of time in their study period. Also, patients care will be affected by the psychological distress among physicians such as poor communication, diminished quality of care and probability of medical errors.

The current study aims to estimate the prevalence of depressive symptoms and the most important factors associated with it among Assiut University Medical Students in the academic year 2019–2020.

Methods

Study design and studied population

A cross sectional study was conducted on 766 medical students at Assiut University in the academic year 2019–2020. Data was collected from December 2019 to the middle of March 2020 away from exam times (2 weeks before or after exams).

Assiut University is in the capital city of Asyut Governorate in Upper Egypt. It was launched in 1949 and established in October 1957 as the first university in Upper Egypt to prepare qualified graduates with the basic specialized academic knowledge and training expertise on the various necessary skills.

Sample size and technique

Based on a previous study among medical student in Al-Azhar University, Cairo where prevalence of depression was 42.9% [8], with a confidence interval of 95%, acceptable margin of error 5%, design effect of 2, the minimum required sample size was 674. To compensate non-complete/refusal, 20% was added giving a sample size of about 809 students. During data collection, the final number of completed questionnaire was 766, which were distributed proportionate to size of students in each academic year.

Sample design

Multi-stage sampling technique was used. There were six academic years in the faculty of medicine, and students in each year are classified into practical sections or small classes. The number of students from each academic year was recruited according to proportion of total number of students in each year to the total number of students of the 6 years. Then, two practical classes from each academic year were chosen by a simple random sampling by covered sealed base to cover the required sample size. All students from the chosen classes in each study year were invited to complete self-administered questionnaire.

The used tool

Self-administered questionnaire consisted of three parts

1. Socio-demographic characteristics: age, gender, residence, academic year, marital status, father and mother education and occupation, smoking, and drug addiction. Socioeconomic level assessed by (Family affluence scale III) which consists of six items translated into Arabic and back-to-back translation was done with a score ranging from 0 to 13 [19]
2. The Patient Health Questionnaire (PHQ-9) [20]:
   It is used for diagnosis of depression and rating the severity of depressive symptoms, used in research and clinical practice to assess depression. The reliability and validity of the Arabic version have been tested in a study conducted in Saudi Arabia with a Cronbach's alpha of 0.857 [21].
   It consists of nine questions inquired about frequency of bothering certain problems over the last 2 weeks. The questions are arranged as Likert scale and graded from 0 to 3 (not at all = 0, several days = 1, more than half the days = 2, and nearly every day = 3). The interpretation of PHQ-9 was as follow; minimal depression (score 0–4), mild depression (score 5–9), moderate depression (score 10–14), moderately severe depression (score 15–19) and severe depression (score 20–27). The PHQ 9 score was dichotomized into presence and absence of depressive symptoms using a cutoff of 10 (≥ 10 cut-off score includes moderate + moderately severe and severe depression) [22].
3. Correlates of depressive symptoms:

a) History of any chronic disease, family history of depression, and family history of mental illness other than depression.
b) Sense of control scale [23]:
It is a self-reported measure of sense of control consisted of six questions from the surveys conducted by the MacArthur Foundation Network. Each item is rated on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = do not know, 4 = agree, 5 = strongly agree). Questions were translated into Arabic and back-to-back translation was done. Cronbach's Alpha of reliability was 0.71. A mean score is calculated by dividing the total score by the number of items with scores ranging from 1 to 5. Lower scores indicated higher sense of control [24].
c) Medical Student Stressor Questionnaire (MSSQ) [25]:
The MSSQ was developed to identify the stressors of medical students as well as measure the intensity of stress caused by the stressors.
It composed of 20 questions to measure stress among medical students. It consists of 6 models: academic-related stressors (ARS), intrapersonal- and interpersonal-related stressors (IRS), teaching- and learning-related stressors (TLRS), social-related stressors (SRS), drive- and desire-related stressors (DRS), group activities-related stressors (GARS). The responses were measured on a 5-point Likert scale: ("0 = causing no stress", "1 = causing mild stress", "2 = causing moderate stress", "3 = causing high stress", or "4 = causing severe stress"). The mean score for the MSSQ is calculated by summing all the item scores and dividing the sum by the total number of items. The mean score for individual subscales is calculated by summing the item scores in that particular subscale and dividing the sum by the total number of items in that subscale. Questions were translated into Arabic and back-to-back translation were done. Cronbach's alpha of reliability was 0.89.
d) Satisfaction with life scale (SWLS) [26]:
The SWLS is a short 5-item instruments designed to measure a global cognitive judgment of satisfaction with one's life. It is a 7-point Likert scale ranging from strongly disagree to strongly agree score. 7 = strongly agree, 6 = agree, 5 = slightly agree, 4 = neither agree nor disagree, 3 = slightly disagree, 2 = disagree, and 1 = strongly disagree. Total satisfaction score was calculated by summing scores on each item, it ranged between 5 and 35. Questions were translated into Arabic and back-to-back translation was done. Cronbach's alpha of reliability was 0.81.
e) Measurement of weight and height
They were measured following a standard methods of measuring weight and height. Body mass index was calculated as weight in kilograms divided by height in meters squared. Calculation of weight categories was done according to the international classification of adult underweight, overweight and obesity according to body mass index.

Statistical analysis

Data was analyzed using the Statistical Package for Social Science (SPSS), version 26.0 for Windows. Mean and standard deviation were used to express quantitative data, while qualitative data was presented using frequencies and percentages. Student's sample t test was used to compare mean between depressed and non-depressed, chi-square (χ^2) and Fisher's exact tests were used to compare proportion between groups. Unadjusted and adjusted logistic regression models were applied to identify predictors of depression among medical students. Significance of statistical tests was at p value < 0.05.

Results

Figure 1 showed proportions of depressive symptoms grades among studied students, about 11% of students have minimal depressive symptoms. 33.7%, 26.8%, 16.8%, and 11.9% of students have mild, moderate, moderately severe, and severe depressive symptoms respectively. On classifying depressive symptoms according to cut-off point 10, 55.5% of students have depressive symptoms.

Table 1 showed personal criteria of the studied students and their families, the mean age of students was 21.27 ± 1.9. Female students had statistically significantly higher percent of depressive symptoms compared to males (58.9% vs 51.2% respectively, $p < 0.05$). Students with higher grade have statistically significant lower percent of depressive symptoms compared to those with lower grades (53.1% VS 74.3%, $p < 0.05$). Moreover, there was statistically significant lower mean socio-economic score among students having depressive symptoms compared to students with no depressive symptoms (5.73 ± 2.46 and 6.22 ± 2.5 respectively, $p = 0.002$).

Table 2 showed statistically significant higher depressive symptoms among students having chronic illness compared to others (78.4% compared to 54.3% respectively, $p = 0.004$). Also, there were statistically significant higher depressive symptoms among students having family history of mental illness other than depression (64.9% vs 54.1%) and family history of depression (71.1% vs 53.8%). Moreover, mean score of life satisfaction was significantly lower among students having depressive

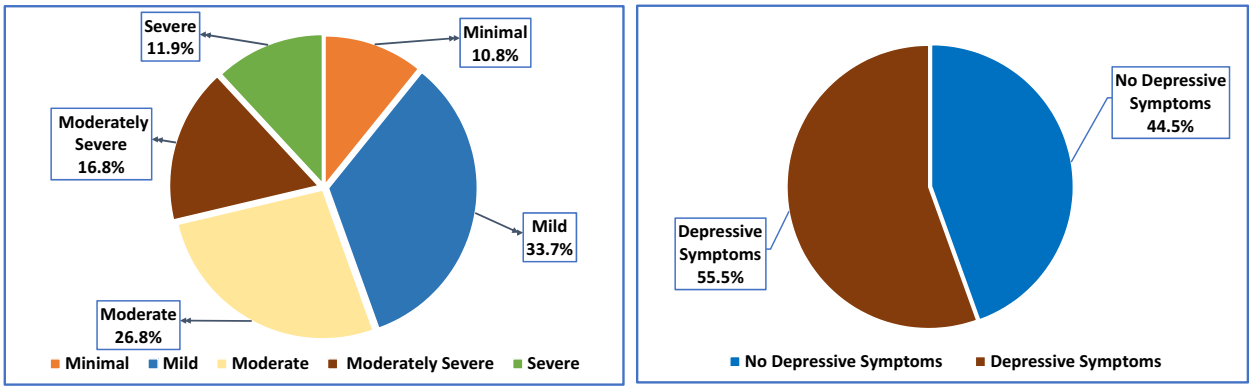

Fig. 1 Distribution of depressive symptoms among studied medical students

symptoms compared to students with no depressive symptoms (18.71 ± 6.3 compared to 22.95 ± 5.9 respectively).

Table 3 showed that, students having depressive symptoms had higher mean scores for ARS, IRS, TLRS, SRS, DRS, and GARS compared with those without symptoms and all associations were statistically significant ($p < 0.001$). Moreover, there was higher statistically significant mean sense of control score among students with depressive symptoms compared to students with no depressive symptoms (2.89 ± 0.8 compared to 2.27 ± 0.64 respectively).

Univariate logistic regression showed, the significant correlates associated with depressive symptoms were being female, low socio-economic status, having a chronic disease, presence of family history of depression and mental illness, lower score of life satisfaction, higher score of total stress and high sense of control. The multivariable regression showed that younger age of the students (OR = 0.797; $p < 0.001$), having a chronic disease (OR = 3.174; $P = 0.024$), lower life satisfaction score (OR = 0.908; $p < 0.001$), students with higher stress score (OR = 3.596, $P < 0.001$) and higher sense of control score (OR = 2.323; $p < 0.001$) were the significant correlates of depressive symptoms among medical students Table 4.

Discussion

Medical students are at high risk of developing depressive symptoms rather than their age- matched group as medical education is stressful and medical students have psychological and academic stressors.

The stress that the medical students experience was thought to be associated with depressive symptoms and decrease the quality of life, deteriorating academic achievements, and clinical practice [27].

The present research revealed that, the prevalence of depressive symptoms among medical Students of Assiut University was 55.5%, and this finding is nearly similar to a study among Assiut University medical students in the academic year 2003–2004 (55.3%) (4) and a study conducted among medical students at the academic year 2015 in Alexandria University 57.9% [3].

However, prevalence of depressive symptoms in our study is lower than that reported by a study among Egyptian medical students in 2016 at Fayoum University which found prevalence of depressive symptoms 60.8% [6].

Prevalence of depressive symptoms in our study is higher than the study among Al-Azhar University medical students (42.9%) [8], and among study conducted at Alexandria University 2020 between medical students of 4th, 5th, and 6th academic years, which found prevalence of depressive symptoms about 45.0% [28].

In the present study, the multivariable regression revealed that, younger age of the students was significant associated with more depressive symptoms (OR = 0.797; $p < 0.001$). This is consistent with Elsway et al. that reported prevalence of moderate and severe depression decreased with the increase in the students' age. This can be explained by the fact that with their advance in age, they became more mature [28].

However, a study conducted among medical Students in Sudan International University [10], and study among medical students in India [22] found no statistically significant difference between age and the presence of depressive symptoms.

Regarding gender, our study found statistically significant higher depressive symptoms among females than males (58.9% vs 51.2% respectively). This is consistent with other studies in reporting higher levels of depressive symptoms among females [3, 8, 29–31].

Table 1 Association between students' characteristics and depressive symptoms

Variables	Total	Depressive symptoms	No depressive symptoms	*P* value*
	n **= 766 (%)**	***n*** **= 425 (%)**	***n*** **= 341 (%)**	
Mean age	21.27 ± 1.9	21.13 ± 1.9	21.36 ± 1.9	= 0.075
Sex				
■ Male	338 (44.1%)	173 (51.2%)	165 (48.8%)	**= 0.033**
■ Female	428 (55.9%)	252 (58.9%)	176 (41.1%)	
Marital status				
■ Single	763 (99.6%)	423 (55.4%)	340 (44.6%)	= 0.696
■ Married	3 (0.4%)	2 (66.7%)	1 (33.3%)	
Living during study				
■ With family	336 (43.9%)	183 (54.5%)	153 (45.5%)	= 0.327
■ Dormitory	242 (31.6%)	129 (53.3%)	113 (46.7%)	
■ Apartment alone\friend	188 (24.5%)	113 (60.1%)	75 (39.9%)	
Family residence				
■ Urban	432 (56.4%)	236 (54.6%)	196 (45.4%)	= 0.589
■ Rural	334 (43.6%)	189 (56.6%)	145 (43.4%)	
Academic year				
■ Academic (1st 3 years)	386 (50.4%)	225 (58.3%)	161(41.7%)	= 0.115
■ Clinical (last 3 years)	380 (49.6%)	200 (52.6%)	180 (47.4%)	
Grade [c]	***N*** **= 621**	***N*** **= 337**	***N*** **= 284**	
■ Excellent/very good/good	586 (94.4%)	311 (53.1%)	275 (46.9%)	**= 0.014**
■ Accept/pass/failed	35 (5.6%)	26 (74.3%)	9 (25.7%)	
Father education				
■ Sec. education or below	235 (30.7%)	131 (55.7%)	104 (44.3%)	= 0.923
■ University and above	531(69.3%)	294 (55.4%)	237 (44.6%)	
Father occupation [a]	***N*** **= 731**	***N*** **= 405**	***N*** **= 326**	
■ Farmer/unskilled/skilled worker	78 (10.7%)	46 (59.0%)	32 (41.0%)	= 0.234
■ Professional	358 (49.0%)	184 (51.4%)	174 (48.6%)	
■ Employee	175 (23.9%)	105 (60.0%)	70 (40.0%)	
■ Retired/not working/died	120 (16.4%)	70 (58.3%)	50 (41.7%)	
Mother education				
■ Sec. education or below	330 (43.1%)	185 (56.1%)	145 (43.9%)	= 0.780
■ University and above	436 (56.9%)	240 (55.0%)	196 (45.0%)	
Mother occupation [b]	***N*** **= 765**	***N*** **= 424**	***N*** **= 341**	
■ Professional work	330 (43.1%)	178 (53.9%)	152 (46.1%)	= 0.463
■ Employee	107 (14.0%)	56 (52.3%)	51 (47.7%)	
■ Housewife/retied	328 (42.9%)	190 (57.9%)	138 (42.1%)	
Socio-economic status	5.96 ± 2.5	5.73 ± 2.46	6.22 ± 2.5	**= 0.002**

Data expressed as frequency (%) or mean ± SD

* Student's *t* test and chi-square were used

[a] 35 case their father died

[b] 1 cases his mother died

[c] 145 students were excluded as they were still in the first year

Higher prevalence of depressive symptoms among females may be due to that female complain more about the high load of the curriculum, they are more likely to report stress, females are more liable to over complaint about physical and psychological symptoms [3].

Regarding *academic year*, our study revealed that, there was high depressive symptoms among students of the first three years (academic years) (58.3%) vs (52.6%)

Table 2 Association between students' health profile and depressive symptoms

Variables	Total *n* = 766 (%)	Depressive symptoms *n* = 425 (%)	No depressive symptom *n* = 341 (%)	*P* value*
Smoking				
■ Yes	24 (3.1%)	13 (54.2%)	11 (45.8%)	= 0.895
■ No	742 (96.9%)	412 (55.5%)	330 (44.5%)	
Drug addition				
■ Yes	6 (0.8%)	3 (50.0%)	3 (50.0%)	= 0.786
■ No	760 (99.2%)	422 (55.5%)	338 (44.5%)	
Chronic disease[b]				
■ Yes	37 (4.8%)	29 (78.4%)	8 (21.6%)	**= 0.004**
■ No	729 (95.2%)	396 (54.3%)	333 (45.7%)	
Family history of mental illness other than depression				
■ Yes	97 (12.7%)	63 (64.9%)	34 (35.1%)	**= 0.045**
■ No	669 (87.3%)	362 (54.1%)	307 (45.9%)	
Family history of depression				
■ Yes	76 (9.9%)	54 (71.1%)	22 (28.9%)	**= 0.004**
■ No	690 (90.1%)			
Life satisfaction score	20.57 ± 6.5	18.71 ± 6.3	22.95 ± 5.9	**< 0.001**
Anthropometric measures (*n* = 751) [a]				
■ Weight	70.14 ± 15.5	70.28 ± 15.9	69.97 ± 14.9	= 0.904
■ Height	167.67 ± 9.3	167.35 ± 9.4	168.08 ± 9.2	= 0.775
■ BMI	24.79 ± 4.2	24.95 ± 4.4	24.6 ± 3.9	= 0.417
BMI categories				
■ Under weight	23 (3.1%)	14 (60.9%)	9 (39.1%)	= 0.72
■ Normal weight	409 (54.5%)	223 (54.5%)	186 (45.5%)	
■ Overweight	247 (32.9%)	137 (55.5%)	110 (44.5%)	
■ Obese	72 (9.5%)	44 (61.1%)	28 (38.9%)	

Data expressed as frequency (%) or mean ± SD

* Student's *t* test and chi-square were used

[a] 15 students missing in weight and height and in BMI calculation (refused to measure weight and height)

[b] Chronic disease like endocrinal diseases, respiratory diseases

Table 3 Association between stress, sense of control, and depressive symptoms

Variables	Total *n* = 766 (%)	Depressive symptoms *n* = 425 (%)	No depressive symptom *n* = 341 (%)	*P* value*
MSSQ				
■ ARS	1.73 ± 0.7	1.94 ± 0.7	1.47 ± 0.6	**< 0.001**
■ IRS	1.93 ± 0.9	2.19 ± 0.9	1.61 ± 0.8	**< 0.001**
■ TLRS	2.04 ± 1.1	2.29 ± 1.1	1.69 ± 1.0	**< 0.001**
■ SRS	2.09 ± 0.9	2.33 ± 0.9	1.77 ± 0.9	**< 0.001**
■ DRS	2.34 ± 1.1	2.72 ± 1.0	1.85 ± 1.0	**< 0.001**
■ GARS	1.89 ± 0.9	2.19 ± 0.9	1.49 ± 0.9	**< 0.001**
Total score	1.96 ± 0.7	2.22 ± 0.65	1.6 ± 0.6	**< 0.001**
Sense of control				
■Total score	2.61 ± 0.8	2.89 ± 0.8	2.27 ± 0.64	**< 0.001**

ARS academic-related stressors, *IRS* intrapersonal- and interpersonal-related stressors, *TLRS* teaching- and learning-related stressors, *SRS* social-related stressors, *DRS* drive- and desire-related stressors, *GARS* group activities related stressors

Data expressed as mean ± SD

* Student sample *t* test

among students of clinical years but was of no significant association and this is in accordance with a study among medical students in Khartoum University [32]. This is consistent with a study among medical students et al.-Azhar University which showed that the level of depressive symptoms increases among students in the second and third years of the medical course than clinical years.

The decrease in depressive symptoms with advance of academic years can be explained also by either their advance in age; a gradual adaptation to the academic environment and that the stress of new study environment and taking more responsibility for their learning [28].

Regarding scholastic achievement, the present research revealed statistically significant higher depressive symptoms among pass/failed students (74.3%) compared to (53.1%) among excellent, very good and good students. This is in consistent with Sarokhani et al.'s study which reported a low prevalence rate of depressive symptoms among students with moderate and high performance in examination [33].

As regards *living with family during study*, there was higher depressive symptoms among students who live in apartment alone or with a friend (60.1%) compared to (54.5%) among students who live with their families.

However, many studies revealed that living away from their families during study period is associated with more depression as reported in a study among medical students in Saudia Arabia showed that, 88% of participants who lived alone had depressive symptoms [34].

Another study conducted et al.-Azhar University found that, students who live away from their family (in and outside the University residence) were found to have had a significant high prevalence of depressive symptoms. This can be explained by the fact that students who live away from their families are in need of family support [8].

As regards *parental education and occupation*, our study revealed that there was no significant association between them and presence of depressive symptoms among medical students. However, Ibrahim et al. conducted a study in 2012 among Assiut University undergraduate students including medical students, and he found a highly significant association between parental education, occupation, and presence of depressive symptoms (4). This may be attributed that, sampled students are of different socio-economic classes.

The current study revealed that, depressive symptoms were higher among students with lower socioeconomic status. This is consistent with a study performed among Assiut University students including medical students [4]. Also, a study among medical students from South Korea [35]. However, in India Hakim et al.'s study, it was revealed that there was no significant association between socio-economic status and presence of depressive symptoms [36].

The present research revealed significant association between depressive symptoms and the presence of *chronic medical condition* (OR = 3.174; $P = 0.024$), this is in accordance with a study in New-Delhi [37] and another study performed among first year medical students in Menoufiya University [5]. However, Elsawy WIH et al. reported no statistically significant difference between presence of chronic medical illness and presence of depressive symptoms [28].

Family history of mental illness other than depression had a significant association with the presence of depressive symptoms, and this is consistent with a study in Portugal [2], study among medical students in Sudan [10], and Elsawy et al.'s study [28]. However, a study among medical students at Qassim University, Saudia [38] showed no significant association between them.

Table 4 Logistic regression analysis for correlates of depressive symptoms among study students

	Univariate				Multivariable			
	OR	95% C.I		*P* value	OR	95% C.I		*P* value
		Lower	Upper			Lower	Upper	
Age/years	0.932	0.864	1.006	0.073	0.797	0.721	0.880	**< 0.001**
Female gender	1.366	1.025	1.820	**0.034**				
S.E. status	0.917	0.866	0.972	**0.004**				
Presence of Chronic disease	3.048	1.375	6.758	**0.006**	3.174	1.168	8.623	**0.024**
Family history of mental illness other than depression	1.571	1.008	2.450	**0.046**				
Family history of depression	2.111	1.257	3.542	**0.005**				
Life satisfaction score	0.892	0.869	0.915	**< 0.001**	0.908	0.879	0.937	**< 0.001**
MSSQ total score	4.357	3.341	5.681	**< 0.001**	3.596	2.680	4.825	**< 0.001**
Sense of control score	3.453	2.722	4.381	**< 0.001**	2.323	1.763	3.060	**< 0.001**

OR odds ratio and *CI* confidence interval. Model used was backward LR

Moreover, *family history of depression* was significantly associated with higher depressive symptoms, this is in accordance with a study among medical students at an institution in Karnataka [39] and a study among medical students at a private medical college in south India [40].

The present research revealed that, lower life satisfaction score was associated with the presence of depressive symptoms (OR=0.908; $p<0.001$), this is consistent with a study among medical students at Irish medical university, Bahrain [41].

Regarding stress, the present research revealed that drive- and desire-related stressors (DRS) followed by social-related stressors (SRS) and teaching- and learning-related stressors (TLRS) were the major stressors faced by students and depressive symptoms were significantly less in the absence of medical stressors assessed by MSSQ. In multivariable regression, students with higher medical stress score were three times more liable to have depressive symptoms (OR = 3.596, $P<0.001$).

This is consistent with a study performed among medical students in University of Putra in Malaysia [42], a study conducted among undergraduate medical Students in a Teaching Medical Institution of South India [43] and study conducted among female Health Profession Students in a Saudi University [44].

Our study revealed an inverse relationship between *sense of control* and depressive symptoms (a low sense of control was related with the presence of depressive symptoms), (OR = 2.323; $p<0.001$). This agreed with a study carried out among students from six UK universities that found depressive symptoms were related with lower perceived control with an OR of 1.6 [24].

Study limitations

Students' schedules to find convenient time for data collection without disruption of educational process and to be away from exams take time from us for coordination and appointments. Risk of missing severely depressed because of absenteeism. The study depends on self-reported data that is subjected to reporting bias (over reporting/recall bias).

Conclusions

The prevalence of depressive symptoms among medical students is 55.5%. Being a female, low socio-economic status, having chronic disease, presence of family history of either mental or depressive illness, low satisfaction with life, higher total medical stressors, and low sense of control were the most important correlates of depressive symptoms among medical students.

Abbreviations

PHQ-9: Patient health questionnaire-9; MSSQ: Medical Student Stressor Questionnaire; ARS: Academic-related stressors; IRS: Intrapersonal- and interpersonal-related stressors; TLRS: Teaching and learning-related stressors; SRS: Social-related stressors; DRS: Drive- and desire-related stressors; GARS: Group activities-related stressors; SWLS: Satisfaction with life score.

Acknowledgements

Delighted to appreciate all subjects who participated in the study.

Authors' contributions

HMM participated in designing the questionnaire, statistical analysis, interpreting data, writing major parts in the manuscript, drafting and preparing manuscript for submission. SMS contributed to data collection, data entry, reviewed the literature, and statistical analysis. AAA revised tools of data collection especially tools related to depression and stress. AKI conceived the idea of the study, revised all statistical analysis and conceptualized the study design. All authors read and approved the final manuscript.

Funding

This study did not receive any specific grant from the funding institution.

Availability of data and materials

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved via the Ethical Review Committee of Assiut University, Faculty of Medicine before starting data collection (IRB number 17100694). Written consent was obtained from students who welcomed to participate in the study (at front page of the questionnaire). Privacy and confidentiality of all data was assured, name of the student was optional, and every name was represented by a number for identification of those need to be referred to students' hospital.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Received: 7 July 2022 Accepted: 7 August 2022
Published online: 02 September 2022

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