Original Research Article

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PREVALENCE AND PREDICTORS OF DEPRESSION, ANXIETY AND STRESS AMONG PHARMACY STUDENTS UMM AL-QURA UNIVERSITY, SAUDI ARABIA

ABSTRACT

Introduction:

There is an increasing concern about the effect of mental diseases on academic performance, especially in the medical field. However, there is a very limited study done on depression, anxiety, and stress among pharmacy students in Makkah. The study aimed to determine the prevalence and predictors of depression, anxiety, and stress among pharmacy students from Umm Al-Qura University, Makkah.

Methods:

A cross-sectional study was conducted among all pharmacy students from both genders who enrolled in both pharmacy programs (B-Pharm and Pharm D) at Umm Al-Qura University, Makkah, during 2018. A standardized data collection sheet was used to collect the personal, socio-demographic data. It included the depression Anxiety and Stress Scale (DASS-21), the authentic leadership questionnaire, Schutte Self-Report Emotional Intelligence (SSREI) scale. Descriptive statistics e.g. means and SDs. Inferential statistics were done as a Chi-square test. Multiple Linear and logistic regression analyses were conducted.

Results:

The prevalence of depression, anxiety, and stress among pharmacy students were high; 62.8%, 59.0%, and 49.2%, respectively. A longer duration of exercise is an important predictor for decreasing anxiety and stress levels. General life satisfaction is an important predictor for decreasing depression, anxiety, and stress levels. Academic stress was an important predictor to increase depression, anxiety, and stress levels. Male students suffered from a significantly more prevalence of depression compared to females. Younger students suffered more from stress compared to older students. A higher EI score was positively associated with better leadership capacity.

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Conclusion:

The prevalence of depression, anxiety, and stress among pharmacy students were high (62.8%, 59.0%, and 49.2%, respectively). General life satisfaction is an important predictor for decreasing depression, anxiety, and stress levels. Duration of exercise is an important predictor for decreasing anxiety and stress levels. Academic stress was an important predictor for increasing depression, anxiety, and stress levels. Screening programs for depression, anxiety, and stress among pharmacy students are needed, with the proper management of the cases.

Psychosocial support services need to be available to help students to deal and cope with their personal and social difficulties for avoiding mental distress.

Keywords: Depression, Anxiety, Stress, Prevalence, Predictors. Pharmacy students.

Introduction

Mental health is one of the most important determinants of quality of life and life satisfaction. Poor mental health is a complex and common psychological problem among university students in both developed and developing countries. [1] Mental disorders ranked as the ninth cause of global burden of disease, 2017, and accounted for about 15% of the global burden of diseases, with their burden being higher than from all cancers. Mental illnesses are complicated, multi-factorial disorders that occur due to the interaction of personal and environmental conditions.[2] Health care schools have been long been recognized as having numerous stressors that can affect the well-being of students. [3, 4] Generally, students from medical fields have reported to be more suffering from anxiety, depression and stress. [5]

The commonest mental illnesses in the world are depression, anxiety.[2] Abdel Wahed, et al. (2016) conducted a study at Fayoum University to assess the psychological mood disorders among 442 medical students by using (DASS-21). They reported high levels of each of depression, anxiety and stress. They also found that higher level of stress and anxiety were significantly associated with female sex and older age. Moreover, increasing age and low socioeconomic was associated with higher depression score.[5] Kulsoom, et al., conducted a study among 575 medical students to at the Alfaisal University in Riyadh to assess anxiety, depression and stress traits using DASS-21 using the questionnaire for two times (2-3 weeks before the examination and post-examination). High prevalence of each of depression, anxiety, and stress was found in the first time (43%, 63%, and 41%, respectively). It was then reduced (30%, 47%, and 30%, respectively) after the exam. Students claimed that busy schedule and curriculum caused the increasing scores of the DASS-21 before the exam.[6] Asiri, et al. (2017) conducted a research to identify the prevalence of psychological morbidity such as depression, anxiety, and stress among male medical students at Najran University, Saudi Arabia and high level of DASS-21 were reported.[7]

EI helps individuals to able to capture the differences in identifying, processing and regulating emotions. The researchers have identified a significant link between the ability to manage emotions and the mental health of individuals.(8) General findings suggest that some forms of

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EI play a role in protecting individuals against stress while helping them to better adaptation. If stress persists for a long time or is of high intensity, an individual may collapse and may even lead to the development of physical and mental disorders.[9, 10]

There are increasing concerns about the importance of mental health in academic life, especially among health care students. However, there is a very limited studies done on depression, anxiety and stress among pharmacy students in Makkah. The study aimed to determine the prevalence and predictors of depression, anxiety and stress among pharmacy students from Umm Al-Qura University (UQU), Makkah.

Methods

A cross-sectional study was conducted among pharmacy students at UQU, Makkah, during the educational year 2018/2019. Pharmacy students from both genders who completed the first year from both programs of Bachelor of Pharmacy (B Pharm) or Doctor of Pharmacy (Pharm D), who accepted to participate were recruited. A multi-stage stratified random sampling technique was used. Stratification considered the gender, educational program (Pharm-D or B-Pharm), and educational year. The sample size was determined using the formula for calculation sample from the cross sectional study. (11)

$$\text{“n} = \frac{Z^2 * p * q}{L^2}\text{”}$$

Where “n” is the minimal calculated sample, “Z” is a constant =1.96 at 95% confidence level, and “P” was assumed to be 50 % (as the most conservative sample because there was no previous similar study in Makkah), and “q” = 1-p = 0.5. So, the minimal estimated sample size to accomplish a precision of 0.05%, at 95% Confidence Interval (CI) was 384 students, which was exceeded to reach 400 participants for the stratification purpose.

The study was conformed to the ethical standards of Helsinki Declaration and approved by the Institutional Review Board (IRB) of King Abdulaziz University (KAU), with a Reference Number: 151-18. The ethical approval was obtained also from the Ethics Committee Board of Pharmacy at Umm Al-Qura University, with a project number of 14907. Administrative approvals were taken. Pharmacy students at Umm Al-Qura University were informed with a brief description of

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the study. An informed written consent forms were completed from each accepted student when they enrolled to participate in the study. There is confidentiality and freedom of participation.

The data collection sheet contains the followings:

1- Personal & socio-demographic data (age, gender, marital status, etc.,)

2-Habits like smoking and exercise practicing.

3-General life satisfaction: A question asked about general life satisfaction was included.

4- Depression Anxiety and Stress Scale 21 (DASS-21): It is a self-report instrument consisting of 21 Questions with seven items in each scale. It is used to measure the negative emotional states of anxiety, stress, and depression. The responses are given on a 4-point of severity to rate the extent to which they have experienced each state over the past weeks, ranging from zero if "totally disagree" to 3 if "totally agree".

The total DASS score and each subscale were calculated. Finally, two multiplied the overall score of the DASS for matching with the original long version (DASS-42). The symptom severity levels ranged from "normal" to "extremely serious".[12] According to the reliability scores (using Cronbach's alpha) the overall DASS-21 reliability is 0.93 (at the normative sample). This reliability scores are 0.88, 0.90 and 0.93 for depression, anxiety and stress, respectively. (13) Moreover, DASS-21 had overall good construct validity of 0.79.(14)

5- Authentic Leadership Scale: It consists of 16 questions with 4 subscales measures which are: Self-awareness, internalized moral, balanced processing and relational transparency and each subscale consists of 4 questions. The responses recorded by 5- point Likert scale ranging from 1 for "strongly disagree" to 5 for "strongly agree".

6-Schutte Self-Reported Emotional Intelligence (SSREI): It is a scale of 5-point response scale ranging from 1 "strongly disagree" to 5 "strongly agree", containing a total of 33 questions asking about 4 sub-scales which are: Emotion Perception (EP), Managing Self-Relevant Emotions (MSE), Managing Others' Emotions (MOE) and Utilizing Emotion (UE). Higher scoring of the scale representing greater levels of EI trait.

All statistical analysis was performed by SPSS version 22 (IBM, Armonk, NY, USA).

Descriptive statistics was done. Inferential statistics were used. Chi-square test ($\chi 2$) was used to compare between categorical variables. Odds Ratios (ORs) and 95 % Confidence Intervals. Independent sample t-test and ANOVA tests were used to compare between means. The post-hoc test was done using the Least Significant Difference (LSD) was also calculated.

Pearson's product-moment correlations were also calculated. Furthermore, a stepwise multiple logistic regression model was constructed to determine the significant predictors of depression, anxiety and stress after controlling of confounding factors. Adjusted Odds Ratios (aORs), and 95 % Confidence Intervals (CI) were calculated. The level of significance for all statistical tests was set at P value ≤ 0.05.

Results

The prevalence of depression, anxiety, and stress among pharmacy students according to symptom intensity (ranging from normal to extremely severe level) were 62.8%, 59.0%, and 49.2%, respectively. For students categorized with depression, 18%, 24.8%, 9%, and 11% suffered from mild, moderate, severe, and extremely severe degrees, respectively. Regarding anxiety, 7.5%, 20.8%, 12.2%, and 18.5% of them suffered from the same degrees, respectively. Concerning stress, 13.2%, 17.8%, 10.5% and 7.8% had the same levels, respectively.

Figure (1) illustrates that females recorded a lower prevalence of depression (60.7%) compared to male students (66.9%). However, females had higher percentages of severe and extremely severe levels compared to males. The rate of both severe and extremely severe was 22.6% among females compared to only 14.6% among males. A highly statistically significant difference was present. (X^2 = 14.45, P < 0.01).

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Female students reported a higher overall anxiety prevalence (60%) compared to males (57.9%). Moreover, both severe to extremely severe anxiety stress levels reported more among females (33.7%) than males (24.6%). However, there is a statistically significant difference between both genders regarding anxiety (P > 0.05). Figure (2).

Figure (3) demonstrates the prevalence & intensity of stress among pharmacy students at UQU. Female students had a higher level of overall stress (50.7%) compared to males (46.2%). Moreover, severe to extremely severe stress levels were also more among female students (23.3%) compared to males (7.6%). A highly statistically significant difference was present (X^2 = 15.79, P < 0.01).

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It is apparent from table (1) that younger students (≤ 21 years) had a higher prevalence of depression (69.9%) compared to the older (59.9%). Age was statistically associated with depression (OR=1.78; 95% CI: 1.18-2.69). GPA was negatively associated with depression (X2= 6.52, P < 0.05). Good achievers (had GPA ≥ 3.5 out of 4) had a significantly lower prevalence of depression (53.7%) than others (67.0%) did. On the other hand, gender, marital status, fathers' and mothers' education, and residency had no significant association with depression. Students who suffered from academic stress had a much higher rate of depression (69.3%) compared to others (37.0), with a highly statistically significant difference (P < 0.001). On the other hand, students who had a general life satisfaction were significantly less prone to depression (OR=0.26; 95% CI: 0.15-0.44).

Table (2) shows that neither physical activity nor the number of practicing days per week had any significant association with depression. On the other hand, concerning the duration of physical activity, students who practiced exercise ≥ 30 minutes/day reported a significantly lower prevalence of depression compared to others (X^2= 5.85, P ≤ 0.05). Furthermore, Smoking was not associated with depression (P > 0.05).

Concerning anxiety, table (3) shows that younger students (≤ 21 years) had a higher prevalence of anxiety (64 %) compared to others (54.7%). However, there is no statistically significant difference (P> 0.05). Moreover, gender, marital status, type of program, and educational year did not have any statistical association with anxiety. Furthermore, fathers' and mothers' education and residency had no significant association anxiety (P > 0.05). Students who had academic stress reported a much higher rate of anxiety compared to others (OR=5.46; 95% CI: 3.17-9.40). On the other hand, students who had a general life satisfaction were significantly less liable to have anxiety (OR=0.39; 95% CI: 0.24-0.63) compared to others.

Table (4) shows that smoking had no statistical association with anxiety. There is no significant association between practicing physical activity, number of exercise per day, or the duration of exercising with presence of anxiety (P > 0.05).

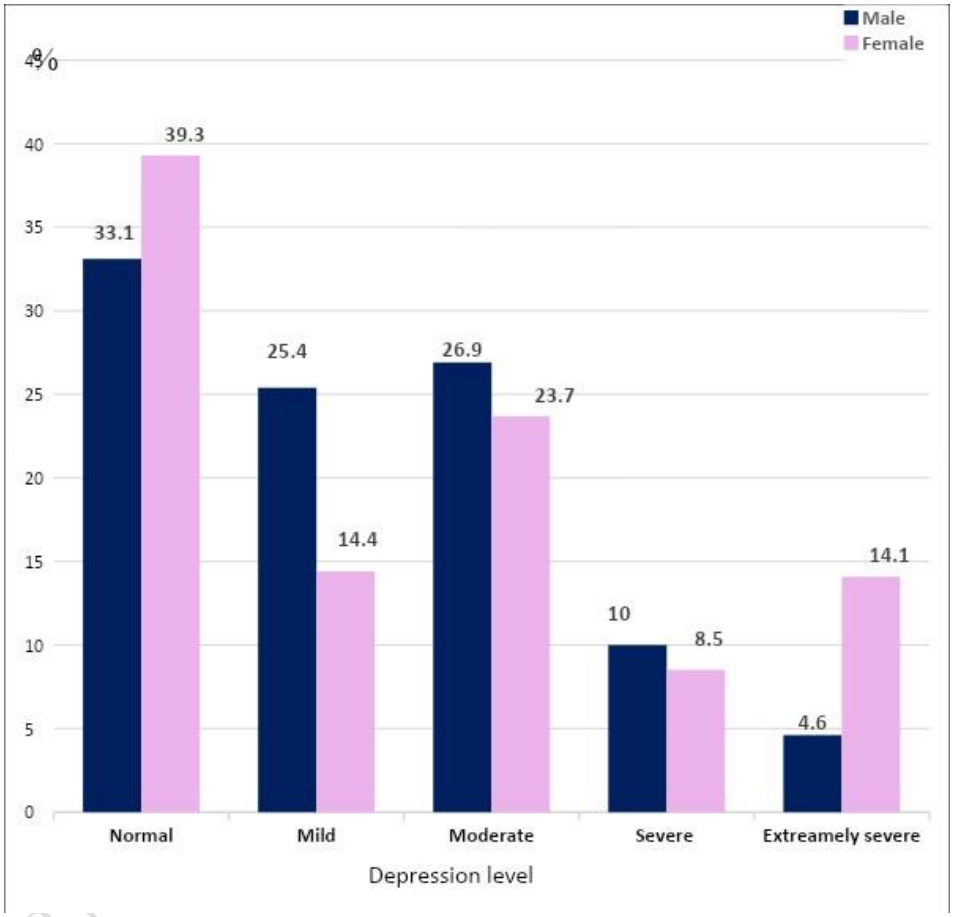
Table (5) demonstrates that stress was not significantly associated (X^2= 0.74, P > 0.05) with gender. On the other hand, younger students had a higher prevalence (58.6%) of stress

compared to older (41.1%), with a highly statistically significant difference (X^2= 12.16, P <0.001). Each of marital status, type of program, educational year, GPA, father and mother's educational levels and the residency had no statistical association with stress (P > 0.05). However, students who suffered from academic stress were about 5 times more liable to diagnosed with stress (OR= 5.33; 95% CI: 2.95-9.61). Similarly, students who had exam anxiety were about 3 times more liable to stress compared to others (OR= 2.82; 95% CI: 1.68-4.73). On the other hand, students who reported general life satisfaction were less prone to stress compared to others (OR= 0.36; 95% CI: 0.23- 0.57).

Table (6) shows that each of smoking, physical activity and the number of days of physical activity (per week) were not statistically associated with the presence of stress (P > 0.05). However, there is a statistically significant association between stress and the duration of physical activity (X^2= 8.98, P < 0.05).

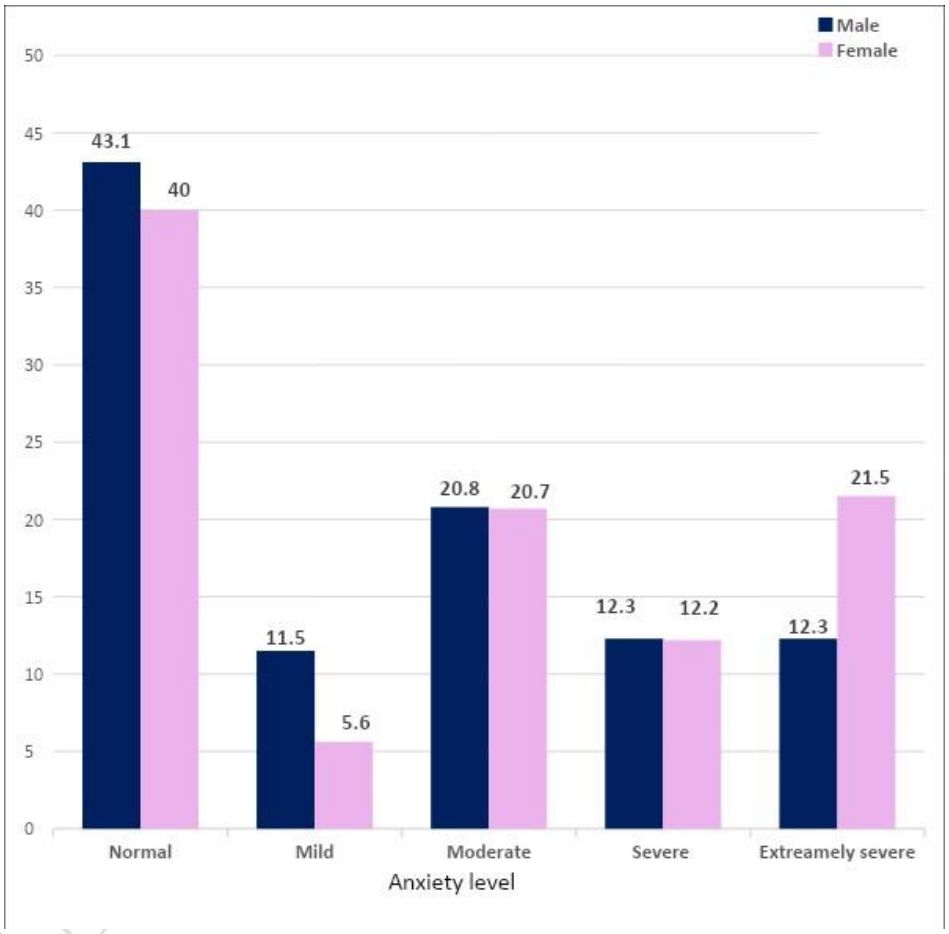
After controlling confounding factors in logistic regression analyses, table (7) shows that the first predictor of depression was having academic stress (aOR=3.32; 95% CI=1.94-5.67), followed by male gender (aOR=1.74, 95% CI=1.02 - 2.96). The following predictors were general life satisfaction which had a protective effect (aOR=0.30; 95% CI= 0.17, 0.53), and the duration of physical exercise (≥ 30 minutes/ day). It is apparent also from the table that the first predictor of anxiety was the presence of academic stress (aOR=4.82; 95% CI=2.78, 8.37). The second predictor was having positive general life satisfaction as it is a protective factor against anxiety (aOR=0.47; 95% CI=0.28, 0.78).

Regarding stress, logistic regression model showed that the first predictor of stress was having academic stress (aOR=4.93; 95% CI=2.62 -9.29). This is followed by high EI score ≥110 (aOR= -0.94; 95% CI= 0.21- 0.72), good general life satisfaction (aOR= 0.72, 95% CI= 0.30 - 0.81), older age (aOR= - 0.48; 95% CI=0.40 - 0.96) and duration of practicing exercise for ≥ 30 minutes (aOR=-1.27, 95% CI= 0.11 - 0.70).



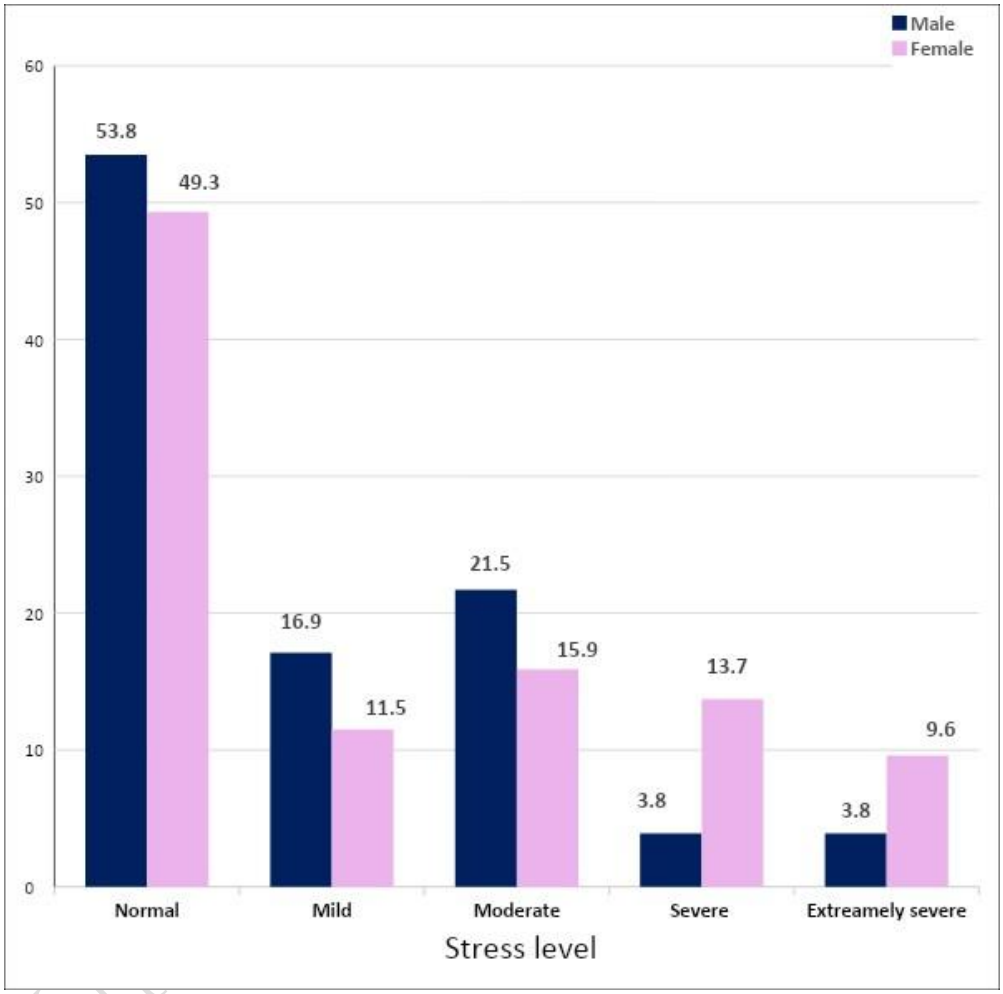
$X^2 = 14.45$, $P = 0.006$

Figure (1): Prevalence & intensity of depression among pharmacy students according to gender, Umm AL-Qura University.



X^2 = 8.38, P = 0.07

Figure (2): Prevalence & intensity of anxiety among pharmacy students according to gender, Umm Al-Qura University.



X^2 = 15.79, P = 0.003

Figure (3): Prevalence & intensity of stress among pharmacy students according to gender, Umm Al-Qura University.

Table (1): Relationship between depression and personal and socio-demographic characteristics of pharmacy students at Umm Al-Qura University.

Depression	**Abnormal (N = 251)**	**Normal (N= 149)**	X^2	***P-value***	**OR**	**95% C.I**
Variable	**No (%)**	**No (%)**				
Gender						
Male	87 (66.9%)	43 (33.1%)	1.43	*0.23*	0.76	0.47, 1.21
Female	164 (60.7%)	106 (39.3%)				
Age						
21 ≥	130 (69.9%)	56 (30.1%)	7.58	*0.006*	0.56	, 0.35 0.83
21<	(56.5%) 121	(43.5%) 93				
Marital status						
Single	(62.6%) 238	142(37.4%)	0.05	*0.83*	1.10	, 0.45 3.27
Married	(65%) 13	(35%) 7				
Type of program						
(Basic years(RC	(62.3%) 114	(37.7%) 69	1.48	0.47	1	
B-Pharm	(67%) 75	(33%) 37			1.23	0.75-2.01
Pharm-D	(59%) 62	(41%) 43			0.87	0.53-1.42
Educational year						
(Second (RC	(63.2%) 55	(36.8%) 32	3.64	0.45	1	
Third	(61.5%) 59	(38.5%) 37			0.93	0.51-1.69
Fourth	(59.5%) 44	(40.5%) 30			0.85	0.45-1.61
Fifth	(61.1%) 66	(38.9%) 42			0.91	0.51-1.63
Sixth	(77.1%) 27	(22.9%) 8			1.96	0.80-4.83
Grade Point Average (GPA)						
<3.5	185 (66.8%)	92 (33.2%)	6.52	*0.01*	0.57	*0.37 ,0.87*
≥3.5	66 (53.7%)	57(46.3%)				

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Table (2): Relationship between depression and personal and socio-demographic characteristics of pharmacy students at Umm Al-Qura University (Continue)

Depression	**Abnormal (N = 251)**	**Normal (N= 149)**	X^2	***P-value***	***OR***	***95% C.I***
Variable	**No (%)**	**No (%)**				
Father education						
< University	106 (60.9%)	68 (39.1%)	0.44	0.50	1.14	0.75 , 1.76
≥University	145 (64.2%)	81 (35.8%)				
Mother education						
< University	114 (60.3%)	75 (39.7%)	0.90	0.34	1.21	0.81, 1.79
≥University	137 (64.9%)	74 (35.1%)				
Residency						
With family	238 (62.8%)	141 (37.2%)	0.01	0.93	0.96	0.39, 2.99
Not with family	13 (61.9%)	8 (38.1%)				
Academic stress						
Yes	221 (69.3%)	98 (30.7%)	28.72	*0.00*	0.26	0.15 , 0.43
No	30 (37%)	51 (63%)				
General life satisfaction						
Yes	160 (55.4%)	129 (44.6%)	24.31	*0.00*	3.66	2.14 ,6.53
No	91 (82 %)	20 (18%)				

OR: Odd ratios, RC: Referent category

Table (3): Relationship between depression and habits and lifestyle of pharmacy students at Umm Al-Qura University

Depression	**Abnormal (N = 251)**	**Normal (N= 149)**	X^2	**P-value**	**OR**	**95% C.I**
Variable	**No (%)**	**No (%)**				
Smoking						
Yes	22 (52.4%)	20 (47.6%)	2.16	*0.14*	0.62	0.83, 2.98
No	229 (64%)	129 (36%)				
Physical Activity						

Yes	99 (59.6%)	67 (40.4%)	1.17	*0.28*	0.79	0.83 ,1.98
No	152 (65%)	82 (35%)				
Number of exercise Days						
≥3 days/ week	54 (41.2%)	77 (58.8%)	1.33	0.51	0.50	0.21 , 2.04
<3 days / week	12 (34.3%)	23 (65.7%)			0.96	0.45 , 2.03
Not practice (RC)	83 (35.5%)	151 (64.5%)			1	
Duration of exercising						
≥30 min/ day	76 (55.5%)	61(44.5%)	6.20	*0.05*	0.68	0.54 , 1.06
<30 min /day	23 (76.7%)	7 (23.3%)			1.86	0.77 , 4.51
Not practice (RC)	152 (65.2%)	81 (34.8%)			1	

OR: Odd ratios, RC: Referent category

Table (4): Relationship between anxiety and personal and socio-demographic characteristics of pharmacy students at Umm Al-Qura University

Anxiety	**Abnormal (N= 236)**	**Normal (N=164)**	X^2	***P-value***	**OR**	**95% C.I**
Variable	**No (%)**	**No (%)**				
Gender						
Male	74 (56.9%)	56 (43.1%)	0.34	*0.55*	1.13	0.73 , 1.71
Female	162 (60%)	108 (40%)				
Age						
21 ≥	119 (64%)	67 (36%)	3.56	*0.06*	0.67	0.44 , 1
21<	(54.7%) 117	(45.3%) 96				
Marital status						
Single	(% 60)228	(40%) 152	3.14	*0.08*	0.44	0.15 , 1.18
Married	(40%) 8	(60%) 12				
Type of program						
(Basic years(RC	(59.6%) 109	(40.4%) 74	0.20	*0.90*	1	

B-Pharm	(59.8%) 67	(40.2%) 45			0.99	0.99
Pharm-D	(57.1%) 60	(42.9%) 45			1.10	1.10
Educational year						
(Second(RC	(39.1%) 34	(60.9%) 53	2.56	*0.63*	1	
Third	(41.7%) 40	(58.3%) 56			1.11	1.11
Fourth	(48.6%) 36	(51.4%) 38			1.10	1.10
Fifth	(25%) 41	(62%) 67			0.95	0.95
Sixth	(7.9%) 13	(62.9%) 22			0.92	0.92
Grade Point Average (GPA)						
<3.5	163 (58.8%)	114 (41.2%)	0.01	*0.93*	1.02	0.67 ,1.61
≥3.5	73 (59.3%)	50 (40.7%)				

OR: Odd ratios, RC: Referent category

Table (5): Relationship between anxiety and personal and socio-demographic characteristics of pharmacy students at Umm Al-Qura University (Continue).

Anxiety	**Abnormal (N= 236)**	**Normal (N=164)**	**X^2**	***P-value***	**OR**	**95% C.I**
Variable	**No (%)**	**No (%)**				
Father education						
< University	100 (57.5%)	74 (42.5%)	0.29	*0.58*	1.11	0.75 ,1.68
≥University	136 (60.2%)	90 (39.8%)				
Mother education						
< University	110 (58.2%)	79 (41.8%)	0.09	*0.75*	1.06	0.71 ,1.54
≥University	126 (59.7%)	85 (40.3%)				
Residency						
With family	226 (59.6%)	153 (40.4%)	1.18	*0.27*	0.61	0.22 , 1.62
Not with family	10 (47.6%)	11 (52.4%)				
Academic stress						
Yes	214 (67.1%)	105 (32.9%)	42.56	*0.00*	0.18	0.10, 0.31
No	22 (27.2%)	59 (72.8%)				
General life satisfaction						

Yes	154 (53.1%)	136 (46.9%)	15.16	*0.00*	2.47	1.54 , 4.20
No	82 (74.5%)	28 (25.5%)				

OR: Odd ratios, RC: Referent category

Table (6): Relationship between anxiety and habits and lifestyle of pharmacy students at Umm Al-Qura University

Anxiety	Abnormal (N= 236)	Normal (N=164)	X^2	P-value	OR	95% C.I
Variable	**No (%)**	**No (%)**				
Smoking						
Yes	27 (64.3%)	15 (35.7%)	0.54	*0.46*	0.78	0.37 ,1.58
No	209 (58.4%)	149 (41.6%)				
Physical Activity						
Yes	70 (42.2%)	96 (57.8%)	0.16	0.69	1.08	0.72 , 1.69
No	94 (40.2%)	140 (59.8%)				
Number of exercise Days						
≥3 days/ week	74 (56.5%)	57 (43.5%)	1.01	0.60	1.30	0.62, 2.73
<3 days / week	23 (65.7%)	12 (34.3%)			1.50	0.69, 3.27
Not practice (RC)	139 (59.4%)	95 (40.6%)			1	
Duration of exercising						
≥30 min/ day	75 (54.7%)	62 (45.3%)	2.64	0.26	0.82	0.53, 1.25
<30 min /day	21 (70%)	9 (30 %)			1.55	0.68, 3.53
Not practice (RC)	140 (60.1%)	93(39.9%)			1	

OR: Odds ratio, RC: Referent category

Table (7): Relationship between stress and personal and socio-demographic characteristics of pharmacy students at Umm Al-Qura University.

Stress	Abnormal (N=197)	Normal (N=203)	X^2	*P-value*	OR	95% C.I
Variable	**No (%)**	**No (%)**				
Gender						
Male	60 (46.2%)	70 (53.8%)	0.74	*0.39*	1.20	0.77 , 1.85
Female	137 (50.7%)	133 (49.3%)				
Age						
21 ≥	109 (58.6%)	77 (41.4%)	12.16	*0.00*	0.49	0.32, 0.72

21<	88 (41.1%)	126 (58.9%)				
Marital status						
Single	(48.7%) 185	195(51.3%)	0.97	*0.32*	1.58	0.59 , 4.68
Married	(60%) 12	(40%) 8				
Type of program						
(Basic years (RC	(49.2%) 90	(50.8%) 93	0.46	*0.79*	1	
B-Pharm	(50.9%) 57	(49.1%) 55			1.07	0.67 , 1.71
Pharm-D	(53.3%) 56	(46.7%) 49			1.18	0.67 , 1.71
Educational year						
(Second (RC	(43.7%) 38	(56.3%) 49	5.73	*0.21*	1	
Third	(54.2%) 52	(45.8%) 44			1.52	0.85 , 2.73
Fourth	(50%) 37	(50%) 37			1.08	0.59 , 1.99
Fifth	(57.4%) 62	(42.6%) 46			1.74	0.98 , 3.07
Sixth	(40%) 14	(60%) 21			0.89	0.39 , 1.91
Grade Point Average (GPA)						
<3.5	142 (51.3%)	135 (48.7%)	1.46	*0.23*	0.76	0.50 , 1.18
≥3.5	55 (44.7%)	68 (55.3%)				

OR: Odd ratio, RC: Referent category

Table (8): Relationship between stress and personal and socio-demographic characteristics of pharmacy students at Umm Al-Qura University (Continue).

Stress	**Abnormal (N=197)**	**Normal (N=203)**	**X^2**	***P-value***	**OR**	**95% C.I**
Variable	**No (%)**	**No (%)**				
Father education						
< University	87 (50%)	87 (50%)	0.07	*0.79*	0.95	0.64,1.43
≥University	116 (51.3%)	110 (48.7%)				
Mother education						
< University	88 (46.6%)	101(53.4%)	1.03	*0.31*	1.22	0.81 , 1.83

≥University	109 (51.7%)	102 (48.3%)				
Residency						
With family	186 (49.1%)	193 (50.9%)	0.08	*0.76*	1.14	0.40 , 2.88
Not with family	11 (52.4%)	10 (47.6%)				
Academic stress						
Yes	181 (56.7%)	138 (43.3%)	35.35	*0.00*	0.18	0.09, 0.33
No	16 (19.8%)	64 (80.2%)				
General life satisfaction						
Yes	123(42.6%)	166 (57.4%)	18.64	*0.00*	2.69	1.73 ,4.41
No	74 (66.7%)	37 (33.3%)				

OR: Odd ratios, RC: Referent category

Table (9): Relationship between stress and habits and lifestyle of pharmacy students at Umm Al-Qura University

Stress / **Variable**	**Abnormal (N=197) No (%)**	**Normal (N=203) No (%)**	**X^2**	***P-value***	**OR**	**95% C.I**
Smoking						
Yes	23 (54.8%)	19 (45.2%)	0.57	*0.45*	0.78	0.39 ,1.48
No	174 (48.6%)	184 (51.4%)				
Physical Activity						
Yes	78 (47%)	88 (53%)	0.58	*0.45*	1.17	0.78 ,1.78
No	119 (50.9%)	115(49.1%)				
Number of exercise Days						
≥3 days/ **week**	57 (43.5%)	74(56.5%)	4.44	*0.11*	0.76	0.49-1.16
<3 days / week Not practice (RC)	22 (62.9%)	13 (37.1%)			1.66	0.80-3.46
Duration of exercis	118 (50.4%)	116 (49.6%)			1	
≥30 min/ day	57(41.6%)	80 (58.4%)	8.68	*0.01*	0.68	0.45 – 1.05
<30 min /day	21 (70%)	9 (30%)			2.23	0.98 – 5.09
Not practice (RC)	119 (51.1%)	114(48.9%)			1	

OR: Odds ratio, RC: Referent category

Table (10): Logistic regression analyses of the predictors of depression, anxiety and stress among pharmacy students at Al-Qura University

Depression				
Variable	**B**	***P-value***	**aOR**	**95%C.I**
(**Academic stress** (Yes	1.20	0.000	3.32	5.67 , 1.94
(**Gender** (male	0.56	0.05	1.74	2.96 , 1.02
General life Satisfaction	1.19-	0.000	0.30	0.53 , 0.17
Duration of exercising				
<30 min/day ≥30 min/day Not practice (RC)	0.54- 1.00-	0.26 0.04	0.58 0.37 1	1.49 ,0.22 0.96 , 0.14
Constant	**1.96**			

Anxiety				
Variable	**B**	**P-value**	**aOR**	**95%C.I**
Academic Stress	1.57	0.000	4.82	8.37 , 2.78
General life Satisfaction	0.76 -	0.003	0.47	0.78 , 0.28
Constant	**1.14-**			
Stress				
Variable	**B**	**P-value**	**aOR**	**C.I 95%**
(**Academic Stress** (Yes	1.60	0.000	4.93	9.29 , 2.62
(**Total EI** (EI ≥110	0.94-	0.003	0.40	0.72 , 0.21

General life Satisfaction	0.72 -	0.005	0.49	0.81 , 0.30
(**Age** (≥ 21	-0.48	0.029	0.62	0.96 , 0.40
Duration of exercising				
min 30 >	0.90-	0.05	0.40	0.98 , 0.17
min 30 ≤	1.27-	0.007	0.28	0.70 , 0.11
Not practicing [RC]			1	
Constant	**1.69**			

aOR: adjusted Odds Ratio **CI: Confidence interval**

Discussion

Global mental health is of growing concern, with increasing benefits from worldwide efforts for sustainable development of mental health programs. [2] Analysis of DASS in the current study revealed that the overall prevalence of depression, anxiety, and stress among pharmacy students were 62.8 %, 59.0 %, and 49.2 %, respectively. Such rates are somewhat high. However, previous studies showed also that the students who studied in the medical field, as medicine and pharmacy generally reported suffering from such high levels. Abdel Wahed, et al. conducted a study using the same tool among medical students from Fayoum University, Egypt. They reported that the corresponding rates were 60.8%, 64.3%, and 62.4%, respectively. [5] Their rates are comparable to our rates regarding depression and anxiety. However, they reported a higher rate of stress compared to our study. The cause of such discrepancy may be due to different in the target populations or cultural differences. Similarly, another Saudi study conducted in Najran University, 2017, found that the prevalence of depression, anxiety, and stress among medical students were 59%, 71% and 61%, respectively. [7] However, Hashmi, et al., conducted a study in Pakistan using the Aga Khan University Anxiety and Depression Scale (AKUADS), and found that symptoms of anxiety and depression were exist among 45.5% of medical students.[15] The cause of their much lower rate than that of the current study may be due to differences between the target populations or the used tools.

Regarding gender, our results showed that female pharmacy students had a higher level of stress and anxiety compared to males. Females may be more vulnerable to negative emotion compared to males with an increased risk of anxiety and stress.[16] A study among Danish medical students found that females reported higher levels of stress compared to male medical students, but the differences were not significant.[17] Similar result obtained among 4000 doctor of pharmacy (Pharm.D) students. [18]

In the present study, there was a significant association between gender and depression. Males had a higher depression score than females. This result goes in line results of the result of Cheung, et al., (2015) who found that male nursing students from Hong Kong suffered more from depression than females.[19] On the other hand, the study of Haldorsen, et al., found that

Comment [a11]: Could the results you find be a normal indicator of society? Does your study have a control group? When we consider the pandemic conditions today, stress and anxiety or depression can affect a large part of the society. Was there a pandemic when your study was done?

females reported higher levels of depression compared to male medical students, but the differences were not significant.[20] Moreover, Demirbatir, et al., also found an insignificant association between gender with stress, anxiety, and depression among 1088 Turkish medical and music college students.[21] The sex differences revealed from our results and the previous studies may be due to multifactorial causes. Females are better at recognizing emotions and expressing themselves more easily, explaining the different behavioral responses which may lead to increased psychological disorders among them.[22] Furthermore, some theories explained the gender difference in the prevalence of stress and anxiety that it could be due to two main biological factors. The first factor is due to stress hormones disorders (adrenaline and cortisol); which affect stress and anxiety level. The second factor is related to sex hormones (estrogen and progesterone). The complex of estrogen and progesterone across the menstrual cycle may increase vulnerability to develop anxiety disorders among females.[23], [24], [25] In addition, females may suffer more from stress because they are looking for the ideal personality. However, male students are more able to control impulses and more able to minimize stress.[26] Furthermore, the relation of environmental factors such as social, cultural, and economic differences may also affect the DASS score.[27]

Concerning age, younger students (≤ 21) in the current study suffered more from each of depression, anxiety and stress. Students in their early years in the medical fields may have an increased academic pressure, many studying hours, and having a complexity of the learned subjects. Then they tried to adapt to their college environment.[28] The study of Cheung, et al., found that age was associated with stress and anxiety (not depression). [28] Furthermore, a meta-analysis (2018) done for 27 cross-sectional studies composed of 8,918 nurse students. They reported that younger students have the highest depression prevalence score. [29]

On the other hand, some studies found the opposite association between age and phycological distress among healthcare students. The study of Abdel Wahed, et al. suggested that older medical students suffered more from stress, anxiety, and depression.[5] Furthermore, the study of Shamsuddin, et al., found that older students aged between 20–24 years are more likely to be depressed, anxious, and stressed than younger students < 20 years.[30] The cause of such

discrepancies between the previous results and ours may be attributed to differences between the target populations.

The current study's results found that married had a higher prevalence of depression and stress compared to single students (but not show any statistically significant association). The study of Cheung, et al., also found that higher depression levels among married nursing residence. [28] The lower rates of psychological traits among single than married students may be due to social support which single students are surrounded with (e.g. caring and support from family and friends). [31] Our results agree with the results from the previous studies. An American study done among 374 university students at Franciscan University also didn't find any significant relationship between marital status and DASS.[32] Similarly, another Egyptian study done among first year medical students didn't find any association between marital status and level of DASS.[33] Furthermore, a Ghanaian study failed to find a relationship between marital status and depression level among 270 college students. [34] On the other hand, an Iranian study conducted among 10,000 adults at Yazd Greater Area in 2019 found a significant difference among married as they recorded higher DASS level compared to others. [35] This discrepancy between the current and the Iranian study may be due to differences between both target populations.

Comment [a12]: You should remove this sentence. You should write it in one sentence with the same meaning.

Our results showed that academic achievement had a statistically significant negative association with depression. Students with a higher GPA (GPA ≥ 3.5/4) had a lower level of depression compared to others. This may be because students with lower GPA may be afraid of academic failure and this can negatively influence the student's psychological health. Our result coincides with the previous studies that found that high depression level was correlated with poorer academic performance among college students.[36] Our results showed that academic stress had significant positive association with depression, anxiety and stress. Academic stress was also the first predictor (aOR= 3.44; 95%CI: 2.01-5.88) of the increased DASS. These findings stand in the same line with ideas of the previous studies that suggested that students' academic stress is a significant predictor for depression. Similarly, Kang, et al., (2013) suggested that nursing and undergraduate students who were suffering from a high level of academic stress had a higher level of depression.[37]

The current study revealed that physically active students had lower levels of stress and depression. This result coincides with another Chinese study. [28] Students who exercised ≥ 30 minutes /day suffered significantly from lower levels of stress and depression compared to

others. Duration of physical activity is also one of the predictors of DASS. Correspondingly, Zwan, et al., (2013) conducted a randomized controlled trial (RCT) among 76 adults at the University of Amsterdam. They reported that 20 minutes of physical exercise decreased the stress and stress-related symptoms such as symptoms of anxiety and depression; when carried out in a self-directed way. [38] Anxiety and Depression Association of America (ADAA) recommended physical activity as one of stress coping techniques; as it reduce stress hormones, i.e. (adrenaline and cortisol) while stimulating the production of endorphins. This can lead to high euphoric state , during or after exercising which reduces anxiety and depressed mood.[39] Additionally, physical activity have an important social benefit, as it also have positive effect on DASS.[40]

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Our finding verified that DASS was negatively correlated with EI. Students obtained a higher EI score had lower levels of both depression and stress. Similarly, the study of Meng, et al., (2018) suggested that high EI improved the perceived stress among nursing students. [41] The study of Ibrahim et al., (2017) suggested that having higher EI negatively associated with stress.[3] Likewise, Foster et al., (2018) suggested that EI had a significant negative correlation with stress level between pharmacy and nursing undergraduate students.[42] The study of Ruiz-Aranda, et al., (2014) found that health-care students with high EI had lower stress level; which positively influencing life satisfaction and happiness. [43]

Current study suggested that general life satisfaction had a negative association with depression, stress and anxiety. It is one of the negative predictors of these three mental illnesses after controlling other confounding factors. Previous studies showed similar findings. Stankov suggested that higher level of depression correlated with low level of life satisfaction among Asian adolescents.[44] Our results could be explained by the mediator role of self-esteem which enhanced by emotional awareness and social support, and this enhanced by abilities which can recognize and manage emotions resulting in an increased life satisfaction also case decreasing psychological distresses (2013).[45]

Conclusion

The prevalence of depression, anxiety, and stress among pharmacy students were high (62.8%, 59.0%, and 49.2%, respectively). In bivariate analysis, male student suffered had a significantly higher prevalence of depression compared to females. Younger students suffered more from stress compared to older students. IN regression analysis, general life satisfaction is an important predictor for decreasing depression, anxiety, and stress levels. Duration of exercise is an important predictor for decreasing anxiety and stress levels. Academic stress was an important predictor for increasing depression, anxiety, and stress levels. Screening programs for depression, anxiety, and stress among pharmacy students are needed, with the proper management of the cases. Psychosocial support services need to be available to help students to deal and cope with their personal and social difficulties for avoiding mental distress. Future longitudinal studies are required.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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