



## **Prevalence and Predictors of Anxiety and Depression among Female Medical Students in King Abdulaziz University, Jeddah, Saudi Arabia**

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### **Abstract**

**Background:** Medical education & medical profession are among the most challenging and most stressful ones. Anxiety and depression represents an escalating public health problem among medical students. The objective of the study was to determine the prevalence & predictors of anxiety and depression among female medical students in King Abdulaziz University, Jeddah, Saudi Arabia.

**Methods:** A cross-sectional study was carried out during 2010-2011. A stratified random sample method was used to select 450 medical students. A confidential, anonymous & self administered questionnaire included Standardized Hospital Anxiety & Depression Scale was used.

**Results:** The mean scores for anxiety and depression were  $9.32 \pm 3.77$  &  $6.59 \pm 3.62$ , respectively. There is a positive correlation between anxiety & depression scores ( $r= 0.52$ ,  $P< 0.001$ ). Prevalence of morbid anxiety and depression were 34.9% and 14.7%, respectively. Logistic regression analysis revealed that the first predictor of morbid anxiety was depression (adjusted Odds Ratio (aOR) = 3.28; 95% Confidence Interval (CI): 1.85-5.82,  $P < 0.001$ ). Students complained from condensed academic course, had academic and emotional failures during the 6 months preceded the study were about 2 times more prone to anxiety. Predictors of depression were having anxiety, nationality (being non-Saudi) & having emotional failure.

**Conclusion:** Medical students encountered high rates of anxiety & depression compared to others. Academic problems and major life events were the main predictors. Enhancing faculty preventive & curative mental health services is recommended. Initiation of stress management courses & enhancing academic advising services are required since the start of medical education.

**Keywords:** Epidemiology, Anxiety, Depression, Medical students

### **Introduction**

The greater the psychosocial health, the better is the well-being and the capacity to overcome troubles and lifelong problems (1). Mental health among university students accounts as vital and escalating public health problem for which epidemiological data is required and should be addressed as a priority problem (2). Medical education is among the most challenging and stressful ones. Medical students, as future physicians, will have an

enormous influence on the community lifestyles and behaviors. They will play a vital role in preventing diseases & providing community health services (3).

Medical students face several emotions & stresses during their revolution from insecure students to young knowledgeable physicians (1, 4, 5). This can lead to mental distress with negative impact on cognitive functioning and learning (6, 7). A

cross-sectional study conducted in Malaysia reported that 41.9% of the medical students have psychological stress (8). The corresponding rates among medical students in Thailand & Riyadh were 61.4% (9) & 57% (5), respectively.

Previous studies in many countries have shown that medical students have high rates of anxiety & depression during their training (10, 11). In addition, anxiety & depression may not be properly diagnosed & treated leading to higher rates & unwanted effects during their education & future lives (10). A study done in Sweden, 2011, reported a 12.9% prevalence of depression among medical students (6). Another comparative study done among male medical students in both Mansoura University, Egypt & King Faisal University, Riyadh, Saudi Arabia concluded that anxiety & depression represented a prevalent problem in both countries (12).

It is crucial to conduct mental screening of medical students, as they will be tomorrow's physicians (3). Anxiety and depression represent escalating mental health problems among medical students, especially among females (6) & Literature up to date is scanty (13). In addition, extremely limited studies have been conducted among medical students in Jeddah. For these reasons, a comprehensive epidemiological study is urgently needed, to assess this fundamental problem among female medical schools.

The objective of the study was to determine prevalence & main predictors of anxiety & depression among female medical students at King Abdulaziz University, Jeddah, Saudi Arabia.

## Materials and Methods

### *Ethical statement*

The work of the paper was on compliance with the ethical principles of Helsinki Declaration (1964). The protocol of the study was reviewed and approved by the Institutional Review Boards of the Faculty of Medicine, King Abdulaziz University Hospital & ethical approval was obtained. Administrative approvals were taken by the Vice-dean. During field work, the objective of the research was discussed with each participant separately

and upon acceptance consent was taken from each student.

A cross-sectional study was done during 2010-2011. A stratified random method was used to select students who completed the freshman year (2<sup>nd</sup> - 6<sup>th</sup> grades). The sample size was calculated according to the established formula for determination of sample size (14).

$$\frac{Z^2 X p X q}{L^2}$$

Since the actual prevalence of depression & anxiety among medical students in Jeddah is unknown, so the probability of its occurrence was estimated to be equal to non occurrence ( $P = q = 0.5$ ). The minimum calculated sample size to achieve a precision of  $\pm 5\%$  with a 95% confidence interval (C.I.) was 384. During the field work, the sample increased to reach 450 students. A validated, pre-constructed, anonymous, confidential & self-administered questionnaire was used. The questionnaire inquired about personal and socioeconomic data, physical or psychological disorders among student or her family & valuable life events during the 6 months preceded the study (failure in examinations, death or loss of close friends or family members & emotional failure, etc). It asked also about exam anxiety, condensed course, non-encouragement from parents or faculty members and no-cooperation. It included the English version of the Hospital Anxiety and Depression Scale (HADS) (15). HADS is a self-screening tool for anxiety & depression which has demonstrated good validity & reliability when it used in different languages. It has been used for both patients & general population (16). It includes 14 questions; 7 for each anxiety & depression. Each item is answered on 4 points (0-3 response) using a Likert scale (15,16).

### *Statistical analysis*

Data was analyzed using Statistical Package of Social Sciences (SPSS) Version 16. (17) & Epi-Info Statistical Package (18). The total HADS score is the sum of the 14 items, and for each subscale (anxiety & depression) the score is the summation of the particular seven items (ranging from 0-21) (15).

HADS scoring is grouped for each of anxiety and depression as following:

1. Normal: 0- 7
2. Borderline abnormal: 8-10
3. Abnormal (morbid): 11-21

Descriptive statistics and inferential statistics were done. For inferential statistics, both anxiety and depression were then categorized into 2 categories; either having morbid condition of anxiety or depression (abnormal) or not having morbid condition (normal and borderline). Pearson's Chi-square test ( $X^2$ ) was conducted to observe and quantify an association between the categorical outcome (anxiety and depression) and the different variables. Bivariate correlation was done to show strength of association between 2 continuous variables. Odds ratio (OR) with a 95% Confidence Intervals (CI) were calculated using Epi-Info. Stepwise multiple logistic regression analysis, with combination of all significant variables from each table, was applied to delineate significant predictors of students' depression & anxiety after controlling of possible confounders.  $P < 0.05$  was considered statistically significant.

## Results

The total number of the sample was 450 students & their ages ranged from 18 - 25 years with a mean of  $21.1 \pm 1.4$  years. The majority of students were Saudi (94.7%) & single (93.8%). Concerning fathers' education, more than two-thirds (68.9%) of the students' father had a university degree or above. Meanwhile, 57.8% of mothers obtained a similar degree. Regarding the father's occupation more than half (55.6%) of fathers had a professional job while about half the students' mothers were housewives (49.1%). Regarding the students' health, 88% had a good health while 12% had some health problems.

Analysis with HADS revealed the mean anxiety score was  $9.32 \pm 3.77$  while the mean depression score was  $6.59 \pm 3.62$ . Bivariate correlation showed that there was a positive association between anxiety and depression scores ( $r = 0.52$ ,  $P < 0.000$ ).

Regarding anxiety, it was found that 31.8% of students were normal according to HADS-Anxiety, while 33.3% & 34.9% of students had a borderline & morbid anxiety, respectively. Regarding depression, 63.6% of students were normal according to HADS-Depression, while 21.8% & 14.7% had a border-line & morbid depression, respectively.

Table 1 shows that 33.8% of Saudi students had morbid anxiety. This rate is lower than anxiety rate among non-Saudis (54.2%). A statistical significant difference ( $X^2=4.14$ ,  $P < 0.05$ ) was present. The highest rate of anxiety was found among students enrolled in the sixth (39.2%) and fourth year (39.0%). However, there is no statistical significant difference ( $X^2 = 2.5\%$ ,  $P > 0.05$ ). The rate of anxiety was significantly higher among students whose mothers had professional jobs compared to others ( $X^2 = 5.75\%$ ,  $P = 0.01$ ). Regarding educational environment, Table 2 shows that students who had academic failure were about twice more prone to anxiety than others ( $OR=2.05$ ;  $95\% CI: 1.28-3.26$ ,  $P = 0.001$ ). Those suffering from exam anxiety had significantly higher rate of anxiety (41.2%) compared to others ( $X^2 = 15.26\%$ ,  $P < 0.001$ ). Similarly those complained from condensed course, who felt no cooperation and non-encouragement had higher rates of anxiety compared to others, with highly statistical significant differences. Table 3 illustrates that females who complained from emotional failure during the six months preceded the study, had also a higher anxiety rate (44.2%) compared to others (27.5%). A highly statistical significant difference ( $X^2= 15.16$ ,  $P =0.001$ ) was present. About half (49.0%) of students who lost a close friend during this period diagnosed as having anxiety, compared to only 30.6% among others. ( $OR= 2.18$ ;  $95\% CI: 1.63-3.49$ ,  $P = 0.001$ ). The prevalence of anxiety was higher among students who had death of a close relative or friend, marriage of a close friend, had family physiological problem. However, there is no statistical significant difference ( $P > 0.05$ ).

**Table 1:** Relationship between personal, socioeconomic condition & anxiety among female medical students in King Abdulaziz University

Variables	Anxiety		No Anxiety		Total	$X^2$ (P)	OR (95%CI)
	n	%	n	%			
<b>Nationality</b>							
Saudi	144	33.8	282	66.2	426	4.14	0.43 (0.19-0.98)
Non Saudi	13	54.2	11	45.8	24	(0.04)	Reference
<b>Age</b>							
< 20 years	23	38.3	37	61.7	60	0.36	1.19 (0.67-2.08)
≥ 20 years	134	34.4	256	65.6	390	(0.5)	Reference
<b>Marital status</b>							
Single	149	35.3	273	64.7	422	0.52	1.36(0.58-3.17)
Non-single	8	28.6	20	71.4	28	(0.46)	Reference
<b>Educational year</b>							
Second	37	33.3	74	66.7	111		0.78 (0.4-1.5)
Third	27	29.7	64	70.3	91	2.5	0.56 (0.3-1.3)
Fourth	39	39.0	61	61.0	100	(0.62)	0.99 (0.5-1.9)
Fifth	25	33.8	49	66.2	74		0.79 (0.4-1.6)
Six (RC)	29	39.2	45	60.8	74		Reference
<b>Residual status</b>							
With family (RC)	141	35.2	259	64.8	400	0.2	Reference
A private resident	8	32.0	17	68.0	25	(0.9)	0.86 (0.3-2.2)
College dormitory	8	32.0	17	68.0	25		0.86 (0.3-2.2)
<b>Father's education</b>							
Less than university	44	31.4	96	68.6	140	1.07	0.79 (0.52-1.22)
University and above	113	36.5	197	63.5	310	(0.3)	Reference
<b>Mother's education</b>							
Less than university	59	31.1	131	68.9	190	2.1	0.79 (0.52-1.22)
University and above	98	37.7	162	62.3	260	(0.08)	Reference
<b>Father occupation:</b>							
Professional	85	34.0	165	66.0	250	0.196	0.92 (0.61-1.38)
Non-professional	72	36.0	128	64.0	200	0.6	Reference
<b>Mother occupation:</b>							
Professional	77	41.2	110	58.8	187	5.57	1.60(1.06-2.42)
Non-professional	80	30.4	183	69.6	263	(0.01)	Reference
<b>Crowding index:</b>							
< 2 person / room	141	36.2	249	63.8	249	2.1	1.5 (0.84-2.86)
≥ 2 person / room	16	26.7	44	73.3	44	(0.15)	Reference
<b>Income:</b>							
Sufficient	156	35.0	290	65.0	446	0.174	1.61 (0.16-15.64)
Non-sufficient	1	25.0	3	75.0	4	0.677	Reference
<b>Total</b>	<b>157</b>	<b>34.9</b>	<b>293</b>	<b>65.1</b>	<b>450</b>		

RC: Referent category

Regarding depression, Table 4 shows that Saudis had a lower prevalence of depression (13.6%) than non- Saudis (33.3%), with highly statistical significant difference ( $X^2=7.06$ ,  $P=0.006$ ). Married females had significantly ( $P < 0.05$ ) higher rate of

depression (28.6%) compared to single students (13.7%).

Students with insufficient income had also a higher rate of depression than others ( $P < 0.05$ ).

**Table 2:** Relationship between faculty environment conditions & anxiety among female medical students in King Abdulaziz University

Variables	Anxiety		No Anxiety		Total	$X^2$ (P)	OR (95%CI)
	n	%	n	%			
Academic failure							
Yes	45	48.4	48	51.6	93	9.4	2.05 (1.28-3.26)
No	112	31.4	245	68.6	357	0.002	Reference
Exam anxiety							
Yes	128	41.2	187	59.4	315	15.26	2.75 (1.68-4.53)
No	29	21.5	106	78.5	135	0.000	Reference
Condensed course							
Yes	119	41.2	170	58.8	289	14.06	2.27 (1.44-3.58)
No	38	23.6	123	76.4	161	0.000	
No cooperation							
Yes	57	47.1	64	52.9	121	10.87	2.04 (1.30-3.20)
No	100	30.4	229	69.6	329	0.001	
No encouragement							
Yes	52	46.0	61	54.0	113	8.23	1.88 (1.19-2.98)
No	105	31.2	232	86.8	337	0.004	
Total	157	34.9	293	65.1	450		

**Table 3:** Relationship between events in 6 months preceded the study & anxiety among female medical students in King Abdulaziz University

Variables	Anxiety		No Anxiety		Total	$X^2$ (P)	OR (95%CI)
	n	%	n	%			
Emotional failure							
Yes	88	44.2	111	55.8	199	13.68	2.09 (1.41- 3.10)
No	69	27.5	182	72.5	251	0.000	Reference
Death of relative							
Yes	43	41.0	62	59.0	105	2.2	1.41 (0.87-2.26)
No	114	33.0	231	67.0	345	0.13	Reference
Death of a close friend							
Yes	9	50.0	9	50	18	1.88	1.92 (0.68-5.40)
No	148	34.3	284	65.7	432	0.17	Reference
Loss of a close friend							
Yes	51	49	53	51	104	11.92	2.18 (1.36-3.49)
No	106	30.6	240	69.4	346	0.001	Reference
Marriage of a close friend							
Yes	94	37.0	160	63.0	254	1.15	1.24 (0.82-1.87)
No	63	32.1	133	67.9	196	0.28	Reference
Family psychological problem							
Yes	52	38.0	58	62.0	137	0.81	1.78 (1.11-2.83)
No	105	33.5	208	66.5	313	0.63	Reference
Total	157	34.9	293	65.1	450		

**Table 4:** Relationship between personal, socioeconomic condition & depression among female medical students in King Abdulaziz University

Variables	Depression		No Depression		Total	$\chi^2$ (P)	OR (95%CI)
	n	%	n	%			
Nationality							
Saudi	58	13.6	368	86.4	426	7.06	0.32 (0.12-0.85)
Non Saudi	8	33.3	16	66.6	24	0.006	Reference
Age							
< 20 years	8	13.3	52	68.7	60	0.09	0.88 (0.37-2.05)
≥ 20 years	58	14.9	332	85.1	390	0.74	Reference
Marital status							
Single	58	13.7	364	86.3	422	4.61	0.40 (0.16-1.04)
Non-single	8	28.6	20	71.4	28	0.03	Reference
Educational year							
Second	16	14.4	95	85.6	111		Reference
Third	10	11.0	81	89.0	91	4.07	0.73 (0.29-1.38)
Fourth	13	13.0	87	87.0	100	0.39	0.89 (0.38-2.08)
Fifth	11	14.9	63	85.1	74		1.04 (0.42-2.56)
Six	16	21.6	58	78.4	74		1.64 (0.71-3.77)
Residential status							
With family (RC)	58	14.5	342	85.5	400		Reference
Private resident	7	28.0	18	72.0	25	5.8	1.12 (0.46-2.65)
College dormitory	1	4.0	24	96.0	55	0.05	0.25 (0.01-1.76)
Father's education							
Less than university	25	17.9	115	82.1	115	1.65	1.43 (0.80-2.45)
University and above	41	13.2	269	86.8	310	0.19	Reference
Mother's education							
Less than university	30	15.8	160	84.2	190	0.33	1.17 (0.67-2.05)
University and above	36	13.8	224	86.2	260	0.56	Reference
Father occupation:							
Professional	29	11.6	221	88.4	250	4.23	0.58 (0.33-1.01)
Non-professional	37	18.5	163	81.5	200	0.64	Reference
Mother occupation:							
Professional	27	14.4	160	85.6	187	0.01	0.97 (0.80-2.45)
Non-professional	39	14.8	224	85.2	263	0.9	Reference
Crowding index:							
< 2 persons / room	58	14.9	332	85.1	390	0.09	0.97(0.55-1.07)
≥ 2 persons / room	8	13.3	52	86.7	60	0.75	Reference
Income:							
Sufficient	64	14.3	382	85.7	446	4.02*	0.17 (0.02-1.70)
Non-sufficient	2	50.0	2	50.0	4	0.04	Reference
Total	66	14.7	384	85.3	450		

RC: Referent category

Table 5 shows the effect of educational environment on depression, students who had academic

failure had significantly ( $P < 0.05$ ) higher rate of depression (24.6%) compared to others (13.1%).

**Table 5:** Relationship between faculty environment conditions & depression among female medical students in King Abdulaziz University

Variables	Depression		No Depression		Total	$\chi^2$ (P)	OR (95%CI)
	n	%	n	%			
Academic failure							
Yes	18	19.4	75	80.6	93	2.05	1.55 (0.85-2.81)
No	48	13.4	309	86.6	375	0.15	Reference
Exam anxiety							
Yes	49	15.6	266	84.4	315	0.66	1.27 (0.70-2.31)
No	17	12.6	118	87.4	135	0.4	Reference
Condensed course							
Yes	50	17.3	239	82.7	289	4.48	1.90 (1.04-3.45)
No	16	9.9	145	90.1	161	0.03	Reference
No cooperation							
Yes	27	22.3	94	77.7	121	7.73	2.14 (1.24-3.67)
No	39	11.9	290	88.1	329	0.005	Reference
No encouragement							
Yes	18	15.9	95	84.1	113	0.19	1.14 (0.63-1.84)
No	48	14.2	289	85.8	337	0.66	Reference
Total	66	14.7	384	85.3	450		

**Table 6:** Relationship between last events & depression among female medical students in King Abdulaziz University

Variables	Depression		No Depression		Total	$\chi^2$ (P)	OR (95%CI)
	n	%	n	%			
Emotional failure							
Yes	40	20.1	159	79.9	199	8.42	2.18 (1.24-3.84)
No	26	10.4	225	89.6	251	0.004	Reference
Death of a close relative							
Yes	18	17.1	87	82.9	105	0.67	1.28 (0.68-2.40)
No	48	13.9	297	86.1	245	0.41	Reference
Death of a close friend							
Yes	2	11.1	16	88.9	18	4.02	0.72 (0.11-3.37)
No	64	14.8	368	85.2	432	0.6	Reference
Loss of a close friend							
Yes	23	22.1	81	77.9	104	6.0	2 (1.11-3.64)
No	43	12.4	303	87.6	346	0.01	Reference
Marriage of a closed friend							
Yes	33	13.0	221	87.0	254	1.30	0.74 (0.42-1.28)
No	33	16.8	163	83.2	196	0.25	Reference
Family psychological problem							
Yes	20	14.6	117	85.4	137	0.001	0.99 (0.54-1.81)
No	46	14.7	267	85.3	313	0.9	Reference
Total	66	14.7	384	85.3	450		

Students who felt that there no cooperation in the faculty were about two-times more prone to depression compared to others (OR= 2.14; 95% CI: 1.24-3.67,  $P = 0.005$ ). Similarly, those complained from condensed academic course had higher rates of depression compared to others.

Table 6 illustrates that students complained from emotional failure during the six months preceded the study, had also higher prevalence of depression (20.1%) compared to others (10.4%). There was a highly statistical significant difference ( $\chi^2= 8.42$ ,  $P = 0.004$ ). There was no relationship be-

tween family histories of psychological problems and depression among students.

Table 7 shows that the first predictor of anxiety was depression diagnosis (OR= 3.28; 95.0% C.I.: 1.85 – 5.82). The following predictors were the presence of condensed course, academic failure & emotional failure. Regarding depression, the first predictor was anxiety, the second was nationality; non Saudi female medical students were 2.66 times more depressed than Saudis (OR= 2.66; 95.0% C.I. 1.04 – 6.85). The following depression predictor was emotional failure (OR= 1.78; 95.0% C.I. 1.04 – 3.15).

**Table 7:** Logistic regression analyses of predictors of anxiety and depression among medical students in King Abdulaziz University

VARIABLE	B	P	Exp (B)	
			OR	95.0% C.I.
<b>Anxiety</b>				
Depression	1.187	0.000	3.28	1.85-5.82
Condensed course	0.744	0.001	2.10	1.33-3.32
Academic failure	0.678	0.007	1.97	1.20- 3.22
Emotional failure	0.574	0.007	1.78	1.17- 2.69
Constant	- 6.140	0.000		
<b>Depression</b>				
Anxiety	1.276	0.000	3.58	1.04- 6.85
Nationality (Non Saudi)	0.979	0.04	2.66	1.04 – 6.85
Emotional failure	0.591	0.03	1.78	1.04- 3.15
Constant	-1.985	0.005		

## Discussion

It is well known that medical students often face many obstacles during their medical training. If these difficulties are ignored, they are likely to produce further stresses (19). The present study illustrated presence of high prevalence rates of anxiety & depression among female medical students. The rates were 33.3% & 34.9% for borderline & morbid anxiety, respectively. While the corresponding rates for depression were 21.8% & 14.7%, respectively. This agrees with results of a systematic review from the USA & Canada which reported high anxiety & depression rates (20). Rab et al. (21) conducted a similar study among female medical students in Pakistan and reported slightly higher rates of anxiety and depression than those of the current study (43.7% and 19.5% for anxiety and depression, respectively). This

may attributed to presence of more stresses in Pakistan than in Saudi Arabia. A study carried out in Dubai (1) reported that 28.6% of medical students had depression & a similar rate (28.7%) showed anxiety. Another research from Nigeria reported that the prevalence of depression was 23.3% (22). A Brazilian study showed that 38.2% of medical students had depression (19). On the other hand, much higher rates, than the current study, reported among medical students from Beirut, Lebanon; 69.0% for anxiety & 27.6% for depression (23). These differences may be attributed to presence of more instability in Lebanon, or due to difference in the diagnostic scales used in both studies. Similarly, another research conducted among Dutch medical students showed that the prevalence of common mental



disorders was 54% and 48%, among the clinically non-active and clinically active students, respectively (24). This difference may be because Finland study screened many mental health problems, but the current one screened anxiety and depression only.

The present study showed that the mean anxiety score was  $9.32 \pm 3.77$  & the mean depression score was  $6.59 \pm 3.62$ . These means are higher than mean scores reported among Indian medical students in first two years of their medical education ( $7.66 \pm 3.21$  &  $5.77 \pm 3.45$ , respectively) (25). The cause of this discrepancy may be due to differences between the 2 study populations or between the students' year of education.

There was a positive correlation between depression and anxiety among medical students in the current work. The first predictor of anxiety was depression and vice versa. Our results also agree with results from the study of Dubai (1) where there was positive correlation between both. They explained that this significant correlation may indicate a cause-effect relationship. WHO has declared that is high co-morbidity present between different mental health problems. This address the needs integrated public health efforts & policies for early screening of these problems, and targeting preventive measures for high risk populations, (26) as medical students.

The current study found that final year students had the highest prevalence of both anxiety and depression. These may be due to increased stress and study load during the last year of medical education. Niemi & Vainiomäki found in a Finland study that there was a consistent increase in stress reports throughout the medical program (27). A cross sectional study done among medical students in Riyadh, Saudi Arabia, revealed that psychological stress significantly decreased as the year of study increased, except for the final year (5). On the other hand, Inam et al. (28) reported that the prevalence of anxiety and depression was higher among first 2 years among private college medical students.

Regarding the student's nationality, current study revealed that Saudis had significantly lower prevalence of both anxiety and depression compared

to Non- Saudis. This agrees with the results of the comparative study between Saudi Arabia and Egypt (12). It showed that anxiety and depression were significantly lower among Saudi than Egyptian male students.

In the present study, most of the personal and socioeconomic characteristics, except nationality, played a minimal role as predictors of both anxiety and depression. The predictors mainly related to faculty environmental factors (as condensed course), or attributed to occurrence of major life events in the 6 months preceded the study. Similarly a study from Antalya, Turkey, reported that long and tiring medical education may have the strongest effect on the psychological changes (29). Age, marital status, locality and total family income did not significantly affect the prevalence of anxiety and depression among medical students (30).

In the current study, students complained from condensed course, academic failure, and emotional failure were about 2 times more prone to anxiety than the others. Similarly, the study of Thailand (9) found that academic problems were the leading cause of stress among medical students.

Depression was more among students who encountered major life events in the 6 months preceded their study than others (21). This result goes on line with results of the current study; students who had an emotional failure were about 2 times more prone to depression compared to others.

Limitations of the study: Because of the study was a cross-sectional study, cause-and-effect relationships could not be determined & The study only comprised female medical students from the King Abdulaziz University, Jeddah, Saudi Arabia, and this sample may not necessarily be representative of all medical students in Saudi Arabia.

## Conclusions

Female medical students encountered high prevalence of both anxiety and depression. There was a positive correlation between both anxiety &

depression. Academic problems (condensed course and academic failure) and major life events were among main predictors of anxiety & depression. Nationality also plays a role as non-Saudis had significantly higher prevalence of both anxiety and depression. These findings highlight the need for addressing mental health as an important public health subject in medical schools. Enhancing both preventive & curative mental health services is required for medical students. Early detection of psychological problems by annual screening of medical students is recommended. Students with anxiety and / or depression should be referred to receive suitable care as counselling, psychotherapy or treatment. Vulnerable students may need also psychiatric counselling and supportive services. Initiation of stress management courses from the start of medical education to help students to cope up with the stress encountered in the advanced educational years is also recommended. Enhancing academic advising services, since the start of medical education, is also required. Conduction of similar study for males and females is recommended.

### Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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