

# Depression, Anxiety, and Stress in Sudanese Medical Students: A Cross Sectional Study on Role of Quality of Life and Social Support

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**Abstract** We aimed to find out the prevalence of depression, anxiety and stress among medical students in a developing country, and to find the possible role of social support and quality of life in developing depression, anxiety, and stress. We did a cross sectional study in medical students of faculty of medicine in Khartoum, Sudan. We did a clustered random sampling in students from the second to sixth year and collected 500 questionnaires of which 487 were suitable for analysis. The data collection tool composed of three questionnaires; MOS social support survey, Depression, anxiety, and stress scale (DASS21), and WHO quality of life brief (WHOQOLB) questionnaire. More than 50% of respondents had different grades of depression, anxiety, and stress where 21%, 22%, and 16% had moderate degree of depression, anxiety, and stress respectively. Quality of environment and physical health were the major determinant of depression, anxiety, and stress ( $R=0.252-0.465$ ,  $P$  values  $<0.001$ ). From the four domains of social support assessed by MOS survey, there was significant association only between positive social interaction domain and depression ( $R=0.354$ ,  $P<0.001$ ). There was no significant association between social support and stress and anxiety. There was no significant differences in depression scores among different academic years ( $P=0.246$ ). However, stress and anxiety showed significant differences in different academic years, notably between the middle years, and second and final years ( $P=0.043$  and  $0.00$  respectively). The quality of environment and physical health seems to play a key role in student mental health.

**Keywords:** depression, anxiety, stress, medical students, social support, quality of life, developing country

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## 1. Introduction

Medical students experience depression, burnout, and mental illness at a higher rate than the general population, with mental health deteriorating over the course of medical training. [1] prevalence of depression among medical students is high ranging from 30 to 50%, although in one study it was as low as 14.7%. [2,3,4] Anxiety prevalence showed high variation between different studies from 21.9 to 66.9%. [3,5,6,7] Previous studies showed that depression leads to increased rate of suicide among medical doctors. [5,8] Studies also found that stress leads to increased incidence of anxiety and depression and most commonly a decline in academic performance among medical students. [9] In the same way, student distress may influence professional development

and adversely impact academic performance contributing to academic dishonesty and substance abuse, and may play a role in attrition from medical school. [10] Moreover, Medical students are less likely than the general population to receive appropriate treatment despite seemingly better access to care, and may engage in potentially harmful methods of coping, such as excessive alcohol consumption, and, despite their training, may fail to recognize that depression is a significant illness that requires treatment. [1]

Student stress has been associated with a variety of negative outcomes, including effects on general and health-related quality of life. Stress may not only impair the quality of life of medical students but can also influence patient care and the complex psychodynamics of the doctor- patient relationship. [11] As a consequence of increased stress, medical students can experience an alarming amount of stress-associated anxiety, depression,

substance abuse, and even suicide. Chronic stress is also known to influence memory and learning, especially problem solving abilities which require flexible thinking. [12]

But what makes medical students highly susceptible to depression, anxiety, and stress? The continuous evaluation process, exhausting work hours, striving for earning high grades, goals etc. are not the only source of stress for medical students. [11] Other potential sources of stress for students may include academic stress: enormous syllabus to be covered in a limited time period, sudden change in their style of studying, flooding of medical science with new concepts lack of proper guidance, thought of appearing /failing in exams, inadequate time allotted to clinical posting, insufficient bedside teaching, social stress: relationship with peer groups, hostel friends, senior teachers, displacement from home, expectations of parents, peer pressure, change in the medium of education, physical stress: inadequate hostel facilities, hostel food etc. [12] Another risk factor was the academic stressors such as curricular overload, examination, obtaining certain grades, competition and to graduate and land the residency they desire. [13,14] Other studies found that anxiety and stress was associated with weak social support, being non-native, lower semester, younger age and non-smokers. [3,7] Several studies among medical students found an association between gender and depression, anxiety and stress with the risk being more in females. [7,13,15,16]

Although a lot of studies had been conducted to measure the negative effect of depression anxiety and stress in medical student, the exact extent and severity of the problem and the factors that are used to cope with them are not yet well known, which might aid in designing intervention strategies and planning modification [17].

In this study we aimed to find the prevalence of depression, anxiety and stress among medical students in a developing country, and to find the possible role of social support and quality of life in developing depression, anxiety, and stress.

## 2. Methodology

The data of this study was obtained from a study accomplished to validate the Arabic version of MOS social support survey. We did a cross sectional study in medical students of faculty of medicine in Khartoum, Sudan. The faculty of medicine has around 1800 medical students who graduate after completing six years curriculum. The curriculum is composed of three years basic clinical sciences followed by three years clinical sciences. We included students who are older than eighteen years. First year students were excluded because most of them were below eighteen which interfered with selection and sampling. We did a clustered random sampling in students from the second to sixth year and collected 500 questionnaires of which 487 were suitable for analysis. We excluded the first year students because great proportion of them was under eighteen at time of data collection which may interfere with randomization and cause a selection bias. The data collection tool composed of three questionnaires; the MOS social support survey, Arabic Depression, anxiety, and stress scale (DASS21), and Arabic WHO quality of life brief WHOQOLB) questionnaire. Ethical approval was taken

from local ethical committee. Verbal consent was taken as necessary.

### 2.1. MOS Social Support Survey (MOS-SSS)

The MOS survey is self-administered and uses five-point answer scales. self-administered, social support survey that was developed for patients in the Medical Outcomes Study (MOS), a two-year study of patients with chronic conditions. This survey was designed to be comprehensive in terms of recent thinking about the various dimensions of social support. In addition, it was designed to be distinct from other related measures. Empirical analyses indicated that the emotional and informational support items should be scored together, so four functional subscales were derived: tangible support (items 2, 5, 12, 15), affectionate (items 6, 10, 20), positive social interaction (items 7, 11, 14, 18), and emotional or informational support (items 3, 4, 8, 9, 13, 16, 17, and 19). These support measures are distinct from structural measures of social support and from related health measures. They are reliable (all Alphas >0.91), and are fairly stable over time [18].

### 2.2. The WHO Quality of Life Brief (WHOQOLB) Questionnaire

The WHOQOL-BREF produces a quality of life profile. It is possible to derive four domain scores. The WHOQOLB questionnaire is composed of 25 items divided into four domains; physical health, psychological, social, and environment. The four domain scores denote an individual perception of quality of life in each particular domain. Domain scores are scaled in a positive direction (i.e. higher scores denote higher quality of life). The mean score of items within each domain is used to calculate the domain score. Mean scores are then multiplied by 4 in order to make domain scores comparable with the scores used in the WHOQOL-100.

### 2.3. The Depression, Anxiety, and Stress (DASS21) Questionnaire

The DASS 21 is a 21 item self-report questionnaire designed to measure the severity of a range of symptoms common to both Depression and Anxiety. In completing the DASS, the individual is required to indicate the presence of a symptom over the previous week. Each item is scored from 0 (did not apply to me at all over the last week) to 3 (applied to me very much or most of the time over the past week). The essential function of the DASS is to assess the severity of the core symptoms of Depression, Anxiety and Stress. Accordingly, the DASS allows not only a way to measure the severity of a patient's symptoms but a means by which a patient's response to treatment can also be measured. Although the DASS may contribute to the diagnosis of Anxiety or Depression, it is not designed as a diagnostic tool. Indeed, a number of symptoms typical of Depression such as sleep, appetite and sexual disturbances, are not covered by the DASS and will need to be assessed independently. The DASS questionnaire is composed of 3 domains; depression, anxiety, and stress. Each one has 7 items. We used the version developed by Taouk et al in Australia [19].

## 2.4. Data Entry and Analysis

We used SPSS v22 to analyze data. We used stepwise regression to test the association between the scores of the DASS21 (depression, anxiety, and stress), MOS-SSS (social support), and WHOQOLB (quality of life). We used analysis of variance (ANOVA) to test association of depression, anxiety, and stress with the academic year.

## 3. Results

### 3.1. Univariate Analysis

The participants' age ranged from 18 to 26, with a male to female ratio of almost 2:3. Table 1 below demonstrates the percentage of students who had different degree of stress, anxiety, and depression.

Table 1. prevalence of depression, anxiety, and stress

		Column Valid N %
Stress categories	normal	49.5%
	mild	13.7%
	moderate	16.1%
	severe	16.7%
	very severe	4.1%
Anxiety categories	normal	49.0%
	mild	7.3%
	moderate	22.3%
	severe	7.7%
	very severe	13.7%
Depression categories	normal	46.6%
	mild	18.2%
	moderate	21.2%
	severe	8.9%
	very severe	5.1%

We can notice that more than half of respondents had different grades of depression, anxiety, and stress.

The Table 2 below shows the mean, median, standard deviation, and percentiles of domains of MOS survey, DAS21 survey, and WHOQOLB questionnaire.

Table 2. Descriptive statistics of domains of MOS survey, DAS21 survey, and WHOQOLB questionnaire

	Mean	Standard Deviation	Median	Percentile 25	Percentile 75
DAS depression scale	11.22	8.21	10.00	4.00	16.00
DAS anxiety scale	9.20	8.25	8.00	2.00	14.00
DAS stress scale	16.44	9.46	16.00	10.00	24.00
MOS overall score	3.43	.91	3.47	2.74	4.16
Emotional support	3.31	1.10	3.38	2.38	4.13
Tangible support	3.74	1.08	4.00	3.00	4.75
Affectionate support	3.33	1.36	3.33	2.33	4.33
Positive social interaction	3.51	1.08	3.67	2.67	4.33
Physical health	45.67	8.25	45.71	41.14	50.29
Psychological	51.86	8.38	50.67	45.33	58.67
Social relationships	53.80	17.46	53.33	48.00	64.00
Environment	49.46	10.87	50.00	42.00	56.00

### 3.2. Bivariate Analysis

#### 3.2.1. Social Support and Quality of Life vs Depression, Anxiety, and Stress

Table 3. results of stepwise regression analysis

Stress								
Model	R	R Square	Std. Error of the Estimate	F	Confidence interval		t	Sig.
					Lower Bound	Upper Bound		
Physical health	.285	.081	9.44690	28.7	-.412	-.146	-4.121	.000
Environment	.339	.115	9.28577	21.0	-.247	-.034	-2.604	.000
Positive social interaction	.354	.126	9.24357	15.5	-1.991	-.012	-1.991	.000d
MOS overall score							.229	.819
Emotional support							.341	.733
Tangible support							-.822	.412
Affectionate support							.008	.994
Psychological							-1.223	.222
Social relationships							-1.034	.302
Anxiety								
Model	R	R Square	Std. Error of the Estimate	F	Confidence interval		t	Sig.
					Lower Bound	Upper Bound		
Environment	.252	.063	8.40366	21.7	-.266	-.084	-3.799	.000
Physical health	.276	.076	8.35823	13.4	-.252	-.009	-2.119	.000
MOS overall score							-.719	.826
Emotional support							-.283	.903
Tangible support							-.781	.837
Affectionate support							-.793	.901
Positive social interaction							-1.497	.863
Psychological							-1.300	.696
Social relationships							-.535	.872
Depression								
Model	R	R Square	Std. Error of the Estimate	F	Confidence interval		t	Sig.
					Lower Bound	Upper Bound		
Psychological	.437	.191	7.60514	77.1	-.461	-.240	-6.235	.000
Environment	.465	.216	7.49983	44.7	-.229	-.055	-3.197	.000
MOS overall score							-.997	.774
Emotional support							-1.419	.870
Tangible support							-.202	.830
Affectionate support							-.524	.861
Positive social interaction							-1.324	.809
Physical health							-1.375	.825
Social relationships							-1.349	.886

We used Stepwise linear regression analysis to evaluate the relationships between depression, anxiety, and stress with the quality of life domains (physical health, psychological, social health, and environment) and Social support domains (Emotional/informational, tangible, affective, positive social interaction, and overall social support scale). In this type of regression the analysis process include only the independent variables found to be significantly associated with the dependent variable. Table 3 illustrates the correlation coefficient (R), coefficient of determination (R square), standard error, and P values of the regression analysis of the factors found to be significantly associated with stress, anxiety, and depression.

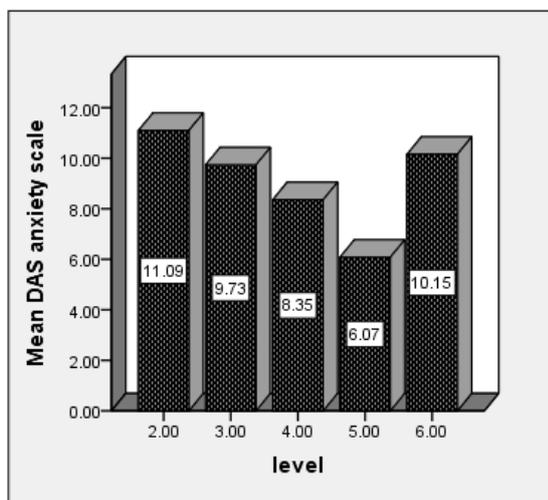
It is clear that quality of environment and physical health were the major determinant of depression, anxiety, and stress. They were all inversely related as the scatter blots below demonstrates. In fact, quality of environment was responsible for 21% of variance of depression, 12% of variance of stress, and 6% of variance of anxiety. Quality of physical health was responsible for 8% of variance of anxiety and stress.

**3.2.2. Depression, Anxiety, and Stress Among the Different Academic Years**

We used analysis of variance (ANOVA) to test association between academic year and depression, anxiety, and stress. Table (4) demonstrates the mean, Median, and P values of the test.

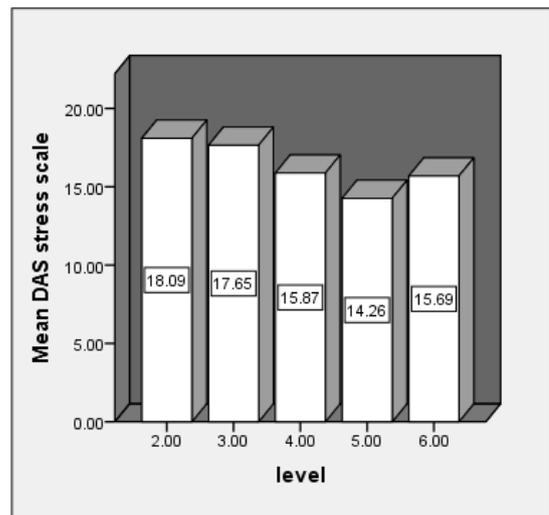
**Table 4. academic year versus depression, anxiety, and stress**

		Mean	Median	Standard Deviation	P value
DAS depression scale	2nd year	12.71	10.00	8.96	.246
	3rd year	10.90	10.00	7.36	
	4th year	10.49	9.00	7.89	
	5th year	10.32	10.00	8.05	
	6th year	11.37	10.00	8.51	
DAS anxiety scale	2nd year	11.09	10.00	8.82	.000
	3rd year	9.73	8.00	7.70	
	4th year	8.35	6.00	6.99	
	5th year	6.07	4.00	6.45	
	6th year	10.15	6.00	9.79	
DAS stress scale	2nd year	18.09	18.00	10.47	.043
	3rd year	17.65	18.00	8.50	
	4th year	15.87	14.00	8.72	
	5th year	14.26	14.00	9.05	
	6th year	15.69	14.00	9.91	



**Figure 1.** relationship between academic year and anxiety

The results showed that there was significant difference in the scores of anxiety and stress scales among students of different academic years (P value <0.05). Figure 1 and Figure 2 showed that the young students and final year students had higher level of stress and anxiety.



**Figure 2.** relationship between academic year and stress

**4. Discussion**

The current study aimed to measure the prevalence of stress among medical students and to identify the role of quality of life and social support. Results of the study revealed that half (50.5 %) of the respondents were stressed. This was supported by results of many previous works, in which medical students experienced a high level of stress. In Egyptian study among 1st year medical students, the stress prevalence was 57.8%. The prevalence of anxiety was found to be 78.4% which is higher by more than 25% than in our population. [20] In Lithuania, a study revealed lower prevalence in which symptoms of anxiety and symptoms of depression were prevalent in medical students with ratio of 43% and 14% respectively. [6] In fact, medical school is recognized as a stressful environment that often exerts negative effect on the academic performance, physical health and psychological well-being of the students. [4] It has been observed that academic, social, physical and emotional factors are greater perceived causes of stress in these students. [21,22] Presence of high levels of stress anxiety and depression among medical students is not surprising. The presence of stressors specific to medical education in addition to normal stressors of everyday life could explain this high prevalence of psychological impairment among medical students.

Regarding the role of social support and quality of life, we found that the degree of stress in medical students was significantly and inversely related to quality of physical health, environment, and social interaction. Ipseeta Ray and Daniel Joseph stated that physical, environmental and social factors resembled by the, exhausting work hours, physical stress, inadequate hostel facilities, relationship with peer groups, hostel friends, senior teachers, displacement from home, expectations of parents, and peer pressure were strongly associated with stress among medical students. Similarly, The quality of environment

and physical health had important link to degree of anxiety [12]. Ayat A. Abdallah and Hiba M. Jabir clarified in their study in Egypt that chronic physical illness, insomnia and language barrier were significantly related to increase in the level of anxiety which strengthen our results. [20] This might be due to the fact that environmental and physical health may affect recreational activities and leisure time that will adversely affect our mood and lead to anxiety.

For depression, the grade of depression depended mainly on the quality of the environment and the psychological life of medical students. However there was no significant dependence on the social support and physical domains of quality of life. In contrast to our results, Park et al found that medical students with no social support had a higher prevalence of depression than did those who could get help from family and/or friends indicating the impact of the social domain of quality of life on the grade of depression [23]. The exact explanation of the discrepancy between our study and the Chinese study may not be clear, but what we can conclude is that lack of optimal physical health and surrounding environment may raise the risk of depression in medical students.

Although some studies found no significant association between stress and the academic level, [16,24,25] we found that both anxiety and stress appeared to affect the extremities, i.e. the second and last year. Our findings were similar to results obtained by Iqbal et al and Beck et al where the transition from an undergraduate program to a professional program has been reported to result in increased stress levels for students [7,26]. Derby et al indicated that Medical students experience substantial stress from the beginning of the training process [10]. The first-years medical student is faced with the challenges of being uprooted from family and friends and adapting to a demanding new learning environment. Human cadaver dissection is a well-recognized stress for many students, [2] but other sources of distress, such as a substantially increased scholastic workload, and concern for academic performance, also characterize this transition. Attempting to master a large volume of information and joining a peer group of equal motivation and intelligence can be intimidating for young adults accustomed to rapid mastery of material and academic distinction. This challenge is amplified for students who struggle academically [10,22,27]. The drop of stress in the subsequent years can be attributed to adaptation to curriculum and environment [28]. The increased level of anxiety and stress during the second and final years of medical school can be attributed to the transition to the basic medical sciences, and the academic stress especially during the final year and high academic load. In addition, students who are about to graduate become more concerned about the difficulties of postgraduate life that doctors face in form of lower income, higher work load, and relatively inadequate clinical training in the developing countries compared to developed countries.

In short, medical students expressed high prevalence of depression, anxiety, and stress of different grades. The quality of surrounding environment and maintenance of physical health seems to play a key role in preservation of student mental health. Researches that focus on efficiency of different academic and nonacademic approaches to

prevent stress, depression, and anxiety are needed and strongly recommended.

## Conflict of Interest

The authors declare that they have no competing interest.

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