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ORIGINAL RESEARCH

The Prevalence of Stress Among Medical Students Studying an Integrative Curriculum During the COVID-19 Pandemic

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Purpose: Stress is a psychological shift that negatively affects student achievement. We sought to investigate the extent of stress in the medical students at our university.

Patients and Methods: A total of 337 medical students representing three program phases were represented. Stress was measured using a questionnaire divided into three main parts: 10-question Kessler instruments, 10-questions specific to identifying the causes of stress, and a qualitative component to report additional information. For the Kessler questionnaire, a score of less than 20 was considered negative for stress of any level (alert) and scores of 20–24 were considered mild stress (resistance phase), 25–29 moderate stress (near exhaustion), and 30–50 severe stress (exhaustion). Descriptive studies in the form of mean, standard deviation, and confidence interval (CI) were used in addition to the chi-squared test for estimate significant differences between variables. A P-value of <0.05 was considered significant.

Results: The prevalence of stress was 85.5%, with a slight male predominance. The prevalence of stress was seen among the male students during Phase I (88.25%), followed by male students during Phase III (87.7%), female students during phase II (86.5%), male students during phase II (84.5%), female students during phase I (83.3%) and female students during phase III (80.4%). Stress was uniformly high during phase I (86.2%) followed by phase II (85.4%) and phase III (85.1%), and 85% of stress was obtained from the number and content of assessments.

Conclusion: There is a high level of stress throughout the curriculum. The number of assessments and the number of modules and their content are the primary sources of stress. Student mentorship, including academic, psychic, and social counseling, may help predict and manage stress and improve student performance. Detection of stress among the students is a major issue for program monitoring and development.

Keywords: academic performance, COVID-19, integrated curriculum, stress

Introduction

Medical school curricula primarily provide graduates with three main attributes: knowledge, skills/professionalism, and values. However, these attributes may be adversely affected by student distress such as anxiety, depression, burnout, and other psychological problems.[1] In general, psychological distress is somewhat more common in medical students than in the general population. Complications from stress include the development of mental disorders, drug abuse, anxiety, depression, and suicidal tendencies.[2] Rafidah et al[3] found that some degree of stress can improve learning ability and learning outcomes, and that a high degree of stress

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can lead to the development of mental and physical health problems as well as reduced student self-esteem.[4] El-Monshed et al[5] reported that 40% and 74% of undergraduate students during the COVID-19 pandemic had stress and depression that required extensive work to eliminate and improve student academic performance.

In the evaluation of any integrated medical program, it is crucial that the medical educator, monitors, and academic counselors be aware of the prevalence, risk factors, and levels of stress among their students to prevent the impact of stress not only on health but also student performance, learning outcomes, and program evaluation.

An integrated medical curriculum promotes many types of teaching, learning, and assessment methods throughout the levels and phases of the curriculum. These create some degree of stress among medical students. The Albaha medical curriculum comprises 67 modules and courses that include three phases (preparatory, preclinical, and clinical) and 12 levels (two semesters by year). The preparatory phase consists of university and faculty required courses and is a prerequisite for the preclinical phase, which in turn is a prerequisite for the clinical phase.[6,7]

The 67 modules and courses are represented in a primarily horizontal way. Horizontal modules are performed in sequential order with no interval period of rest between these modules. This reflects some sort of stress among the students that may interfere with the acquisition of knowledge, especially within cognitive and skills domain. The process enhances student performance and learning outcome achievement.

Student-centered activities require pre-activity preparation, as they promote the acquisition of interpersonal communication, presentation, and values skills.[8,9] The assessments and evaluation for each module range from 3–5 assessment models: quizzes, objective structured practical/clinical examination (OSPE/OSCE), continuous activity assessments, and a final exam. All these activities create stress in medical students, especially those involved with an integrated curriculum.

Like any integrated medical curriculum, the Albaha curriculum has areas of similarities but is unique in that integration is not restricted to only the basic or preclinical years, but also extended to involve the clinical years through multidisciplinary, intradisciplinary and interdisciplinary forms that are considered a high level of integration. This is supported by previous studies.[10,11] It also includes specific modules that are community and research oriented.

Several curricular changes were made to adopt the learning environment to the COVID-19 pandemic. These changes include the introduction of blended learning, long day schedules, modified teaching strategies to become more student-centered, modifications to bedside teaching to use simulation instead of real patients in clinical situations, and modification of assessment methods. All these modifications may result in some degree of stress among the students.

In general, many prior studies have measured the degree of stress among medical students,[12–14] and some of these studies evaluated the effects of stress on student performance.[15–17] However, the degree of student stress during COVID-19 has not been fully studied. The degree of stress was assessed in some medical schools pre-COVID, and the highest stress proportion was found in Thai medical schools (61.4%),[18] followed by Malaysia 41.9%[19] and some British universities (31.2%).[14] Depression was observed in 12.9% of Swedish students, with a suicidal tendency in 2.7%.[16]

Psychological depression and stress among medical students lie along a wide spectrum as described by the Kessler instrument, which divides stress into no stress, mild, moderate, and severe levels.[20] The selection of the Kessler instrument for use in the present study was due primarily because it is a scaler measure that gives answers with a spectrum of potential responses that tend to be steadier over time and with higher planes of reliability, as noted with the dichotomous evaluation that have a narrow spectrum of response in the form of the presence or absence of symptoms. Scalar scores are generally not affected by relatively minor changes in psychological behavior.[21,22]

The purpose of the present study was to detect and estimate the degree and prevalence of student stress among Albaha medical students via a mixed quantitative and qualitative approach. It also sought to identify risk factors for stress and to correlate the degree of stress with performance and curriculum phase.

Methods

This study was carried out following ethical approval from the ethical committee of Albaha Faculty of Medicine under Com/2021/32. Written informed consent was obtained from all participants.

A cross-sectional, quantitative, and qualitative study was performed on 337 medical students (203 males and 134 females). Students represented the three phases of the Bachelor of Medicine and Bachelor of Surgery

(MBBS) program. Prevalence and degree of stress were measured using a valid and well-structured questionnaire. The questionnaire was divided into three main parts: the first part was the 10-question Kessler instrument;[20] the second part is made up of 10 specific questions that investigate the cause of the stress; and the third part was a qualitative component to report additional information about the sources of stress. The Kessler instrument, initially applied by Kessler,[20] is widely used in surveys, especially those performed by the World Health Organization, to investigate stress and its impact on clinical outcomes. It has also been shown to be a good instrument for the estimation of psychometric elements, with a 0.89 Cronbach alpha and a confidence interval of 0.89.[23–26] The importance of the confidence interval is to ensure the reliability of the Kessler instrument and to support the reliability of the present study in comparison with previous works.

The Kessler instrument divides stress into none, mild, moderate, and severe categories. The five potential responses to each question range from "none of the time" to "all the time" and were scored from 1 to 5, respectively. The other 10 questions were organized based on all curricular components, including contents, teaching strategies, policy of assessment, learning resources/facilities, student-centered activities, and extracurricular activities. The aim of the 10 questions was to aid in the identification of sources of stress and are adjusted methodically by educational professionals to improve the validity of the questionnaire. These 10-questions have Likert scale-like responses and were scored from 1 to 5, ranging from strongly agree to strongly disagree. The third part is a qualitative section that allows the students to write about their academic performance and achievement, history of medical illness and drug intake, and sources of stress.

Two pilot studies were performed on males and females. Each group consisted of 35 students with a one-month interval period between the two studies. The results obtained from the male and female groups were similar, affirming that the questionnaire was coherent, valid, and reliable. According to the reliability and validity obtained from the pilot studies, both the male and female groups were entered into the current study.

For the Kessler instrument questionnaire, scores were interpreted as follows: a score of less than 20 was considered negative for stress at any level (alert), a score of 20–24 was considered mild stress (resistance phase), 25–29 indicated moderate stress (near exhaustion), and 30–50 denoted severe stress (exhaustion).[27–31] Each of the 10-questions were analyzed separately. For both questionnaires, descriptive studies in the form of mean, standard deviation, and confidence interval (CI) were used in addition to the analysis of variance (ANOVA) and Student's *t*-tests to compare the frequencies and means of continuous variables in relation to levels of stress. The P-value of <0.05 was considered significant.

Results

Interpretation of Data

The distribution of the current study was as follows: Phase I; 87 (25.8%), Phase II; 123 (36.5%), and phase III: 127 (37.9%). Stress was measured in 288 students (85.5%) and was distributed as follows: mild 81 (24%), moderate 101 (30%), severe 106 (31.5%), and no stress in 49 out of 337 (14.5%) (p-value <0.00001 using the ANOVA test). The overall mean of the Kessler instrument was 27.1, with a 95% confidence interval of (27.1); 26.1–28.2 and a coefficient of variation of 34.46%. The mean Kessler score for each group was 13.87, 21.83, 26.66, and 40.61 for no stress and mild, moderate, and severe stress, respectively.

Due to the unequal representation of male and female students in the current study, the following stress results (number and percentage) were related to the total number of each male and female group. Furthermore, the stress percentage calculation was related to the number of students in each section. Regarding the phase of the curriculum, the percentage applied to each raw value was related to the number of students in each phase for either the male or female section. Student grade was related to the total number of studies (337) due to the unification of the assessment methods between the male and female sections.

The detailed description of the results revealed that the prevalence of stress among the integrated MBBS program of Albaha University was high, accounting for 85.5% with a slight male predominance (86.6%) compared with females (83.6). Analysis of these results against sex and program phase revealed that the prevalence of stress was highest during phase I (85.75%), followed by phase II (85.45%) and phase III (84.1%) (Table 1).

Regarding sex, the highest stress ratio was seen among the male students of phase I (88.25%), followed by male students of phase III (87.7%), female students of phase II

Table 1 Sex, MBBS Phase, and Grade Characteristics

Variable		Sex; No. and Percentage				Total	*p*-value (Student *t* Test)	*t*-value (Student *t* Test)
Sex		Male		Female				
		No	%*	No	%*			
		203	60.2	134	39.7	337		
Phase	I	51	25.1	36	26.9	87	0.497	−0.0059
	II	71	34.9	52	38.8	123		
	III	81	39.9	46	34.3	127		
Grade	High	49	24.1	43	36.6	92	0.402	−0.264
	Moderate	88	43.3	44	32.8	132		
	Low	66	32.5	47	35	113		

Note: *Percentage of number of students to its actual number in both the male and female sections.

(86.5%), male students of phase II (84.5%), female students of phase I (83.3%), and female students of phase III (80.4%). Furthermore, the prevalence of stress was highest during phase I (86.2%), followed by phase II (85.4%) and phase III (85.1%) (Table 2). The degree of moderate and severe stress was the highest during phase III (63.8%), followed by phase I (62%) and phase II (58.5%) with a highly significant p-value (<.00001) (Tables 2 and 3) (Figure 1).

In general, the total percentage of moderate and severe stress was higher in the male section (68.6%) compared with the female section (57.4%). The highest ratio was seen among the male students of phase III (66.6%) and phase I (64.7%), followed by the male students of phase II (59.2), the female students of phase III (58.7), the female students of phase I (58.4%), and the female students of phase II (57.8%). A higher percentage of severe stress was seen in the male section than in the female section, as evident during phase II (33.8%), phase I (33.3%), and phase III (32%) compared with 30.6%, 30.4% and 27%, respectively (p <0.00001) (Tables 2 and 3). All descriptive studies are listed in Table 4.

Low level of stress among students who achieved high grades ranged from 2.4% to 4.7%. High levels of stress were observed among male students who attained moderate grades (B+, C) (10.4%), followed by male students who attained low grades (D+, D) (7.1%). No association between stress and academic grades was observed. Furthermore,

Table 2 Distribution of the Degree of Stress by Sex and Program Phase

Phase of the Program	Sex	Total	Stress: Degree, No., Percentage, Mean ±SD								P value (ANOVA)
			No Stress	Mean ±SD	Mild	Mean ±SD	Moderate	Mean ±SD	Severe	Mean ±SD	
		337	49 (14.5)	13.88±	81 (24)	21.83±	101 (30)	26.66±	106 (31.5)	40.61±	0.0001
	Male	203 (60.2)	27/203 (13.3)	14.3±2.38	47 (23.1)	21.84±1.25	62 (30.5)	26.75±1.4	67 (33)	40.42±5.78	0.4922
	Female	134 (39.7)	22/134 (16.4)	13.36±2.64	36 (26.8)	21.82±1.14	39 (29.1)	26.54±1.28	39 (29.1)	40.94±5.8	
I	Male	51/203 (25.1)	6/51 (11.8)	14.6±3.14	12 (23.5)	21.4±1.25	16 (31.4)	26.75±1.29	17 (33.3)	41±5.3	0.4729
	Female	36/134 (26.8)	6/36 (16.7)	12.5±2.14	9 (25)	21.88±0.99	10 (27.8)	26±1	11 (30.6)	40.9±5.36	
II	Male	71/201 (34.9)	11/71 (15.5)	14.27±3.65	18 (25.4)	21.66±1.41	18 (25.4)	26.88±1.36	24 (33.8)	40.5±6.41	0.4989
	Female	52/134 (38.8)	7/52 (13.5)	13.57±2.32	15 (28.9)	22±1.26	16 (30.8)	26.37±1.16	14 (27)	41.28±5.31	
III	Male	81/203 (39.9)	10/81 (12.3)	14.1±2.16	17 (21)	22.05±1.05	28 (34.6)	26.67±1.44	26 (32)	40.42±4.85	0.1756
	Female	46/134 (34.3)	9/46 (19.6)	14.11±2.6	10 (21.7)	22.3±0.9	13 (28.3)	26.92±1.54	14 (30.4)	39.28±6.88	

Table 3 Summary of the Prevalence of Stress During Each Phase of the Program

Section/Phase	Percentage of Stress	Moderate and Severe Stress	p-value (Student's *t*-Test)	t-value (Student's *t*-Test)
Male section	86.6	68.6	0.349	0.446
Female section	83.6	57.4		
Stress during Phase I	86.2	62	0.00001	17.943
Stress during Phase II	85.4	58.5		
Stress during Phase III	85.1	63.8		
Male students in phase I	88.2	64.7		
Male students in phase III	87.7	66.6		
Female students in phase II	86.5	57.8		
Male students in phase II	84.5	59.2		
Female students in phase I	83.3	58.4		
Female students in phase III	80.4	58.7		

there was no association between the grades of male and female students with the degree of stress (Table 5).

Analysis of the qualitative part of the study revealed that 85% of student stress was obtained from many evaluations of running modules, in addition to the evaluation of longitudinal modules which are inserted within these horizontal modules. Furthermore, 75% of students reported that many modules and their sequence without interval periods of rest were the cause of stress. Approximately 34–48% of students reported that student-centered activities and their preparation were the main causes of stress. Other reported factors were medical

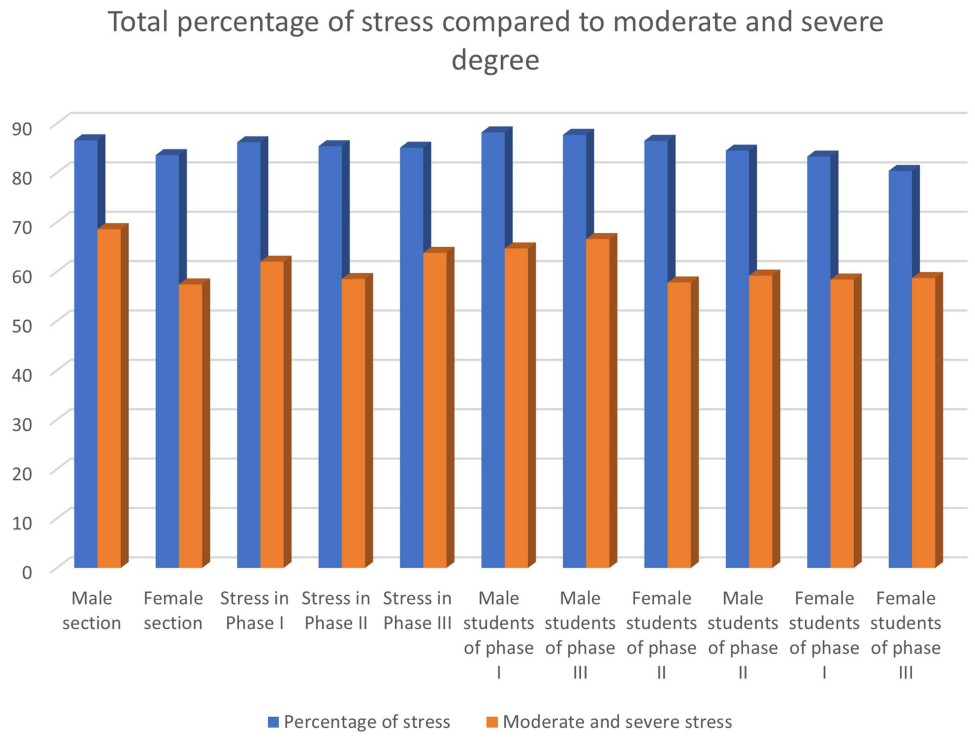

Figure 1 Overall vs moderate/severe in the current study by sex and phase.

Table 4 Self-Reported Stress

	No Stress		Mild Stress		Moderate Stress		Severe Stress	
	Male	Female	Male	Female	Male	Female	Male	Female
Mean	14.296	13.36	21.84	21.82	26.75	26.54	40.42	40.94
SD	2.382	2.645	1.250	1.139	1.396	1.277	5.78	5.8
Median	14	13	22	22	27	27	41	41
Mode	15	14	22	21	25	25	45	46
Co of Variation	16.67	19.8	5.73	5.22	5.22	4.81	14.31	14.19
Confidence interval	95% Confidence Interval: 14.3 ± 0.898 (13.4 to 15.2)	95% Confidence Interval: 13.4 ± 1.11 (12.3 to 14.5)	95% Confidence Interval: 21.8 ± 0.325 (21.5 to 22.1)	95% Confidence Interval: 21.8 ± 0.476 (21.3 to 22.3)	95% Confidence Interval: 26.7 ± 0.335 (26.4 to 27)	95% Confidence Interval: 26.5 ± 0.327 (26.2 to 26.8)	95% Confidence Interval: 40.4 ± 1.57 (38.8 to 42)	5% Confidence Interval: 40.9 ± 2.05 (38.9 to 42.9)

Table 5 Distribution of the Degree of Stress by Sex, Program Phase, and Academic Achievement

Grade	Degree of Stress	Phase I		Phase II		Phase III		Total	No. and % Male	No. and % of Female	P value
		Male	Female	Male	Female	Male	Female				
High grade more than 85% (A+, A, B+)	No	2	3	3	3	3	3	17 (5.04) *	8 (2.4)	9 (2.7)	0.230
	Mild	3	4	4	4	4	2	21 (6.2)	11 (3.3)	10 (2.96)	
	Moderate	3	4	4	3	7	5	26 (7.7)	14 (4.2)	12 (3.6)	
	Severe	4	4	7	5	5	3	28 (8.3)	16 (4.7)	12 (3.6)	
Moderate grade 75–84% (B, C+)	No	2	1	4	2	3	3	15 (4.5)	9 (2.7)	6 (1.8)	0.0509
	Mild	6	3	8	6	6	5	34 (10.08)	20 (5.9)	14 (4.2)	
	Moderate	8	2	7	8	9	4	38 (11.3)	24 (7.1)	14 (4.2)	
	Severe	9	3	13	3	13	4	45 (13.4)	35 (10.4)	10 (2.96)	
Low grade 60–74% (D+, D)	No	2	2	4	2	4	3	17 (5.04)	10 (2.96)	7 (2.1)	0.116
	Mild	3	2	6	5	7	3	26 (7.7)	16 (4.7)	10 (2.96)	
	Moderate	5	4	7	5	12	4	37 (11)	24 (7.1)	13 (3.9)	
	Severe	4	4	4	6	8	7	33 (9.8)	16 (4.7)	17 (5.04)	
Total		51	36	71	52	81	46	337			

Note: *This percentage is related to total number of study 337 due to unification of assessment methods between the male and female section.

illnesses and social factors, which represented 12% and 18%, respectively (Table 6) (Figure 2).

Discussion

In the present study, the prevalence of stress among students taught with an integrated curriculum was high, accounting for 85.5% of students with a slight male predominance (86.6%). This high percentage of stress may be due in part to curricular changes necessitated by the COVID-19 pandemic or other factors related to the integrated curriculum. The high student stress rate seen in the present work correlates with prior studies that have shown that medical

Table 6 Sources of Stress as Reported by the Students in the Present Study

Item	Some Important Reported Causes of Stress by the Students		No. and Percentage
Modules	Number. Sequences, no interval period of rest in-between		253 (75%)
Modules' contents	So condensed. Need more contact hours to learn		132 (39.1%)
Student-centered activities and other small group sessions	PBL, TBL, CBL	Structure of tutorial contents Facilitator role Interpersonal communication Preparation of my work Presentation Teamwork and group harmony Timing Personal student factors	162 (48%)
	Seminar	Language Objectives Preparation Presentation Resources and facilities Inter-tutor bias marking	117 (34.7%)
Assessments	Too many; at least 4 types of assessments per module in addition to the assessments of longitudinal modules within the horizontal modules Usually done at the end of module, without enough time to study OSPE/OSCE environment; number and timing of stations		287 (85.1%) 114 (33.8%)
Medical illness	Acute and chronic medical illness		12 (3.5%)
Social factors	Residence, distance from family (Alienation), financial support		18 (5.3%)

students experience a high level of stress during their undergraduate courses.[32–36] The findings agree with the results of four studies from Arab countries such as Egypt and Saudi Arabia that reported a high level of depression and anxiety among medical students.[37–40] It further agrees with Yang et al[41] who found that changes due to COVID-19 in the form of an increased academic workload and fear of contagion resulted in increased student stress.

The findings of this work also agree with the study by Babicka-Wirkus et al[42] who reported an increased prevalence of stress during the COVID-19 pandemic and stated that younger students who are in the early stages of their academic career were less able to cope due to their short life experience. Furthermore, our results are in agreement with a prior study that showed that the COVID-19 pandemic has had a negative effect on higher education through higher levels of stress among students.[43]

Regarding sex differentiation and stress, we found a slight male predominance with an insignificant difference. This coincides with prior studies that found that sex gaps in stress levels are rare and insignificant.[3,17,31] The slight male predominance seen in the present work coincides with the study by Abdel Rahman et al[44] who found that men had higher levels of stress than women. The authors felt that this was because male students were careful to achieve high scores and end the program on time to enter the postgraduate phase and begin their careers. In contrast, other studies found a higher level of stress in female students.[39,45] This sex debate may be due to differences in educational and social context in addition to the presence of subjectivity in the evaluation of the degree of stress by participants.

The prevalence of stress in the present work was highest during phase I (85.75%), followed by phase II (85.45%) and phase III (84.1%). This high frequency of stress among students in phase I may be due to their change into university life. This transition phase requires students to acclimate to multiple new life changes. This

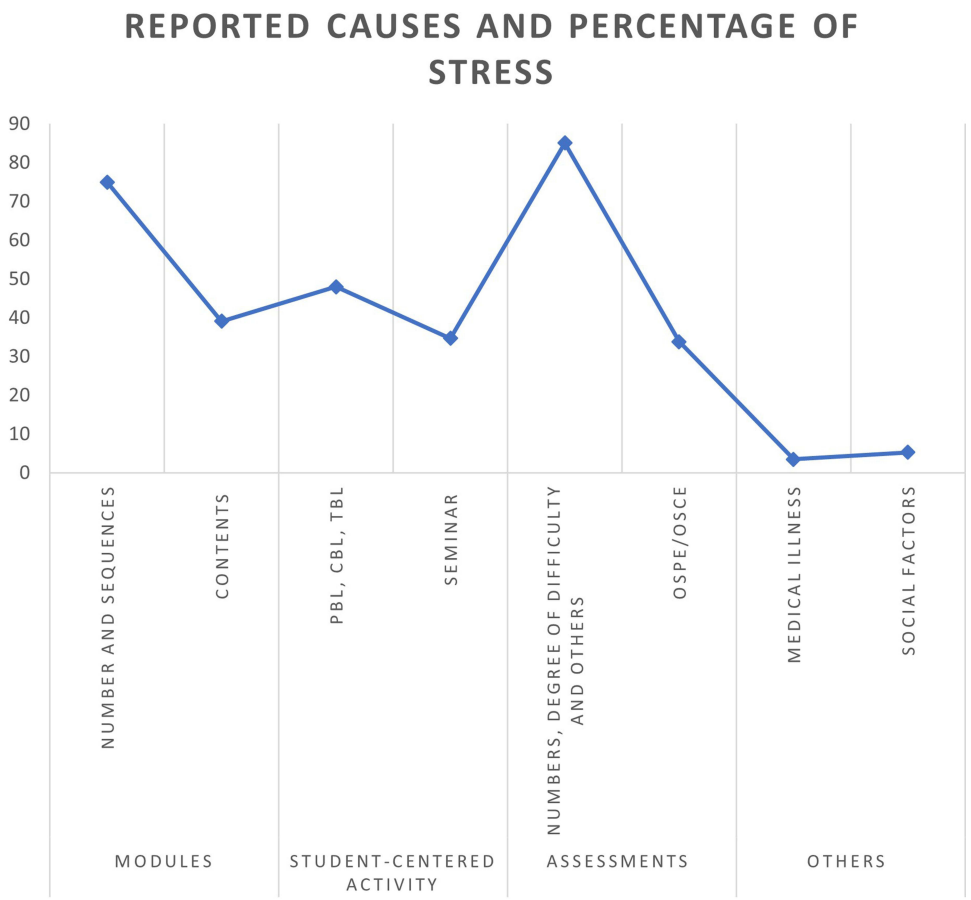

Figure 2 Student-reported causes of stress.

finding coincides with the study by Abdulghani et al[40] who reported that stress was inversely proportional to academic year. In contrast, this finding contradicts with that of another study in which level of stress progressively increased during the program, reaching its highest level at the end of the clinical year.[3] Imperative causes of stress among phase I students may be the large amounts of academic content, competition, time limit, fear of low achievement and failure, and social factors, all of which can cause psychological problems such as depression and anxiety.[46]

The highest wave of stress among males was seen during the first year, followed by the third phase (clinical phase), with a slight decrease during Phase II. Among females, the biggest wave of stress was seen during Phase II, followed by phase I and Phase III. The high level of stress in men during phase I (first year) agrees with many prior studies such as the one by Stewart et al[47] who reported a high prevalence of stress during the first year of the medical curriculum and recommended identifying vulnerable students early and provide them with academic and additional support to prevent stress.

Stress that appeared during the first year can continue throughout the study period and extend to internship and residency, thereby affecting the practical life of the physician.[48] Furthermore, the degree of stress can reach burnout levels.[49] The high percentage of stress in our results coincides with the study by Botelho et al,[23] who identified levels of stress in 71% of students taught with an integrated curriculum compared with 64% taught with a traditional curriculum. However, in contrast with our results the authors found a 72% female predominance of stress compared with 55% among males compared with 83.6% and 83.6%, respectively.

The present study found no association between stress and academic grades. Furthermore, there was no association between the grades of male or female students and stress. This agrees with the study by Abdulghani et al[40] who found no association between academic level and the presence or absence of stress. In the present study, students

reported that assessments, number of modules, sequences, content, and student-centered activities including PBL, CBL, and TBL were the main causes of stress in addition to the stress caused by repeated assessments. This agrees with previous studies that have shown that student-centered activities that include self-directed learning create a degree of stress among students, especially those of the integrated curriculum.[50,51] This agrees with the results of Tarnowski et al[52] and Costa et al[53] who found that a heavy educational content and heavy workload intermingled with high educational needs, short leisure time, and limited contact with family and friends are factors that decrease quality of life and help develop student stress and burnout. Furthermore, these observations are also in agreement with Chhabra et al[54] and Enns et al[55] —who found that the educational climate and environment are crucial factors that influence the quality of life of medical students—and Joseph et al[56] on academic stress among medical students. Ramli et al[57] found that academic stress was most frequent mental state that medical students experienced over their training period. Drolet and Rodgers[58] explained that stress may be due to increasing course requirements. Kumaraswamy[59] discussed stress in medical students and identified several factors that may lead to the development of stress, which include excessive assignments, multiple assessment, peer competition, and challenges associated with time management. Medical students are in contract with many stressors in the medical environment: strong academic requirements and assignments, challenging curricular characteristics and learning environments, personal life experiences, and psychological pressures that are hard to cope with.[60,61]

Limitation of the Study

This study was a cross-sectional analysis of a questionnaire that was completed by the students. This can lead to bias in the evaluation of the student's emotional reaction. Some students may overestimate their responses, some may insist on giving negative feedback on the curriculum, and others may be affected by their performance or social factors. Furthermore, student responses may be affected by changes in the learning environment due to the COVID-19 pandemic, which makes the environment more stressful. Longitudinal cohort studies must be performed that start with the first-level student and follow them to the end of their program to determine the actual percentage of stress at all levels and phases of the curriculum, especially after the end of the COVID-19 pandemic.

Conclusion

The study found a high level of stress throughout all phases of and integrated curriculum that was somewhat elevated during the first phase and decreased thereafter. The level of stress during all phases was similar, likely due to changes in the learning environment and curricular changes throughout all three phases that occurred during the COVID-19 pandemic. It is therefore not surprising to report this high stress level in the current study. No significances are noted between stress with either academic grade or phase of the curriculum. Some potential causes of stress as reported by the students include multiple assessments, the number of modules and their sequences, and the extensive homework from student-centered activities. The curriculum committee must revise the content, teaching strategies, and mode of assessments, and accordingly a minor or major modification should be done not only as a process of curricular reform but also to lessen the degree of stress among the students. These results suggest that teachers should observe and detect any signs of stress in their students. Activating student mentorship, including academic, psychic, and social counseling will help predict and manage stress among students and improve their achievements. We consider the detection of stress among students to be an important issue for program monitoring and development.

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Ihab Shafek Atta is considered as first author. No conflict of interest to declare.

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