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ORIGINAL RESEARCH

Perceived Academic Stress, Causes, and Coping Strategies Among Undergraduate Pharmacy Students During the COVID-19 Pandemic

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Background: Academic stress is a common problem among medical students, and the COVID-19 health crisis lockdown further worsened it. High academic stress has a negative impact on students learning and overall performance.

Objective: To assess perceived academic stress, causes, and coping strategies among undergraduate pharmacy students during the COVID-19 pandemic.

Methods: A descriptive cross-sectional study was conducted among undergraduate pharmacy students at the University of Khartoum. Data were collected from randomly selected participants using three validated self-administered questionnaires; perceived stress scale, study habits inventory, and mental health inventory. Data were analyzed using SPSS software, and descriptive statistics and chi-square were employed.

Results: The response rate in our study was 99.6% (251/252). About 87% of the participants were females. The majority of participants (92%) experience academic stress, with a mean score (24.99 ± 5.159), the level of academic stress ranging from low (4.3%), moderate (73.2%), to high (22.5%). Approximately 80% of the percipients reported academic stress during all exam times with a mean score (25.33 ± 4.976). The level of academic stress was significantly associated with participants' gender (P-value: 0.042), and living conditions (P-value: 0.001). The most common factors that were significantly associated with academic stress were difficulty in remembering all that is studied (66.7%, P=0.006) and worrying about the exams (54.1%, P=0.011). Moreover, the most frequent strategies used to cope with academic stress were praying (84.4%) and maintaining some control over the situation (61.9%).

Conclusion: The study revealed a high prevalence of academic stress among percipients. Academic counseling, monitoring of mental status, and implementation of stress reduction programs are highly recommended.

Keywords: academic stress, exam stress, COVID-19, pharmacy students, Sudan

Introduction

Stress is a prevalent mental health disorder among university students.[1] College student stress is mostly attributed to many factors such as academic pressures, social issues, and financial problems.[2,3] College-related factors contributing to student's stress include, the transition from school to the college environment, the curriculum load, and summative assessments,[4] previous studies reported academia-related factors as the most common stressors among undergraduate pharmacy students.[5] Student's stress may be further exacerbated by the COVID-19 health crisis, and its implications in education.

The World Health Organization (WHO) announced the COVID-19 (SARS-CoV-2) outbreak of a global pandemic on March 2020,[6] and about two months later, Sudan government adopted preventive measures to limit the spread of SARS-CoV-2 infection. The government imposed partial lockdown, closed universities, and suspended prayers in mosques and churches, particularly in the Khartoum state.[7] With the movement restrictions and banning direct contact, universities were either postponed or switched to asynchronous online learning. Implementation of online learning, especially with

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the limited resources and poor technical infrastructure, is a challenge,[8] and can induce stress for students.[9] Unfortunately, no interventions were conducted to study the psychological impact and provide guidance to students. Furthermore, since December 2018, there has been instability in high education in Sudan; governmental universities were suspended for about ten months due to political unrest.

Academic stress has a negative physiological and social impact on students and may affect their learning and overall performance.[10] Understanding prevalence, contributing factors, and coping strategies will facilitate organizing effective counseling strategies to facilitate students' development and academic and professional success. Although many studies addressed academic stress during COVID-19 pandemic in economically developed countries.[11,12] However, there is a lack of studies exploring academic stress and coping strategies in low-income counties with limited digital infrastructure and inadequate mental health support, such as Sudan. Therefore, the current study aimed to assess perceived academic stress and coping strategies among undergraduate Pharmacy students at the University of Khartoum during the COVID-19 pandemic.

Materials and Methods

Study Design and Setting

A descriptive cross-sectional study was conducted among undergraduate pharmacy students at the University of Khartoum, Khartoum, Sudan. In Sudan, undergraduate pharmacy education lasts for 5 years, and the student acquires a Bachelor of Pharmacy (B. Pharm) degree upon satisfactory completion. The Faculty of Pharmacy, University of Khartoum, was established in 1964 and remained the only one in Sudan for about three decades. Currently, the total number of enrolled students is about 750 students.[13,14] The study was conducted from March 21 to May 29, 2021, and data were collected during a blended learning environment that combines asynchronous online learning with limited face-to-face educational activities.

Study Population

Study participants were undergraduate pharmacy students from the first to the fifth year of both genders. The study excluded students who were not registered and undertook courses during the study period, and also students with a history of diagnosed psychiatric disorders were excluded.

Sample Size and Sampling

The sample size was calculated using "Survey systems", a sample size calculation software,[15] with 95% confidence level and a 5% margin of error. Based on the accessible study population (n=733), The minimum sample size required for this study is 252 students.

Stratified and systematic sampling probability sampling methods were used to select the participants. The study population was divided into five strata according to the academic year of study (First year to the fifth year), and then a sample size appropriate to stratum size was obtained separately from each stratum by systematic sampling using students list in each academic year as a sample frame. The first unit of each stratum was selected by simple random sampling using Microsoft Excel.

Data Collection Tool

A pretested self-administered questionnaire was used for data collection. Google form was used to create and submit the questionnaire to the pre-selected study participants. The questionnaire consisted of four sections; the first section explored the socio-demographic characteristics of the participants. The second section contained the validated Perceived Stress Scale (PSS-10) with minor modifications.[16] The PSS-10 was originally developed by Cohen et al in 1983 to evaluate the degree to which situations in participant's life are judged as stress. PSS-10 is widely used to measure the degree to which situations in one's life are appraised as stressful, and it has been proven for reliability and validity among university students in similar conditions, for example, analysis of psychometric properties of PSS-10 showed that it has an acceptable convergent and divergent validity, and internal consistency among university students in Saudi

Arabia,[17] and Ethiopia.[18] PSS-10 consists of 10 questions about the feelings and thoughts of the respondents during the last month. The five-point Likert scale ranging from never to very often was used to rate the participants' responses. Individual scores on the PSS-10 inventory can range from 0 to 40, with higher scores indicating higher perceived stress, and the recommended cut-off scores: 0–13 low stress; 14–26 moderate stress; 27–40 high stress.[16] The last two sections of the questionnaire were adapted from two instruments designed by Rao (2012); study habits inventory and mental health inventory. These two instruments were pre-validated and showed good levels of test-retest reliability coefficients (0.8–0.9).[19] The study habits inventory consisted of 23 statements about factors most related to cause academic stress arranged into four categories; factors related to study habits and exams, factors related to sleep and living conditions, factors related to attitude, and factors related to class and teaching. Participants were asked to choose statements that they agreed with mental health inventory contained data about coping strategies, and it consisted of 24 items. Participants were asked to choose items they were using to cope with academic stress.

Data Management and Analysis

Data were downloaded from "Google drive" as a Microsoft Excel spreadsheet and imported to SPSS, version 22 (IBM SPSS Inc., Chicago, IL) for analysis. Descriptive statistics were used to present the results, and data were illustrated as tables. A Chi-square test was used to examine the significant association between independent socio-demographic variables and dependent variables. Data with a p-value of 0.05 or less was considered statistically significant.

Ethical Consideration

The study was conducted agreeing with the recommendations of the Declaration of Helsinki. The study proposal was approved by the Research Ethics Committee of the Faculty of Pharmacy, University of Khartoum (FPEC-07-2021). Written informed consent was obtained from each participant after explaining the purpose of the study, and the students were informed that their participation was voluntary. The students were given assurances about the confidentiality of information.

Results

The response rate in the study was 99.6% (251/252). The mean age of the participants was 20.86 ± 1.751, and most of them were females (n=202, 87.4%). Almost 147 (63.6%) participants live with their families, and 73 (29%) students live in the university dormitory. Regarding the weekly budget, about 129 (58.8%) of respondents had more than 3000 Sudanese pound/week. Detailed results of socio-demographic characteristics are shown in Table 1.

The overall prevalence of academic stress among participants was 92%, with a mean score (24.99 ± 5.159), and the levels of academic stress were ranged from low (4.3%), moderate (73.2%), to high (22.5%). Approximately 80% of the percipients reported academic stress during all exam times with a mean score (25.33 ± 4.976).

As shown in Table 2, data analysis revealed a statistically significant association of the level of academic stress with the participants gender (p= 0.042), and living condition (P= 0.001). Furthermore, the major factors related to study habits and exams that are significantly associated with the level of academic stress were difficulty in remembering all that is studied (66.7%, P=0.006), worrying about the exams (54.1%, P=0.011), exam papers are tough and do not value well (23.8%, P=0.001), and the exams are too difficult, regardless of my personal hard work (21.6%, P= 0.031). Among factors related to sleep and living conditions, not having good sleep hours before the exam was significantly associated with the level of academic stress (46.3%, P=0.010). In addition, among factors related to attitude, lack of self-confidence, and thinking to pass anyway were significantly associated with the level of academic stress (22.9%, P=0.004). Finally, among factors related to class and teaching, teachers lacking interest in students (30.3%, P=0.001), and dislike of certain courses that affect student desire to study it (34.6%, P=0.003) were significantly associated with the level of academic stress (Table 3).

As summarized in Table 4, students had used several strategies to cope with academic stress. The most frequent positive strategies were praying (84.4%), trying to maintain some control over the situation (61.9%), and thinking through different ways to handle the situation (47.2%). Moreover, no significant associations were observed between the level of academic stress and coping strategies (Table 4).

Table 1 Socio-Demographic Characteristics of Participants

Characteristics		Frequency	Percent
Gender	Female	215	85.7
	Male	36	14.3
Year of study	First-year	45	17.9
	Second year	50	19.9
	Third year	61	24.3
	Fourth year	35	13.9
	Fifth year	60	23.9
Living condition	University dormitory	73	29.1
	Home with relative	10	4.0
	Home with family	159	63.3
	Private dormitory	7	2.8
	Apartment with friends	1	0.4
	Alone	1	0.4
Weekly budget (SDG)	More than 3000	143	57.0
	Between 1000 −2000	80	31.9
	Less than 1000	14	5.6
	Between 2000–3000	14	5.6

Abbreviation: SDG, Sudanese pound.

Discussion

The current research focused on undergraduate university students' psychological well-being during the global COVID-19 pandemic, and accessed the prevalence and various variables contributing to academic stress, as well as exploring coping strategies used by students. The study revealed a high prevalence of academic stress among respondents (92%). The majority of the respondents were identified as expressing a moderate level of academic stress. This finding was in agreement with the results of the study conducted among public health and preventive medicine students in Vietnam, where 90% of participants showed high to moderate stress during the COVID-19 pandemic.[11] On the other hand, the level of academic stress in this study was higher than those reported in other studies conducted in Ethiopia,[20] Saudi Arabia,[21] Jordan,[22] and Ireland,[23] where academic stress was approximately reported in 50% to 64% of the respondents. The high prevalence of academic stress might be attributed to the to the fact that governmental universities including the University of Khartoum were closed for a few months prior to COVID-19 pandemic for political reasons, and students were fear of any further extended lockdown due to the COVID-19 pandemic. In addition, the poor infrastructure, lack of good training and preparation for online learning could negatively impact a student's mental health.

In agreement with the results of studies conducted in Ireland,[23] and Saudi Arabia,[21] the prevalence of academic stress was higher among females than males (P= 0.013). Concerning the duration of academic stress, approximately three-quarters of respondents exhibited academic stress all the exams duration. Out of socio-demographic characteristics (gender, year of study, living conditions, weekly budget), and in agreement with studies conducted in Ireland,[23] and Saudi Arabia,[21] data analyses revealed significant associations between the prevalence and the level of academic stress and gender with P values; 0.013 and 0.042, respectively. Moreover, a significant association was also noted between participant living conditions and the level of academic stress (P-value: 0.001). However, changes in the academic year

Table 2 Association Between Independent Socio-Demographic Characteristics and the Mean Score and Level of Academic Stress

Characteristic		Stress Score Mean ± SD	Stress Level				P-value
			Low	Moderate	High	Total Number (%)	
Gender	Female	25.12 ± 4.75	7	153	42	202 (87.4)	0.042
	Male	24.03 ± 7.67	3	16	10	29 (12.6)	
Year of study	First	23.32 ± 6.14	4	29	5	38 (16.4)	0.154
	Second	24.58 ± 6.14	4	32	9	45 (19.5)	
	Third	25.55 ± 4.8	1	44	15	60 (26)	
	Fourth	26.15 ± 3.83	0	26	7	33 (14.3)	
	Fifth	25.16 ± 5.65	1	38	16	55 (23.8)	
Weekly budget (SDG)	More than 3000	25.37 ± 5.38	6	88	35	129 (55.8)	0.220
	2000 −3000	24.71 ± 4.87	2	10	2	14 (6.1)	
	1000–2000	25 ± 3.96	2	60	13	75 (32.5)	
	Less than 1000	22.27 ± 5.05	0	11	2	13 (5.6)	
Living condition	University dormitory	25.18 ± 5.27	5	47	15	67 (29)	0.001
	Home with relative	25.3 ± 4.64	0	8	2	10 (4.3)	
	Home with family	24.89 ± 4.85	3	112	32	147 (63.7)	
	Private dormitory	24.2 ± 10.04	1	2	2	5 (2.2)	
	Apartment with friends	13	1	0	0	1 (0.4)	
	Alone	39	0	0	1	1 (0.4)	

Abbreviations: SD, standard deviation; SDG, Sudanese pound.

were insignificantly associated with the level of academic stress, which contrasts to the Saudi study that indicated a significant difference between students with high-stress occurrence for the 3rd year medical students.[21] This difference could be attributed to the difference in curriculum model, In the Saudi medical college curriculum, the 3rd year is a transition year from pre-clinical to clinical study level, while in our case, there is no "transition year", the curriculum is based on the spiral model in many courses, where students re-visit material at increasing complexity as they progress.

Study habits inventory and mental health inventory were utilized to assess factors that cause stress.[19] Factors causing academic stress are broadly arranged into four categories: study habits and exams, sleep and living conditions, factors related to attitude, and factors related to class and teaching. Among study habits and exam-related factors, difficulty remembering all that is studied was ranked as the most academic stress-causing factor, followed by worrying about the exams and lack of concentration during study hours. Moreover, physical and psychological disturbances are related to the development of serious psychological disorders such as stress and depression.[20,24] In this study, physical factors such as not having good sleep hours before the exam and being tired sleepy to study efficiently were highly related to academic stress development in the participants. Regarding attitude-related factors, waiting for the mood to start reading and mood changes momentarily and affecting study were selected as the top inducers of academic stress. Boring teaching style was selected by about half of the participants as a most class and teaching-related academic stress-inducing factor. In agreement with our findings, an cross-sectional study conducted among undergraduate medical students at Taibah University reported that studying all night before the exam and extensive course load were the major confounding factors.[25]

Table 3 The Relationship Between Common Factors Associated with Academic Stress and the Mean Score and Level of Academic Stress

Factor	Stress Score Mean ± SD	Stress Level				p-value
		Low	Moderate	High	Total Number (%)	
Factors related to study habits and exams						
Difficulty in remembering all that is studied	25.9 ± 5.09	5	105	44	154 (66.7)	0.006
Lack of concentration during study hours	25.07 ± 5.35	4	81	20	105 (45.5)	0.458
Worrying about the examinations	26.04 ± 4.74	1	92	32	125 (54.1)	0.011
Exam papers are tough and do not value well	27.84 ± 5.35	1	31	23	55 (23.8)	0.001
The exams are too difficult, regardless of my personal hard work	26.7 ± 5.68	0	33	17	50 (21.6)	0.031
Factors related to sleep and living conditions						
No good sleep hours before the exam	26.06 ± 5.25	1	75	31	107 (46.3)	0.010
Tired, sleepy, and listless to study efficiently	26.11 ± 5.18	4	68	29	101 (43.7)	0.138
Inadequate space or room for study where I live	26.11 ± 5.06	3	31	12	46 (19.9)	0.542
Bad living conditions stress me out and affect my study	25.53 ± 5.49	2	36	17	55 (23.8)	0.231
Factors related to attitude						
Lack of self-confidence	27.85 ± 4.47	0	33	20	53 (22.9)	0.004
Think to pass anyway	27.70 ± 4.18	0	33	20	53 (22.9)	0.004
Waiting for the mood to start reading	25.40 ± 5.32	3	81	30	114 (49.4)	0.214
Do not knowing how to prepare for the examinations	26.12 ± 5.51	1	52	19	72 (31.2)	0.247
Mood changes momentarily and that affect my study	25.31 ± 5.08	6	75	25	106 (45.9)	0.589
Tendency to “day-dream” when trying to study	25.48 ± 4.69	4	55	14	73 (31.6)	0.631
have not good time management	25.13 ± 5.42	4	89	28	121 (52.4)	0.717
Feeling that it’s the wrong place	25.89 ± 5.19	1	36	16	53 (22.9)	0.222
My parents have unrealistic expectations towards me and my results	27.96 ± 4.91	0	15	8	23 (10)	0.219
Factors related to class and teaching						
Intense competition between students in our class affect my study	27.06 ± 4.92	0	20	11	31 (13.4)	0.101
Teachers lacking interest in students	26.70 ± 5.07	0	43	27	70 (30.3)	0.001
Teachers make too many extra demands on us make us poring	26.36 ± 5.19	1	37	17	55 (23.8)	0.161
Boring teaching style	25.54 ± 5.1	3	78	32	113 (48.9)	0.72
Dislike of certain courses and that affect my desire to study it	26.72 ± 5.43	2	50	28	80 (34.6)	0.003

Abbreviation: SD, standard deviation.

Table 4 The Relationship Between the Coping Strategies Used and the Mean Score and Level of Academic Stress

Coping Strategy	Stress Score Mean ± SD	Stress Level				p-value
		Low	Moderate	High	Total Number (%)	
Pray, Trust in God	24.73 ± 5.13	10	145	40	195 (84.4)	0.116
Try to maintain some control over the situation	24.51 ± 5.2	7	106	30	143 (61.9)	0.699
Think through different ways to handle the situation	25.15 ± 5.41	4	75	30	109 (47.2)	0.218
Draw on past experience to help you	25.81 ± 5.6	4	46	18	68 (29.4)	0.447
Look at the problem objectively	23.51 ± 5.43	4	48	11	63 (27.3)	0.385
Cry, get depressed	26.40 ± 4.56	2	67	27	96 (41.6)	0.107
Got nervous and keep worry	26.57 ± 4.48	1	54	21	76 (32.9)	0.152
Blame someone else for your problems	25.75 ± 3.88	0	6	2	8 (3.5)	0.825
Talk about the problem with someone who has been in the same type of situation to find a solution.	24.88 ± 4.65	1	51	17	69 (29.9)	0.352
Seek comfort or help from family or friends	25.62 ± 5.05	2	47	19	68 (29.4)	0.386
Go to sleep, figuring things will look better in the morning	25.92 ± 5.39	2	40	21	63 (27.3)	0.053
Do nothing in the hope that the problem will take care of itself	26.57 ± 5.16	0	16	7	23 (10)	0.394
Talk with a good friend	24.48 ± 4.82	3	78	16	97 (42)	0.106
Drink coffee or tea	25.71 ± 5.1	2	70	25	97 (42)	0.247
Listen to music	26.01 ± 5.58	1	56	22	79 (34.2)	0.122
Eat	25.97 ± 4.26	1	45	14	60 (26.0)	0.499
Watch motivation videos	24.52 ± 5.63	5	39	10	54 (23.4)	0.107
Go out for a walk	23.97 ± 6.08	4	25	7	36 (15.6)	0.091
Watch comedy	24.81 ± 5.73	1	26	9	36 (15.6)	0.825
Take along bath	23.37 ± 5.44	1	21	8	30 (13)	0.823
Chew gum	23.25 ± 3.15	0	8	0	8 (3.5)	0.219
Take drugs	25.14 ± 4.14	0	6	1	7 (3)	0.710
Meditation	27.33 ± 3.2	0	4	2	6 (2.6)	0.732
Smoke	28.00 ± 8.37	0	3	1	4 (1.7)	0.910

Abbreviation: SD, standard deviation.

Stress Coping Strategies are a collection of actions or a way of thinking used to cope with or adjust one's response to a stressful event. Problem-oriented and emotion-oriented coping techniques are the two types of coping strategies.[26] In the current study, participants used various stress coping strategies, including positive and negative strategies. The most frequently used positive strategy was religious practice "prying, trusting god", then trying to maintain some control over the situation, and thinking in different ways to solve the situation. Similarly, religious activities were the most adopted coping strategy in a study conducted among King Saud University medical students.[21] On the other hand, the most negative activities adopted by participants to cope with academic stress were crying and getting depressed. The current

study showed no significant relationship between coping strategies and the level of stress, which in contrast, previous literature showed a relationship between the stress coping strategies and developed anxiety or depression for undergraduate students.[27] Moreover, some participant relaxation methods and to overcome academic stress, the most commonly used relaxation strategies were drinking coffee/tea, and listening to music. Coping strategies can divided into three main types; proactive strategies that used manage or solve the problem, emotional strategies that focus on regulating or reducing the emotional arousal associated with the stress, and avoidance strategies designed to avoid the stressful conditions.[28] Although different types of coping strategies can be used, they may vary in their effectiveness. Some studies reported that personality variables, influence the coping strategies adopted as well as the outcomes.[29] Further studies may be required to access the determinants of choice, and the effectiveness of coping strategies.

Limitations of this study are that it was conducted among pharmacy students in one university so, it cannot be generalized to students in other universities. Another limitation is that it's a cross-sectional study, administered to the students at one point in time. However, students' academic stress status may change daily during the pandemic; repeating the survey may enable evaluation of the consistency of findings. In addition, in the questionnaire, the duration of academic stress was reported only about the exam, not at other times.

Conclusion

The present study highlighted the impact of the COVID-19 crisis on pharmacy student mental health. The study showed a high prevalence of academic stress, the level of academic stress was significantly associated with participants' gender and living conditions. The major factors associated with academic stress among participants were difficulty in remembering all that is studied, worrying about the exams, and lack of concentration during study hours. The study's findings revealed an alarming increase in mental health morbidity among study participants, which strongly recommend immediate treatment through academic counseling, mental status monitoring, and stress reduction programs.

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Disclosure

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