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Burden of pandemic COVID-19 on medical students perceived psychological stress in Saudi Arabia

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ABSTRACT

Due to various factors, medical students are at higher risk of perceived stress than the general population during the pandemic (COVID-19). This study was planned to assess the stress levels and the occurrence of various mental health issues among graduate medical students in the Kingdom of Saudi Arabia. Following scales were used for this study - 1) DSM-5 Self-Rated Level 1 Cross-Cutting Symptom Measure-Adult (CCSM-A) – for assessing the prevalence of common mental health issues, 2) Perceived Stress Scale to assess perceived stress and 3) Student Stress due to COVID-19. Questionnaire to assess global stress score related to COVID-19. 123 participants were contacted, out of which 109 (88.6%) agreed to participate in the study. The most of the students (33.9%) were from the second academic year. Anxiety (72%) and depressive symptoms (70%) were the most common symptoms reported by the students as per the CCSM-A scale. The mean (SD) perceived stress score and global stress score was 18.3 (5.7) and 7.6 (5.4), respectively. Anger, suicidal ideation and substance use were significantly associated with the year of study after adjusting for age and self-perceived COVID risk. Graduate medical students experience a significant burden of mental health conditions. Periodic mental health assessment and provision of early and adequate mental health services to those in need are the need of the hour in the post-pandemic recovery phase.

Keywords: COVID-19, Stress, Saudi Arabia, Medical students, Mental health.

1. INTRODUCTION

In the Kingdom of Saudi Arabia (KSA), more than 500,000 confirmed cases of COVID-19 have been identified as of November 2021 (Albagmi et al., 2021). This constitutes more than 1,500 cases and 25 deaths per 100,000 populations. KSA has also experienced lockdowns to curb the transmission of COVID-19 (Albagmi et al., 2021). Outbreak of COVID-19 and associated lockdowns have caused major disruptions in the routine life of the individuals, affecting their mental state (Evans et al., 2021). Education, in general, has been affected due to lockdown measures such as closures of schools and colleges. Likewise,

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higher education, including medical courses, has also been disrupted. In KSA, educational provision has continued through alternative means such as online provision and instructional packages delivered to medical students during the pandemic (Pokhrel and Chhetri, 2021).

However, many factors have played a role in disrupting the mental state of individuals, in general, at the time of COVID-19 pandemic. Firstly, the unpredictable behaviour of COVID-19 infections affecting individuals and their families and the unpredictability of restrictions for preventing transmission of COVID-19 may lead to considerable psychological stress (Puranachaikere et al., 2021; Zandifar and Badrfam, 2020). Secondly, the closure of educational institutions, places for dining-in and entertainment in the form of local/national level lockdowns have put masses in isolation. Such restrictions also necessitate significant adjustments to the new way of living, which enhanced individuals' stress (Kumar and Nayar, 2021; Wang et al., 2020). Lastly, COVID-19 has incurred a financial burden on families with significant economic impact, poses difficulties in future planning and also contributed to stress levels during the COVID-19 pandemic (Pfefferbaum and North, 2020). These are some of the factors which have stressed the individuals in general during the COVID-19 pandemic.

Additionally, to these factors, medical students are exposed to many additional stressors, making them a high-risk group for stress during the COVID-19 pandemic. This includes, 1) the constant high risk of contracting COVID-19 infection among the students themselves and the subsequent risk of transmitting the infection to the family members (Zheng et al., 2021), 2) higher levels of pressure due to rigorous competition in medical schools (Almojali et al., 2017; Iqbal et al., 2015; Saipanish, 2003), 3) adjustment to the newer online mode of teaching, uncertainty regarding examinations and clinical postings, 4) uncertainty regarding the impact of the pandemic on the academic performance and skill acquisition during medical training and 5) security challenges faced by the healthcare professionals while providing care to the patients during COVID-19 pandemic (Lafta et al., 2021). Lasheras et al., (2020) did a meta-analysis and estimated that the pooled occurrence of anxiety among medical students was 28% during the pandemic. The reasons identified in this study were financial concerns, effects on daily life & academic activities and fear of infecting other family members (Lyons et al., 2020; Cao et al., 2020). Based on the literature available, it is apparent that medical students are at greater risk of stress and therefore, it is pertinent to assess their level of stress and determinants. With this background, this study was designed to ascertain the prevalence of symptoms of common mental health domains that are eminent across psychiatric diagnoses as well as to assess the stress level during the pandemic (COVID-19) among medical students in KSA.

2. METHODS

The study was commenced in Prince Sattam bin Abdulaziz University (PSAU) of KSA in the academic year 2022-2023. This study was planned as an online cross-sectional survey among medical students of all years of PSAU. Students of all years of medical school were eligible for inclusion in the present study. The institution's ethical committee gave their prior consent (REC-HSD-104-2021).

Data collection in this study was done using Google Forms. Google Forms is an online platform which was used in the current study to produce self-administered surveys. For filling google forms, participants are required to be signed in to their Google account to thwart multiple entries for completion of the study. To maintain confidentiality, the email addresses used were not disclosed. On first semester, an invitation was sent to all medical students at PSAU to take part in this survey. The survey was distributed using the University's online portal. Participation in the online survey was voluntary and completed on February 2023.

For this study, the following information was collected - 1) socio-demographic characteristics of the participants, 2) symptoms to assess mental health domains that are imperative across diagnoses of psychiatry, 3) perceived individual stress level and 4) COVID-19 related source of stress among students. The tools used for this study were - 1) DSM-5 Self-Rated Level 1 Cross-Cutting Symptom Measure-Adult (CCSM-A), a 23-point scale that helps assess 13 different mental health domains. It is anticipated to identify additional areas of enquiry for establishing psychiatric diagnoses, 2) Perceived Stress Scale, a 10-point self-administered scale used to determine perceived stress for an individual in the form of Perceived Stress Score (PSS) (Lee, 2012) and 3) COVID-19 Student Stress Questionnaire, a 7-point scale intended to assess COVID-19 related sources of stress among university students in the form of Global Stress Score (GSS) (Zurlo et al., 2020).

Frequencies and percentages were described as categorical variables and mean and standard deviation were described as continuous variables. The study tools used (CCSM-A, Perceived Stress Scale and COVID-19 Student Stress Questionnaire) were analysed as per the methods described in the scale. The proportion of participants having above threshold domain score as per CCSM-A tool, PSS and GSS was stratified by medical school year. Adjusted odds ratios were analysed to identify the predictors of common mental health domains as per the CCSM-A scale. The adjusted odds ratio was calculated using logistic regression.

Likewise, to determine the predictors of PSS and GSS, crude and adjusted beta coefficient (using linear regression) were calculated. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS

109 participants corresponded to participate in the study out of 123 contacted (response rate of 88.6%). The mean (SD) age of the participants was 21.3 (2.8) years. The majority of the students were from the second year of study (33.9%), followed by first (26.6%), fourth (17.4%), third (14.7%) and fifth (7.3%) years of study. About one-fifth (22%) of the students had a high self-perceived risk of COVID transmission and all students, except two, were fully vaccinated for COVID.

Among the different symptom measures, the two most common symptoms were anxiety (72%) and depressive symptoms (70%). This was similar across all the years of study, with above-average anxiety (88%) and depressive symptoms (88%) among students in the fifth year of medical school. Anger was highest in the students who were in the fourth year. Substance use, psychosis and feeling detached were the least prevalent symptoms across all years of study (Figure 1). Regarding Perceived Stress Score (PSS); about a quarter of fifth-year students reported high perceived stress compared to <10% in other students (Figure 2). The mean (SD) perceived stress score was 18.3 (5.7), with the highest mean among the fifth-year students (22.4) and the lowest mean among third-year students (16.7) (Figure 2). There was no significant association between PSS and year of study (p=0.15) in the unadjusted analysis.

Global Stress Score (GSS)

The overall mean (SD) GSS was 7.6 (5.4), with the highest among fourth-year students (9.3) and lowest among second-year students (6.9) (Figure 2). There was no significant association between GSS and year of study (p=0.76) in the unadjusted analysis.

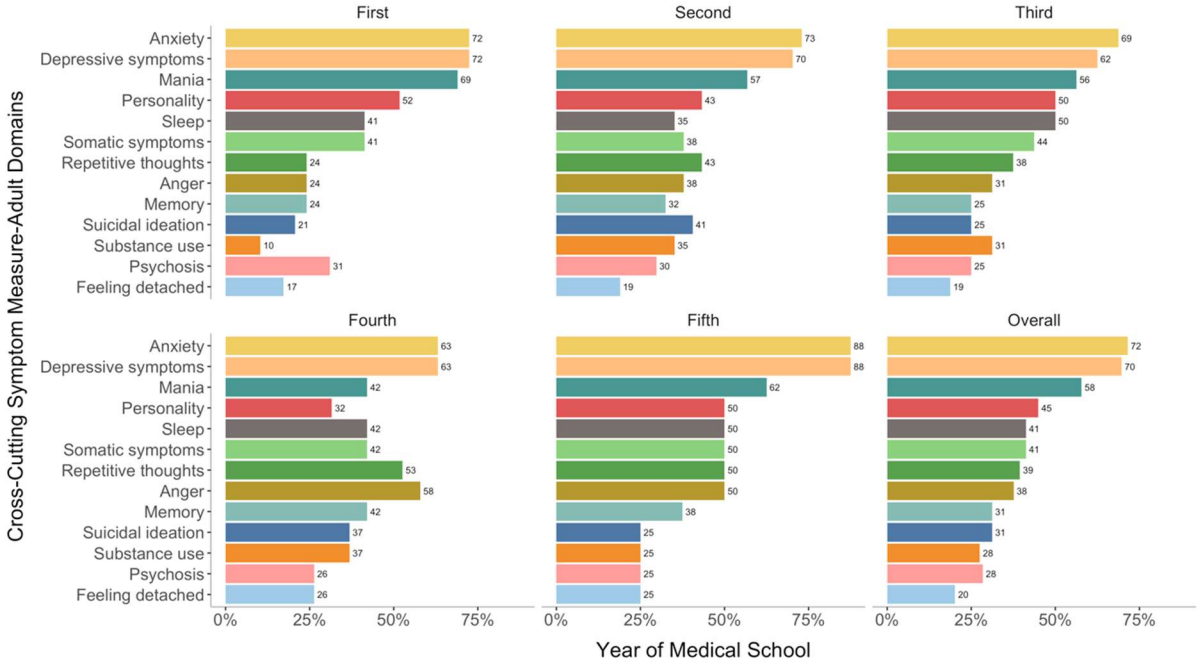

Figure 1 Proportion of participants having above threshold domain score as per Cross-Cutting Symptom Measure-Adult (CCSM) tool by the year of medical school

After adjusting for age and perceived COVID risk, only anger, suicidal ideation and substance use were significantly associated with the year of study. When compared with first-year students, anger was significantly lower in fourth-year students (Adjusted Odds Ratio and 95% CI: 0.19, 0.05 – 0.80), suicidal ideation was significantly lower in second-year students (Adjusted OR and 95% CI: 0.26, 0.08 – 0.93) and substance use was significantly lower in second (Adjusted OR and 95% CI: 0.15, 0.03 – 0.75) and fourth-year students (Adjusted OR and 95% CI: 0.15, 0.03 – 0.89). All other domains were similar across the years of study (Table 1). After adjusting for age and perceived COVID risk, neither PSS nor GSS was significantly associated with the year of study (Table 2).

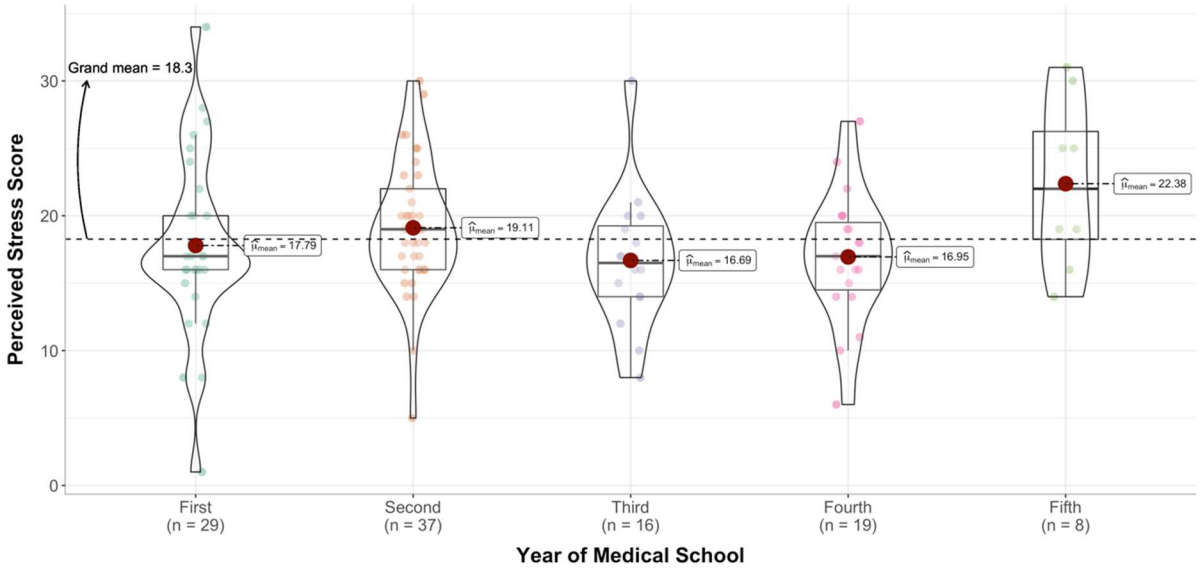

Figure 2 Distribution of Perceived Stress Score by year of medical school

Table 1 Association of Cross-Cutting Symptom Measure-Adult (CCSM) domain scores with the year of study – multiple logistic regression

	2nd year of medical school#		3rd year of medical school#		4th year of medical school#		5th year of medical school#	
	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Depression	1.11 (0.38 – 3.26)	1.03 (0.27 – 3.85)	1.57 (0.43 – 5.77)	1.58 (0.34 – 7.39)	1.53 (0.44 – 5.28)	1.88 (0.40 – 8.79)	0.38 (0.04 – 3.55)	0.41 (0.03 – 5.26)
Anger	0.52 (0.18 – 1.54)	0.40 (0.12 – 1.37)	0.70 (0.18 – 2.72)	0.52 (0.12 – 2.34)	0.23 (0.07 – 0.80)*	0.19 (0.05 – 0.80)*	0.32 (0.06 – 1.62)	0.24 (0.04 – 1.61)
Mania	1.69 (0.61 – 4.70)	0.86 (0.22 – 3.36)	1.73 (0.49 – 6.11)	0.89 (0.17 – 4.69)	3.06 (0.92 – 10.2)	1.16 (0.17 – 7.88)	1.33 (0.26 – 6.82)	0.32 (0.03 – 4.01)
Anxiety	0.97 (0.33 – 2.89)	0.99 (0.27 – 3.65)	1.19 (0.31 – 4.53)	1.04 (0.22 – 4.98)	1.53 (0.44 – 5.28)	1.65 (0.37 – 7.37)	0.38 (0.04 – 3.55)	0.36 (0.03 – 4.49)
Somatic symptoms	1.16 (0.43 – 3.13)	1.08 (0.36 – 3.24)	0.91 (0.26 – 3.11)	0.93 (0.24 – 3.55)	0.97 (0.30 – 3.14)	1.15 (0.32 – 4.10)	0.71 (0.15 – 3.39)	0.79 (0.14 – 4.66)
Suicidal ideation	0.38 (0.13 – 1.16)	0.26 (0.08 – 0.93)*	0.78 (0.19 – 3.32)	0.56 (0.11 – 2.71)	0.45 (0.12 – 1.63)	0.30 (0.07 – 1.35)	0.78 (0.13 – 4.90)	0.42 (0.05 – 3.45)
Psychosis	1.06 (0.37 – 3.06)	0.67 (0.20 – 2.32)	1.35 (0.34 – 5.36)	0.82 (0.17 – 3.84)	1.26 (0.34 – 4.57)	0.80 (0.17 – 3.82)	1.35 (0.23 – 8.03)	0.60 (0.07 – 5.08)
Sleep problems	1.30 (0.48 – 3.54)	1.16 (0.38 – 3.57)	0.70 (0.21 – 2.41)	0.64 (0.17 – 2.52)	0.97 (0.30 – 3.14)	1.07 (0.28 – 4.01)	0.70 (0.15 – 3.39)	0.69 (0.11 – 4.21)
Memory	0.66 (0.22 – 1.98)	0.66 (0.20 – 2.18)	0.96 (0.23 – 3.93)	0.92 (0.20 – 4.11)	0.44 (0.13 – 1.52)	0.47 (0.12 – 1.80)	0.53 (0.10 – 2.80)	0.53 (0.08 – 3.37)
Repetitive thoughts and behaviors	0.42 (0.14 – 1.22)	0.34 (0.11 – 1.11)	0.53 (0.14 – 1.99)	0.50 (0.12 – 2.06)	0.29 (0.08 – 0.99)	0.30 (0.08 – 1.18)	0.32 (0.06 – 1.62)	0.31 (0.05 – 1.96)
Dissociation	0.89 (0.25 – 3.17)	0.63 (0.16 – 2.25)	0.90 (0.19 – 4.39)	0.69 (0.13 – 3.72)	0.58 (0.14 – 2.38)	0.47 (0.10 – 2.23)	0.63 (0.10 – 4.05)	0.37 (0.05 – 3.09)
Personality functioning	1.41 (0.53 – 3.73)	1.27 (0.42 – 3.85)	1.07 (0.32 – 3.63)	0.96 (0.25 – 3.73)	2.32 (0.69 – 7.79)	2.35 (0.61 – 8.96)	1.07 (0.22 – 5.13)	0.89 (0.14 – 5.38)
Substance use	0.21 (0.05 – 0.84)	0.15 (0.03 – 0.75)*	0.26 (0.05 – 1.25)	0.16 (0.03 – 1.06)	0.20 (0.04 – 0.90)*	0.15 (0.03 – 0.89)*	0.34 (0.05 – 2.55)	0.27 (0.03 – 2.67)

1st year was the reference category

Table 2 Association of Perceived Stress Score (PSS) and Global Stress Score (GSS) with the year of study – multiple linear regression

	Year of medical school		Age		High self-perceived risk of COVID	
	Unadjusted Coefficient	Adjusted Coefficient	Unadjusted Coefficient	Adjusted Coefficient	Unadjusted Coefficient	Adjusted Coefficient
Perceived stress score (PSS)	0.05 (-0.64 – 1.08)	0.01 (-0.96 – 1.08)	0.05 (-0.30 – 0.50)	0.05 (-0.36 – 0.55)	0.01 (-2.42 – 2.78)	0.02 (-2.64 – 3.07)
Global stress score (GSS)	0.12 (-0.33 – 1.35)	0.13 (-0.41 – 1.49)	-0.06 (-0.50 – 0.26)	-0.10 (-0.62 – 0.23)	-0.09 (-3.71 – 1.38)	-0.91 (-3.84 – 1.48)

4. DISCUSSION

The most common psychiatric symptoms reported by the medical students were that of anxiety and depression. Substance use, psychosis and dissociation were the least common symptoms reported by the students. Overall, 8.3% of participants reported high-stress scores as per the perceived stress scale and COVID-19 Student Stress Questionnaire. Mean PSS was highest among the final year students, while mean GSS was highest among the fourth-year students. We compared our results with the published literature on psychiatric symptoms and stress levels among students. Our study's burden of depressive symptoms was similar to that of studies from Egypt and Morocco (Soltan et al., 2021; Essangri et al., 2021). However, our population's depressive symptoms were higher than studies from Jordan and China (Alnaser et al., 2021). Similarly, insomnia was reported at a higher proportion in our study than in a Moroccan study (Essangri et al., 2021). The differences may be attributed to different scales used in these studies and the population's different socio-demographic profiles. Likewise, the stress levels of participants in our study were different from other previously published studies from Jordan (Alnaser et al., 2021) and Ireland (O'Byrne et al., 2020). The difference could be attributed to the included population's different socio-demographic characteristics and the different scales used in the Irish study (O'Byrne et al., 2020).

KSA is one of the largest countries in Middle East Asia in terms of population and geographical area. KSA has witnessed >500,000 cases and >8,000 deaths due to COVID-19. KSA witnessed its first lockdown in March 2020 (Kumar and Nayar, 2021; Evans et al., 2021). Lockdowns are known to have an impact the on mental well-being the individuals (Evans et al., 2021). This is multifactorial in causation and affects all age groups and all sections of society (Evans et al., 2021). At the time of lockdown, all schools, colleges and universities suspended student attendance and used virtual online modes for teaching and examinations (except medical colleges wherein the practical sessions were conducted at colleges). In August 2021, the mode of teaching changed from online to offline.

COVID-19 has introduced a sense of uncertainty regarding the well-being of personal life and family life. This, along with the uncertainty regarding education and skill acquisition during medical school, contributes to the stress level of medical students. Other factors also add up to increase stress levels for students (Kumar and Nayar, 2021; Wang et al., 2020). In KSA, more than half of the medical students reported symptoms suggestive of anxiety, depression and mania. Moderate and high level of stress was reported by 88.1% and 57.8% of students as per the perceived stress scale and COVID-19 Students Stress Questionnaire, respectively. This high level of stress and other psychiatric symptoms warrant a detailed assessment of factors responsible for it. This should be complemented by periodic evaluation of the mental states of medical students to triage the students for further management.

To the best of our knowledge, this is one of the very few studies from Middle Eastern countries to assess the stress levels among medical students. Hence the evidence generated could be utilised by other countries of this region for policy implementation. Secondly, we used standard psychiatric assessment scales for assessing the mental state of the students. This will help in comparing the results with studies from other parts of the world. Thirdly, the non-response rate in our study was <15%. Therefore, the results are representative of the included participants. Lastly, we did not collect any personal identifiers from the participants, including email-ID. We expect that anonymous responses will have fewer chances of information bias.

Our study suffered from a few limitations. Only 109 participants were included in the study. The total number of medical students in the University at the time of the survey was 254. Hence, we could include only 43% of the eligible population, limiting the study's external validity/generalizability. Secondly, CCSM-A is a screening tool used to identify participants having above threshold scores in 13 psychiatric domains. It is not diagnostic of psychiatric illness. Because of the online mode of interview, we could not confirm the diagnosis of these students. Finally, the proportion of students of 3/4/5th year students was less as compared

to first- and second-year students and the reason for this is not readily apparent. However, this limits the external validity of the study. This is especially significant as the highest stress scores were noted in fourth- and fifth-year students only.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, it can be seen that graduate medical students experience a significant mental health burden. This is likely to affect their performance in the long run and they need adequate care at the earliest. Their mental health assessment should be implemented across all such institutions periodically and programmatically. This will help in the baseline assessment of students and will also help screen those in need of care. A permanent psychologist may also need to be appointed for these activities in the educational institutions. COVID-19 pandemic has been around for more than one and a half years now and it appears that it will not end soon. Hence, we need to have an institutional mechanism to address this issue. Medical students are at high risk of these disorders than the general population (Kumar and Nayar, 2021; Wang et al., 2020). Hence provision of a clinical psychologist for periodic assessment of medical students is a must. Such psychologists can be recruited at the institution/ministry level as per the resources available and requirements felt by the ministry.

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Authors' Contributions

Study design, collection of data and samples, methodology, writing and editing were performed by Dr Naif Alrudian.

Informed consent

Not applicable.

Ethics Approval

All series of steps that were implemented in this study that included animal models were in compliance with Ethics Committee of Prince Sattam bin Abdulaziz University Institutional Review Board (REC-HSD-104-2021).

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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