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COVID-19 Lockdown and Mental Health Status of Undergraduate Medical Students in Egypt

Ibrahim Ali Kabbash, M.D.[1], Omar Mohammad Al-Sawak[2], Ahmad Mohammad Abou-Elfetouh[2], Ahmad Tarek Almahdy[2], Basem Salama,M.D.[3], Fatma El-Deeb,M.D.,[4] Noha M. Elghazally,M.D.[1]

[1] Public Health & Community Medicine, Faculty of Medicine, Tanta University, Egypt.
[2]Student at Faculty of Medicine – Kafrelshiekh University, Egypt.
[3]Family & Community Medicine, Faculty of Medicine, Northern Border University, Arar, Saudi Arabia.
[4]Neuropsychiatry, Faculty of Medicine, Tanta University, Egypt.

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A B S T R A C T

Background: The global spread of COVID-19 has increased medical students' anxiety and depression. To contain the pandemic, isolation techniques, and social separation have been implemented. **Objective**: To determine the prevalence rates of anxiety and depression among medical students within the ongoing of pandemic, and to determine risk factors that predict changes in their mental health status. **Method**: A cross-sectional study was conducted among 500 undergraduate medical students in Kafr Elshiekh University during the pandemic. A pre-designed questionnaire that included socio-demographic data, perception of the general state of health, personal and family experience with COVID-19 infection, and the hospital anxiety and depression scale. **Results:** A total of 500 participants, of which 49.6% were males and 50.4% were females. 46.8% of the participants experienced symptoms related to mild anxiety, whereas 9.6% reported signs of moderate to severe anxiety. Depression, was reported in 38.0% of students experiencing mild symptoms, while 11.4% reported experiencing moderate to severe symptoms. Female preclinical students who perceived themselves as having health difficulties or prior mental health issues were shown to be at a greater risk for elevated anxiety and depression scores ($p < 0.05$). There was no significant correlation between prior self-infection or infection among family members with COVID-19 and the occurrence of sadness or anxiety. **Conclusions:** The COVID-19 pandemic has negatively impacted the mental health of undergraduate medical students, increasing anxiety and depression levels. Personal factors like pre-existing conditions and academic stress contribute to this.

INTRODUCTION

The World Health Organization (WHO) first declared on January 30, 2020, the outbreak of COVID-19 as a public health emergency of international concern (PHEIC), and then it was stated as a pandemic on March 11, 2020.[1] The severe contagious nature of the Novel Corona virus created an unprecedented global crisis that caused governments to impose rigorous decisions and laws to mitigate the transmission of the disease and manage the spread of infection.[2]

Corresponding Author: Noha Elghazally, Department of Public Health & Community Medicine, Faculty of medicine, Tanta University, Tanta, Egypt. Email: nohaelghazally1@gmail.com.

Several nations implemented a nationwide lockdown, prohibiting both domestic and international flights, suspending attendance at educational institutions and corporate activities, prohibiting all forms of gatherings, and instructing individuals to remain at home.[3] Globally, 3.9 billion people are quarantined in their homes,[4]and students of all ages were significantly impacted by these acts on a global scale.[5] Egypt declared its first COVID-19 case on February 14. Egypt then increased precautions, imposing a partial shutdown that began on March 25, 2020.[6] Consequently, the medical education in universities was modified with a suspension of face-to-face teaching and the countrywide implementation of online education under the direction of the Ministry of Higher Education.[7]

The quarantine measures or physical isolation regulations have resulted in considerable anxiety and fear worldwide.[8,9] Furthermore, aside from the psychological strain of COVID-19 that impacts society as a whole, the medical student population has increased obstacles.[10] Due to the closure of universities and public libraries, along with limited access to other study areas, numerous students were compelled to adapt to an unfamiliar learning environment, resulting in many returning to their family residences.[11] The rapid reorganization of examinations meant that anyone taking or preparing for them had to quickly adapt to new grading schemes and test formats.[12] Certain schools were required to reschedule or move up exams, while others opted to completely postpone them, relying on students' previous comprehensive and ongoing assessment scores. Multiple colleges have substituted written evaluations with remote online assessments for students.[13]

Moreover, during disease outbreaks, exposure to infection among medical students is perceived to be high due to their heightened susceptibility to viral exposure during clinical training.[14,15] This has resulted in high reports of anxiety among medical students during previous disease outbreaks,[16,17] particularly due to their worries about transmitting the virus back to their families.[18]

Anxiety was identified in one in every three medical students worldwide, a rate that was greater than that of the general population.[19] Medical students are psychologically vulnerable groups during these disastrous times.[20] During the COVID-19 crisis and lockdown of the country, Anxiety and depression are more likely to occur and intensify in the absence of direct interpersonal interactions.[21] Therefore, the objectives of the current study were to assess the prevalence of depression and anxiety symptoms among medical students in Egypt during the COVID-19 pandemic and related lockdown, and investigate the possible predictors of mental health disorders caused by COVID-19 lockdown.

METHODS

This cross-sectional study was conducted at Kafr Elshiekh University located in Northern Nile Delta and hosting nineteen faculties, and three higher institutes with 60,000 enrolled students.

The target population for this study was medical students at the Faculty of Medicine totaling 3540 students. Inclusion criteria included students registered in the academic year 2020/2021 in all academic grades from 1-5 while there were no exclusion criteria.

The sample size was estimated using Epi-Info software created by World Health Organization and Center for Disease Prevention and Control, Atlanta, Georgia, USA version 2007. The researchers assumed a prevalence of 50% of students affected with the lockdown (as this conservative estimation will include the largest sample size) with a margin of error of 5% at a confidence interval of 95%. The calculated sample size was found at N>576. The researchers distributed 580 questionnaires during the period from January to March 2021and retained 500 fully completed sheets with a response rate of 86.2%. Students' Affairs divided students into groups (practical sections and clinical rounds) according to the teaching schedules.

Study tools: For data collection, researchers used a predesigned questionnaire that included socio-demographic data, perception of general state of health, personal and family experience with COVID-19 infection, and the hospital anxiety and depression scale.[22] Anxiety scale included six questions answered as never, few days less than half of days and almost every day scored as zero for never and three for every day. The level of anxiety was rated as minimal (1-4), mild (5-9), moderate (10-13), moderate to severe (14-18) and severe (19-21). Depression scale included eleven questions with same answers and score as that for anxiety. The researchers rated depression as

minimal (1-5), mild (6-10), moderate (11-16), moderate to severe (17-22) and severe (23-30). The authors prepared the questionnaire in a Google form and sent a copy to students' academic e-mails asking them to fill it. The questionnaire started with an introductory message clarifying the objectives of the study and asking for consent to participate.

Table 1: Characteristics of study participants

Variables	N (n=500)	%
Age in years		
18-	110	22.0
20-	233	46.6
22-	141	28.2
24-	11	2.2
26-	5	1.0
Range	18-27	
Mean ±SD	20.85±1.59	
Sex		
Males	248	49.6
Females	252	50.4
Academic grade		
Preclinical	204	40.8
Clinical	296	59.2
Perception of general state of health		
Healthy	466	93.2
Suffer from chronic disease	16	3.2
Have physical disability	18	3.6
Perception of mental health		
Never had psychological problems	430	86.0
Previously suffered from psychological problems	34	6.8
Currently suffer from psychological problems	36	7.2
Suffered from COVID-19 infection	57	11.4
Family experience with COVID-19 infection		
None	187	37.4
The study participant	57	11.4
A family member	66	13.2
A relative	227	45.4
Both family member and relative	20	4.0

Data were presented as numbers and percentages, unless mentioned otherwise

Tool validation: Content validity of questionnaires was assessed by a group of five experts in the field of public health. Questions of the studied questionnaire were assessed for relevance and clarity with the item validity index being excellent for all questions ranging from 0.91 to 1. Scale validity index was assessed to be 0.93. A pilot study among 15 students (not included in results) showed a Cronbach's alpha of 0.75 indicating good reliability of the questionnaire. The level of anxiety and depression represented the outcome variables and academic grade, sex, perception of self and mental health, and experience with COVID-19 infection were the independent variables.

Statistical analysis: The collected data were coded, double-checked for completeness, and then analyzed using Statistical Package for the Social Sciences (SPSS) Program version 25.0. (SPSS Inc., Chicago, IL). A significance level of $p < 0.05$ was adopted by the authors. Numerical variables such as mean and standard deviation were presented. Chi square test (X^2) was used to compare differences in the distribution of variables among suited groups. The odds ratio and 95% confidence intervals were calculated to test the association between the independent and outcome variables. A multivariate binary logistic regression was used to identify independent exposure affecting depression and anxiety among the study participants.

RESULTS

The total number of participants was 500 with a mean age of age of 20.85±1.59. Males were 49.6% and 40.8% were students in preclinical academic years. Among participants, 93.2% perceived themselves as having a good general health state while 3.2% and 3.6% reported having chronic illness or physical disability, respectively. Participants who had history of psychological problems represented 6.8% and 7.2% reported currently having psychological problems. Among participants, 11.4% experienced COVID-19 infection which was also reported among 13.2% for a family member and 45.4% for a relative, and 4% for both a family member and relative. (Table 1)

Feeling tired or having little energy was the main symptom of the anxiety scale reported by 23.0% followed by feeling anxiety and tension (21.0%). In the depression scale, participants reported having little interest or pleasure in doing things (23.6%), and feeling down, pressed or helpless (20.2) as the main symptoms (Table 2)

The highest frequency of participants suffered from mild anxiety (46.8%), and females significantly had

Table 2: Manifestations of anxiety and depression among participants

Manifestations	Never		Few days		> Half days		Almost every day	
	n	%	n	%	n	%	n	%
Anxiety manifestations:								
Feeling of anxiety and tension	40	8.0	288	57.6	67	13.4	105	21.0
Unable to stop or control worrying	163	32.6	245	49.0	37	7.4	55	11.0
Unable to control my temper	162	32.4	238	47.6	37	7.4	63	12.6
Unable to deal with others	157	31.4	241	48.2	45	9.0	57	11.4
Feeling tired or having little energy	37	7.4	251	50.2	97	19.4	115	23.0
Eating too much	175	35.0	213	42.6	53	10.6	59	11.8
Depressive manifestations:								
Little interest or pleasure in doing things	90	18.0	213	42.6	79	15.8	118	23.6
Feeling down, depressed or hopeless	89	17.8	228	45.6	82	16.4	101	20.2
Trouble falling or staying asleep	171	34.2	226	45.2	59	11.8	44	8.8
Sleeping too much	96	19.2	249	49.8	78	15.6	77	15.4
Loss of appetite	185	37.0	222	44.4	55	11.0	38	7.6
Feeling bad about yourself	161	32.2	197	39.4	59	11.8	83	16.6
Loss of concentration	174	34.8	213	42.6	58	11.6	55	11.0
Moving or speaking so slowly that other people could have notice	224	44.8	190	38.0	42	8.4	44	8.8
Restless and nervous	187	37.4	216	43.2	49	9.8	48	9.6
Thoughts of death	335	67.0	97	19.4	27	5.4	41	8.2
Difficult to perform usual work or activities	159	31.8	233	46.6	49	9.8	59	11.8

Table 3: Distribution of studied participants by level of anxiety and depression due to COVID-19 lock down

Level of anxiety and depression	Males (n=248)		Females (252)		Total (n=500)		X^2	p
	n	%	n	%	n	%		
Anxiety level:								
Minimal	79	31.9	36	14.3	115	23.0	27.330	<0.001*
Mild	114	46.0	120	47.6	234	46.8		
Moderate / severe	55	22.0	96	38.1	151	30.2		
Depression level:								
Minimal	63	25.4	31	12.3	94	18.8	17.218	<0.001*
Mild	97	39.1	93	36.9	190	38.0		
Moderate to severe	88	35.4	128	50.8	216	43.2		

**Significant (p<0.05)*

higher levels of anxiety compared to males (p=<0.001). Concerning depression, 38.0% had mild depression and females also significantly suffered more form depression than males (p<0.001) (Table 3)

Preclinical grades were more likely to have higher levels of anxiety and depression compared to their peers in clinical grades (OR = 1.966 and 2.171, respectively). The risk of high level of anxiety and depression was significantly lower among males compared to females (0.463 and 0.533, respectively). Those who felt healthy were significantly less likely to suffer from higher levels of anxiety and depression compared to those who had health problems as the odds ratio for anxiety was 0.240 (95% CI 0.117-0.492) while for depression it was 0.389 (95% CI 0.188-0.805). The risk for suffering from higher levels of anxiety and depression in relation to previous experience of COVID-19 infection among participants or one of their family members were not significant. (Table 4)

Multivariate analysis for predictors of occurrence of anxiety revealed that academic grade, gender, perception of self-health and perception of mental health were independent predictors for the prevalence of high anxiety and depression. Perception of mental health had the highest effect (Ex. B= 3.442). Concerning depression, academic year, gender and perception of mental health were independent factors affecting the level of depression with perception of mental health having the highest effect (Ex. B = 3.453). (Table 5)

Table (4): Factors affecting anxiety and depression among studied participants.

Variables	Anxiety					Depression				
	Moderate / severe		Absent / mild		OR 95% CI	Moderate / severe		Absent / mild		OR 95% CI
	N	%	n	%		N	%	N	%	
Academic grade										
Preclinical	79	38.7	125	61.3	1.966	111	54.4	93	45.6	2.171
Clinical	72	24.3	224	75.7	1.335-2.896	105	35.5	191	64.5	1.508-3.125
Sex										
Males	55	22.2	193	77.8	0.463	88	35.5	160	64.5	0.533
Females	96	38.1	156	61.9	0.313-0.686	128	80.8	124	49.2	0.372-0.763
Perception of self-health										
Healthy	130	27.9	336	72.1	0.240	194	41.6	272	58.4	0.389
Have problems	21	61.8	13	38.2	0.117-0.492	22	64.7	12	35.3	0.188-0.805
Perception of mental health										
Have problems	41	58.6	29	41.4	4.113	50	71.4	20	28.6	3.976
Healthy	110	25.6	320	74.4	2.439-6.936	166	38.6	264	61.4	2.285-6.917
Had COVID-19										
No	135	30.5	308	69.5	1.123	188	42.4	255	57.6	0.764
Yes	16	28.1	41	71.9	0.609-2.072	28	49.1	29	50.9	0.439-1.327
Family member/relative had COVID-19										
No	59	31.6	128	68.4	1.107	81	43.3	106	56.7	1.008
Yes	92	29.4	221	70.6	0.748-1.640	135	43.1	178	56.9	0.699-1.452

Table 5: Multivariate binary logistic regression of factors affecting anxiety and depression among studied participants.

	Anxiety			Depression		
	Odds ratio	95% CI	p-value	Odds ratio	95% CI	p-value
Academic grade	1.939	1.284-2.928	0.002	2.111	1.443-3.087	<0.001
Gender	0.484	0.320-0.734	0.001	0.575	0.395-0.838	0.004
Perception of self-health	0.295	0.135-0.644	0.002	0.501	0.228-1.100	0.085
Perception of mental health	3.442	1.983-5.975	<0.001	3.534	1.985-6.292	<0.001

DISCUSSION

During quarantine, and even after that period, students have poor psychological wellbeing and mental illness.[23] This study elucidates the substantial impact of the COVID-19 pandemic and its lockdown on medical students' mental health.

The psychological effects of quarantine during previous outbreaks were reported by Hawryluck et al (2004), who conducted a web-based survey during the first and second SARS outbreaks in Toronto and explained that a high prevalence of psychological distress was observed among those who were quarantined, including posttraumatic stress disorder (28.9%) and depression. (31.2%).[24]Additionally, 23% of medical students, according to a study conducted in Saudi Arabia during the MERS-COV outbreak, reported moderate to severe anxiety.[25]This can be explained that people in general and medical students in particular, were potentially exposed to novel lifetime stressors and disruption of their daily activities: lockdown measures, travel restrictions, reduced levels of physical activity, irregular sleeping patterns, modified living environments, heightened utilization of social media platforms, and a disrupted sleep-wake cycle that incorporates an extended daytime snooze. All these factors, in conjunction with the increased rigors of the medical curriculum, may contribute to a decline in mental health.[26]

The current study revealed that Egyptian medical students showed signs of psychological symptoms in the form of mild anxiety (46.8%) and 11.4% had moderate to severe and severe level of anxiety. Concerning depression, 38.0% had mild depression and 15.0% had moderate to severe and severe level of depression. A nearby study conducted in Egypt, during May 2020 among medical students showed

that 70.5%, 53.6 % of the Egyptian students showed signs of anxiety, depression.[27] Despite the fact that the previous study was conducted during the first suffer from psychological issues, and they need mental health support.

These findings are consistent with the findings of previous research where university students in European nations such as the United Kingdom, France, and Greece experienced an increase in anxiety and melancholy during the pandemic, especially during the lockdown period.[28,29,30] Aker S (2020), in Turkey, found out that 52.4 percent of medical students at Ondokuz Mays University's Faculty of Medicine reported having impaired mental health, according to a study. [31] Moreover, Safa F. et al (2020), who conducted a cross-sectional study conducted among 425 Bangladeshi medical students, revealed that 65.9% of the participants experienced varying levels of anxiety, with 27.3% reporting mild anxiety, 26.8% reporting moderate anxiety, and 11.8% reporting severe anxiety. Additionally, 49.9% of the students exhibited different degrees of depressive symptoms, with 3.3% of the participants experiencing severe depressive symptoms.[32]

However, a low prevalence of reported depression and anxiety was detected by Nguyen (2020), only 7.7% of medical undergraduates presented anxiety among medical students from eight universities in Vietnam .[33] This can be explained that the Vietnamese government has effectively managed to maintain a low infection rate and a zero fatality rate by implementing early intervention and rigorous control measures to contain the spread of the virus.[34] This emphasizes the role of authorities in early and continuous support to medical students during such critical periods.

Given the growing demand for mental healthcare and psychological assistance, it is imperative to comprehend how COVID-19 affects students' psychological well-being. Through the multivariate analysis, this study unveiled that the preclinical students, male gender, having a health or psychological problems were independent predictors for the prevalence of high anxiety and depression.

Prior studies in the field of mental health have identified female gender as a risk factor associated with diminished psychological well-being and poorer mental health.[34] Likewise, female medical students exhibit notably elevated levels of depressive symptoms, as well as emotional and cognitive exhaustion.[35] These challenges are further intensified during times of disaster.[35]Additionally, Sartorao Filho et al. (2020), who illustrated that during this pandemic, female medical students will be at a greater risk of developing depressive symptoms.[36] Salk et al (2017), that males may exhibit a lower propensity for developing depression in comparison to females. [37]

The issue of gender link is contentious, as some research has documented elevated anxiety scores among males.[38] However, Debowska et al(2020) noticed that female students showed high odds of anxiety in studies of Poland.[39]This disparity could be attributed to cultural influences that shape attitudes and actions linked to gender.

There is a negative correlation between the age of the students and their anxiety levels, indicating that younger students tend to have higher levels of anxiety. Saraswathi et al (2020), who conducted a prospective longitudinal study that included 217 medical undergraduates at Chennaicollege in India, revealed that a rise in age was associated with a decreased chance of depression, as indicated by binary logistic regression analysis. (OR 0.737, 95% CI [0.565–0.961]).[39]

Our study indicated that COVID-19 lockdown is more detrimental to individuals with mental health conditions than to those without such conditions. Wang et al. (2020) illustrated that there exists a correlation between a medical history of chronic illness and elevated levels of psychological distress within the Chinese population.[40]Comparable findings were documented by Mazza et al. (2020), who investigated the psychological distress experienced by the Italian populace amidst the COVID-19 pandemic.[41]One potential rationale for this outcome is that individuals who have a medical history of complications and have a negative perception of their overall health may experience heightened susceptibility to acquiring a new illness.[42]

Current study revealed that there was no significant relation between prior self-infection or infection among family members with COVID-19 and the occurrence of sadness or anxiety. On contrary to Cao et al. (2020), who discovered that having COVID-19-

infected relatives or acquaintances was a risk factor for college students in China experiencing increased anxiety.[43]Also, Ghazawy et al(2020), conducted a cross-sectional study among medical students in Egypt, explained that those with close relatives or friends who were infected with COVID-19 had a higher risk of developing depression, anxiety, and tension compared to those who were unaware of the affected individual.[27] This can confirm that medical students have become more conscious in regard to COVID-19 infection, and it refers to the continuous efforts of the Egyptian support system in universities.

CONCLUSIONS

Medical students had mild to moderate level of anxiety and depression. Being a student in academic years, male gender, having a health or psychological problems are independent factors affecting the level of anxiety. Concerning depression, being a student in academic years, and having health or psychological problem predicts the level of depression. Having a health problem was the main factor affecting the level of anxiety and depression.

Ethical Approval

The study obtained all required approvals from the Institutional Review Board (or other appropriate ethics committee) of Tanta University

***Limitations of the study*:** The study reported results of medical students in one faculty of Medicine that make it difficult to generalize to other faculties or non-medical students.

***Recommendations*:** Healthcare services should address adverse effects of social isolation due to lockdown during the COVID-19 pandemic among medical students. Further studies are recommended to explore details of adverse effects on mental well-being by COVID-19 pandemic.

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