



Prevalence and Predictors for Depression among Medical Students during Coronavirus Disease-19 Pandemic: A Cross-sectional Study

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Abstract

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BACKGROUND: Since the declaration of the World Health Organization of the coronavirus (SARS-COV-2) as a pandemic, several countries have locked down and quarantined their residents with restrictive procedures to control spread of the disease. Due to pandemic related stressors, concerns and worries have developed regarding negative psychological impact on the mental well-being of the general population, particularly those known to have higher levels of psychological impairment with high vulnerability to mental health diseases such as medical students.

AIM: The objectives of the study were to assess the prevalence of self-reported depression and to explore its predictors during the period of Coronavirus Disease 2019 first lock down among medical students.

METHODS: This was a cross-sectional study design. The study was conducted at Kasr Alainy Medical School, Faculty of Medicine, Cairo University, Egypt, in June 2020. A simple random sample was picked of one subgroup of 4th year medical students (No. = 300) at faculty of medicine during the academic year 2019–2020. Self-administered questionnaires including Beck's Depression Inventory scoring were distributed using Google form through communication social media such as WhatsApp.

RESULTS: Out of the 300 participants, 238 responses were received with response rate 79.3%. Results indicated that 38.2% of the respondents were experiencing depression with different degrees with Beck's Depression Inventory mean scores was 19.4 ± 11.6 . Multiple logistic regression analysis point out that gender (odds ratio [OR] = 2.4 and $p = 0.022$) and "Good" grade level of academic performance (OR = 7.2 and $p = 0.045$) are significant predictors for developing depression among the participating medical students.

CONCLUSION: A significantly high prevalence of depression is detected among medical students during the first wave of the SARS-COV-2 pandemic. The prevalence of depression is more among females than males and more with medical students achieving "Good" grade level.

Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic and the consequential lockdown are influencing almost every aspect of people's lives, including mental health and well-being. The concerns about the health risks that the COVID-19 pandemic presents and moreover the heart-breaking loss of life it has caused, accompanied with social isolation, a lack of access to favorite activities, and an uncertain future, are exhausting for everyone all over the world. This public health disaster makes life very challenging for all populations and may have a particularly significant effect on those experiencing mental health conditions [1].

Given the fact that depression is considered one of the most common mental health issues among medical students worldwide due to the high intensity of training [2] as researches indicated that anxiety, stress, and depression are more prevalent in the medical professions than the general population [3]. In addition, recent systematic reviews and meta-analysis showed

that the prevalence of depression among medical students globally was around 28%, and suicidal ideation was 11.1% [4], [5], [6], [7].

Furthermore, COVID-19 pandemic has interrupted medical student education significantly where their medical curricula courses were delivered through online virtual tutoring classes or video-based learning classes and they were denied from attending medical school campuses and their clinical rotations [8]. Another challenge medical students were facing in this matter, in dealing with the shift from traditional to online virtual learning is digital illiteracy and limited available recourses and internet access [9], [10].

Awareness and promotion of mental health among medical service providers were difficult to obtain even before the emerging COVID-19 pandemic and its associated mental health conditions. With so much uncertainty accompanying the events unfolding globally, the added stress of medical school responsibilities, cancelled medical placements, exams, and self-isolation with no longer have access to regular social activities or other means of daily life, the weight of it all became too much [11].

It is believed now more than ever that the medical community needs to be aware of the fact that thousands of medical students are facing significantly higher rates of diagnosed mood disorders, anxiety, and psychological distress especially now given the evolving COVID-19 situation [11]. The current study aims at estimating the prevalence of self-reported depression and to identify associated risk factors during the period of COVID-19 first lock down among medical students at Kasr Alainy Medical School, Cairo University.

Methods

Study design

This was a cross-sectional analytical study design.

Study setting and population

The study was implemented among 4th year medical students at Faculty of Medicine – Cairo University during the academic year 2019–2020.

Sample size

The sample size was calculated by software program (Sampsize.sourceforge.net). Assuming precision 5%, the confidence level 95%, and prevalence of depression 15% [7] with the total number of students in the academic year 2019–2020 were 1200, accordingly the sample size was 169 participants and after addition of 40% due to expected dropouts, the sample size increased to be 238 participants.

Sampling type and technique

The 4th year medical students were distributed into four subgroups according to the specialty they were studying. Simple random selection of one subgroup of the students ($n = 300$) who experienced the first COVID-19 lock down was selected for the study after explanation the objective of the study.

Data collection tools

A validated self-administered questionnaire was used to collect data. It was distributed using Google form through communication social media such as WhatsApp. The questionnaire included three sections:

1. Section for the socio-demographic characteristics: Age, gender, residence, level of academic performance, father education, father occupation, mother education, mother occupation, and socio-economic

classification [12]

2. Section for detection of positive history COVID-19 infection
3. Section for assessing the level of depression using Beck's Depression Inventory [13]: Included 21 questions, each question had a scoring scale of (0, 1, 2, and 3) and consequently the total scores were calculated to estimate the level of depression.

Pilot test

The questionnaire was tested on ten students to check the validity and clarity of the questions and to estimate the time needed to complete the questionnaire. The questionnaires of the pilot study were not included in the analysis.

Data analysis and management

All collected data revised for completeness and accuracy. Pre coded data were entered on the computer using the Statistical Package of the Social Sciences software program, version 21 (SPSS) to be statistically analyzed. Data were summarized using mean, SD, median and interquartile range for quantitative variables, number, and percent for qualitative variable. Comparison between qualitative variables was done using Chi-square test for qualitative variables while independent t-test for quantitative and nonparametric Kruskal–Wallis and Mann–Whitney tests for quantitative variables which were not normally distributed. Stepwise multiple logistic regression models were conducted to significant predictors of depression among the study group. The dependent in the regression model was normal and depressed (students with significant depression) excluding the students of mood disturbance. $p < 0.05$ was considered of statistically significant. Variable(s) entered in step 1 were; sex, residence, nationality, socio-economic classification, level of academic performance, getting infected with COVID19, and any one of your family members get infected with COVID19. [Dependent: normal/depression].

Ethical Considerations

The study was revised and approved to be conducted at Public Health department at Faculty of Medicine-Cairo University by the department council members. Informed consent was obtained from all the participants before being recruited in the study and after explaining the objectives of the study. Confidentiality was guaranteed on handling the data base and questionnaire forms according to revised Helsinki Deceleration of biomedical ethics [14].

Results

The questionnaire was distributed to a total of 300 students through an E-form Google sheet where just 238 student responded (response rate 79.33 %). Table 1 shows the socio-demographic characteristics of the study group. The mean age of students was (22.2 ± 0.9) years. With 61.2% of the students were females and approximately three fourth (71%) of the participants lived in an urban area while the majority of students 89.9% were Egyptians. A total of 75.6% of the students were of high socio-economic level. Regarding the level of academic performance of the students, 76.9% of the participants had an "Excellent" grade.

Table 1: Distribution of participating medical students according to their socio-demographic characteristics

Socio-demographic characteristics	Number (= 238)	100%
Gender		
Male	91	38.20
Female	147	61.20
Residence		
Rural	69	29.00
Urban	169	71.00
Nationality		
Egyptian	214	89.90
Non Egyptian	24	10.10
Socio-economic classification		
Low socio-economic level	8	3.40
Intermediate socio-economic level	50	21
High socio-economic level	180	75.6
Level of academic performance		
Fair	9	3.8
Good	13	5.5
Very good	33	13.9
Excellent	183	76.9

Table 2 reveals that the minority of the students (8.8%) had a positive history of getting infected with COVID-19, while nearly one third (32.4%) had a positive history of COVID-19 infection within their family members.

Table 2: Distribution of participating medical students according to history of infection with COVID-19

History of COVID-19 infection	Number (= 238)	100%
Getting infected with COVID-19		
No	217	91.2
Yes	21	8.8
Any one of your family member get infected with COVID-19?		
No	161	67.6
Yes	77	32.4

Table 3 demonstrates that almost a quarter of the students (21.4%) had no depressive symptoms, while (23.1% and 17.2%) of the participants had mild mood disturbance and borderline clinical depression, respectively. Unfortunately 38.2% of students experienced different levels of depression (moderate depression, severe, and extreme depression) according to Beck's depression inventory scores.

The study results in Table 4 revealed that both gender and level of academic performance of the students had a significant effect ($p \leq 0.05$) on increasing the level of depression among the study group, while residence, nationality, socio-economic level, and

Table 3: Distribution of participating medical students according to Beck's depression inventory scores

Beck's depression inventory	Number (= 238)	100%
Normal	51	21.40
Mild mood disturbance	55	23.10
Borderline clinical depression	41	17.20
Moderate depression	54	22.70
Severe depression	22	9.20
Extreme depression	15	6.30
Depression score		
Mean ± SD = 19.4 ± 11.6		
Median (IQR) = 18 (11:25)		

positive history of getting infected with COVID-19 had no significant effect on level of depression with ($p \geq 0.05$).

Table 4: Predictors of depression among the participating medical students

Factors affecting depression	Beck's depression inventory			p-value
	Normal	Mood disturbance and borderline	Depressed	
	n (%)	n (%)	n (%)	
Gender				
Male	27 (29.7)	34 (35.4)	30 (33)	0.048*
Female	24 (16.3)	62 (64.6)	61 (67)	
Residence				
Rural	19 (27.5)	27 (28.1)	23 (25.3)	0.311*
Urban	32 (18.9)	69 (71.9)	68 (74.7)	
Nationality				
Egyptian	45 (21)	86 (89.6)	83 (91.2)	0.844*
Non-Egyptian	6 (25)	10 (10.4)	8 (8.8)	
Socio-economic level				
Low socio-economic level	2 (25)	5 (5.2)	1 (1.1)	0.659**
Intermediate socio-economic level	11 (22)	20 (20.8)	19 (20.9)	
High socio-economic level	38 (21.1)	71 (74)	71 (78)	
Level of academic performance				
Fair	0 (0)	0 (0)	9 (9.9)	0.007**
Good	1 (2)	6 (6.3)	6 (6.6)	
Very good	8 (15.7)	15 (15.6)	10 (11)	
Excellent	42 (82.4)	75 (78.1)	66 (72.5)	
Getting infected with COVID-19				
No	49 (22.6)	84 (87.5)	84 (92.3)	0.203**
Yes	2 (9.5)	12 (12.5)	7 (7.7)	
Any one of your family members get infected with COVID-19?				
No	40 (24.8)	61 (63.5)	60 (65.9)	0.168*
Yes	11 (14.3)	35 (36.5)	31 (34.1)	

*p value of Chi-square test. **p value using exact correction.

The results of the study shown in Table 5 revealed that both gender and level of academic performance were predictors for the probability of getting depressed among the study group. Regarding gender, being a female was of higher probability of getting depressed two times than a male (odds ratio [OR] = 2.4). Also regarding the level of academic performance, it was detected that the students whose academic performance grade was "good" have higher probability to be more depressed 7 times compared to other academic performance grades (OR = 7.27).

Discussion

Several reports have stated that public health emergencies, such as the emerging COVID-19 pandemic, possibly will influence the psychological and mental status of the general public, medical staff, patients, older adults, and children [15], [16], [17], [18].

Table 5: Multiple logistic regression of predictors of depression among the participating medical students

Selected factors affecting depression	B	p-value	OR	95% CI for OR	
				Lower	Upper
Gender (male/female)*	0.891	0.022	2.438	1.14	5.212
Academic performance levels					
Fair		0.023			
Good	1.985	0.045	7.277	1.049	50.495
Very good	-0.151	0.856	0.859	0.168	4.404
Excellent	0.077	0.923	1.08	0.223	5.224
Ill-Any one of your family members get infected with COVID-19 (No/yes)**	0.83	0.056	2.294	0.98	5.37
Constant	-0.447	0.591	0.64		

*Reference male group. **Reference group is No. Dependent: (Normal/depression), OR (odds ratio), P (p-value), CI (confidence interval).

The strict social isolation procedures, continuous spread of the pandemic, and interrupting teaching in schools and universities across the countries are likely to have an impact on the mental health of youth and students [16], [17], [18].

The aim of the current study was to identify the prevalence of depression and its predictors among medical students during COVID-19 Pandemic in Kasr Alainy Medical School. The study was conducted 3 months after the spread of the pandemic, June 2020. Results revealed that the Beck Inventories the mean scores for depression among the study group was 19.4 ± 11.6 , where 38.2% of the participated students were found to be depressed with different percentages ranging from experiencing moderate depression to extreme depression. These results were found to be higher than the results reported by Amir and El Gillany where they reported the prevalence of depression among the participated Egyptian medical students at Mansoura University to be 28.3% [19] and also the results reported by Ediz *et al.* from their cross-sectional study, performed among medical students in Bursa, Turkey, where the prevalence of depression was 23.2% and according to the Beck Inventories the mean scores for depression and anxiety were 9.94 ± 9.32 and 10.89 ± 9.45 , respectively [3]. In addition, the prevalence of self-reported depression in the current study was higher than results reported from a study conducted by Pham *et al.*, among medical students in Vietnam where the prevalence of depression was 15% [7]. This discrepancy could be attributed to the impact of COVID-19 Pandemic and its consecutive lock down on the psychological status and mental health of medical students. Furthermore, according to the results of the meta-analysis conducted by Puthran *et al.* to investigate the prevalence of depression among medical students globally it was demonstrated that a global prevalence of depression among medical students was 28.0% [4].

On the other hand, a study that was conducted among Iranian medical students during COVID 19 pandemic revealed a high prevalence of depression 27.6% but still lower than the prevalence of depression in the present study [20]. These diverse outcomes might be partly explained due to using different sampling selection, assessing tools, and study locations. Hence, the prevalence of depression during the COVID-19 pandemic among medical personal ranged from 12.1% to 59.1% in various researches [21], [22], [23].

Moreover, it is well-known that anxiety disorders are more expected to occur and get worse in the absence of interpersonal communication. Anxiety disorders among college students might have been related to; the effect of the pandemic on their studies, the increasingly distances between people as a result of the quarantine, social distancing and lock down measures, fear of the shortage of masks and disinfectants, and the overwhelming news reports that have additionally added more anxiety and concerns [24], [25], [26].

The present study revealed that both gender and level of academic performance were predictors for the probability of developing depression among medical students. There was a significant difference concerning the prevalence of depression between genders ($p \leq 0.05$) among the study group, where depression was found to be more common among females in comparison to males (twice the probability) where the $OR = 2.4$. These results were in agreement with many studies that have shown similar results that gender is one of the determining factors for the development of depression among the participants [27], [28], [29]. On the contrary, a few researches stated that there was no significant difference observed between genders for the development of depression among the medical students participating in their studies [20], [30], [31].

As well, regarding the level of academic performance, the current study revealed that medical students whose level of academic performance was "good" grade were found to have a higher probability to be depressed (7 times) compared to the medical students achieving any other academic performance levels "fair, very good, or excellent" grades where the $OR = 7.27$.

Positive association of academic achievements [32] and inverse association of motivation and depression [33] were reported.

This could be explained as medical students achieving the "good" grades were more worried about their learning process which was affected by lock-down measures, such as decreasing students' attendance to the clinical settings and transforming teaching their medical program through online courses instead of face to face lectures, that might have left them concerned and alarmed more than the other students achieving the "very good and excellent" grades which are usually more committed to their studies. These findings were in accordance with what was stated by Nahar *et al.* and Shanafelt *et al.* that medical students with lower grades had high prevalence of stress, anxiety, and depression than the students with high grades and academic performance level was considered as a predictor for the development of anxiety disorders [34], [35].

According to the previous researches conducted during epidemics an increased risk of anxiety, depression, and post-traumatic stress disorders (PTSD) among the patients and their relatives were detected [36], [37], [38], [39], [40], [41], [42], [43]. A few studies from China, Turkey, and Italy found that there

is an increase in the prevalence of anxiety, depression, PTSD and insomnia among COVID-19 survivors even after their hospital discharge [44], [45], [46], [47], Dorman-Ilan *et al.* [48] suggested that both isolated COVID-19 patients and their relatives might experience similarly high levels of anxiety and depressive symptoms. On the contrary, in this present study there was no significant difference observed for the development of depression among those who had a family member diagnosed as a COVID-19 case. This may be explained as the number of the participants with related COVID-19 infected cases was a bit low among the sample and the severity of the disease and its long-term complications were not yet understood at the time of conduction of the study.

Conclusion

The present study showed that the prevalence of depression among the participating medical students is very high, ranging from moderate to extreme depression during the COVID-19 pandemic first wave. Associated significant factors with depression are female gender and level of academic performance. Depression can interfere with medical students' academic career in a negative way. Therefore, future research to identify the exact impact of the COVID-19 pandemic on the mental well-being of the medical students as the pandemic still existing and spreading and to investigate the best stress coping strategies and interventions are of vital importance.

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