Research article

Depression and suicidal ideation in Mexican medical students during COVID-19 outbreak. A longitudinal study

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A R T I C L E   I N F O

A B S T R A C T

Introduction: The COVID-19 pandemic has been particularly difficult for populations at risk for mental health problems, such as healthcare professionals and medical students. In the present study, we evaluated the effect of the pandemic on mental health in a sample of Mexican medical students with and without a mental health diagnosis.
Method: Longitudinal and descriptive study based on scales of suicidal ideation, depressive symptoms and risk of alcohol consumption, conducted in April and December 2020.
Results: Sample includes 247 medical students, 64.4% are women. Prevalence of depression increased between April and December from 19.84% to 40.08%. In the case of women from 23.67% to 42.60% ($\chi 2 = 0.000$) and in men from 11.54% to 34.62% ($\chi 2 = 0.001$). In April 16.92% of healthy students presented some sign of depression and in December the percentage increased to 40.80% ($\chi 2 = 0.000$). Regarding medicated students, the prevalence in April was 32.61% and in December it was 36.96% ($\chi 2 = 0.662$). In April, the medicated students with risk of suicidal ideation were 17 out of 46 (36.96%), compared to the students without a diagnosis of psychiatric illness were 29 out of 201 (13.43%) ($\chi 2 = 0.000$). For December, the non-medicated students at risk of suicidal ideation were 34 out of 201 (16.91%), and the medicated students were 12 out of 46 (26.09%) ($\chi 2 = 0.149$).
Conclusions: The pandemic has increase the rate of depression in medical students, being more severe in women. Students under psychiatric treatment showed a higher prevalence of depression; however, the fact of being under treatment resulted in a protective factor for the increase in the prevalence of depression. It is important to deepen the understanding of the causes of depression and to disseminate among the university community the benefits of early detection and treatment of people with socio-emotional disorders.

1. Introduction

Mental health is defined as a state of well-being in which the individual is aware of their capabilities, can cope with the normal stresses of life, can work productively and fruitfully, and can make a contribution to their community. The COVID-19 pandemic impact on the mental health of the general population (Xiong et al., 2020), and psychiatric patients (Hao et al., 2020) has been prominent, particularly challenging for the population at risk for mental health problems. One of these vulnerable groups is university students (C. Wang et al., 2020a), who are in a crucial period of mental development. These years, between 17 and 24, are the period with the highest incidence of mental disorders (McGorry et al.,

2011). There is evidence that shows an association between people with pre-existing mood disorders and an increased risk of hospitalization and death from COVID-19, so they should be categorized as a risk group based on this pre-existing condition (Ceban et al., 2021).

Medical students follow general patterns of young adults and are not exempt from the consequences of substance use such as alcohol, which can include injuries, deterioration in the quality of work and social relationships, violence, risky sexual behavior, cardiovascular disease, Cancer, and Death (Drinking and Your Health Fact Sheets Alcohol CDC, 2021). In a study carried out in Mexico with first-year medical students, it showed that 45.1% of the participants had consumed alcohol (Aburto-Arciniega et al., 2020).

In the case of medical career, the negative effects it can produce on the mental health of students are widely documented, leading to a high prevalence of depression, anxiety, and stress (Dyrbye et al., 2008; Karp and Levine, 2018; Rotenstein et al., 2016). Reports on depression in medical students indicate a prevalence of 27.2%, with a range of 9.3%–55.9%, which is between 2 and 5 times higher than in the general population. The reported prevalence of suicidal ideation was 11.1% with a range of 7.4%–24.2% (Rotenstein et al., 2016).

To date, studies comparing mental health before and during the COVID-19 pandemic are scarce and have reported increased anxiety and depression in university students from China (Li et al., 2020), Vietnam (Tran et al., 2020) and India (Saraswathi et al., 2020) and deterioration of mental health in the general UK population (Pierce et al., 2020).

In Mexico, as a result of the pandemic generated by COVID-19, on March 14, 2020, face-to-face activities were suspended in all educational institutions throughout the country (Suárez et al., 2020) and have remained interrupted until the date.

Facing this global health problem requires the exchange of information between nations to estimate the consequences of this new disease at all levels. To our knowledge, no longitudinal studies are looking at the effects of the COVID-19 pandemic on the mental health of medical students. The study aimed was to conduct a survey-based longitudinal assessment of the effects of the COVID-19 pandemic on mental health among Mexican medical students at a private university. We seek to identify the changes in the prevalence of depression and suicidal ideation in two moments of the pandemic and relate them to the students diagnosed with an illness of the emotional sphere, who were under treatment.

2. Materials and methods

2.1. Design and participants

This is an observational and longitudinal study based on surveys that were carried out in April and December 2020, during the period of the COVID-19 pandemic. All medical students from the Mexican School of Medicine of La Salle University, Mexico were invited to participate in the study. There were no exclusion criteria. The study was approved by the Research Committee and the Research Ethics Committee of the Faculty and the informed consent of the participants was required. This study was reviewed and approved by the Institutional Review Board of La Salle University Mexico and of the Faculty of Medicine of La Salle University Mexico (approval number EDU-19/20).

In the first instance, we send messages to medical students explaining the rationale, objectives, and design of the study. It was mentioned that participation in the study was voluntary and that anonymity was preserved. Optionally, they were asked to enter their account number to be able to identify those who completed both surveys. The surveys were conducted in two stages, in April and December 2020. For each survey, the platform remained open for one week to receive questionnaires.

2.2. Instruments

The self-administration survey used in this study consisted of four sections, sociodemographic and clinical information, the Beck Depression Inventory (BDI-II), the Alcohol Consumption CAGE inventory, and the Plutchik Suicidal Risk Scale (PSRS).

2.3. Sociodemographic and clinical information

The sociodemographic section was designed by the research team to collect information on gender, age, place of origin, presence of medical and psychiatric history, and consumption of prescription drugs.

2.4. Depression symptomatology

The Beck Depression Inventory (BDI-II) is a self-administered questionnaire used to measure the severity of depression in adults and adolescents, through the evaluation of symptoms such as pessimism, guilt, self-accusation, irritability, body image, loss of libido, fatigue, etc. Corresponding to the diagnostic criteria for depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition DSM-V (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition) and ICD-10 (World Health Organization, 1993). It is a questionnaire with 21 groups of three Likert-type statements. For each of the groups of statements the subject answers which one best describes how he has felt in the last week, including today. It is scored by adding the results of each group of statements, which are valued from 0 to 3 according to the selected statement. The range of the scale is from 0 to 63 and the cut-off points are: 0 to 13, does not suffer from depression; 14 to 19, mild depression; 20 to 28, moderate depression; and 29 to 63, severe depression.

2.5. Risky alcohol consumption

The CAGE inventory developed by Ewing (1984) is the oldest screening instrument for detecting routine drinkers. Due to its brevity, simplicity, and psychometric properties, it is the most widely used instrument (Cremonte et al., 2010; Ewing, 1984) for screening for alcohol abuse. In 1974, Mayfield (Mayfield et al., 1974) published the first validation study, and subsequently, its reliability and validity have been well documented in different settings and populations. Therefore, it represents an effective screening method for alcohol abuse.

2.6. Suicidal ideation

The 15-item version of the Plutchik Suicidal Risk Scale (PSRS) was used. This scale assesses previous suicide attempts, the intensity of current suicidal ideation, feelings of depression, hopelessness, and others. It is scored by giving a value of 1 to all affirmative answers and 0 to negative answers. A score equal to or greater than 6 is considered to indicate the presence of suicidal risk (Rubio et al., 1998). The internal consistency found in the Mexican population was 0.749 (Santana-Campas and Telles, 2018).

2.7. Statistical analysis

All analyzes were carried out using the SPSS 23.0 statistical program (SPSS Inc., Chicago, Illinois). Sociodemographic data were analyzed and presented as numbers and percentages.

The normal distribution of the results was estimated with the Kolmogorov-Smirnov test, in which $p < 0.001$ was normal, and it was decided to use non-parametric tests for inferential statistics, using the U-Mann Whitney, Kruskal-Wallis, and Chi-square tests. Statistically, significant differences were those whose $p < 0.05$.

3. Results

The total number of students who answered the April and December surveys was 247 (169, (68.4%) women and 78 (31.6%) men (Table 1). The age range was 18–31 years (M = 20.76, SD = 2.12). The sociodemographic and clinical characteristics of the participants are shown in

Table 1. Population characteristics.

Variable	N (%)
Gender	
Female	169 (68.4)
Male	78 (31.6)
Diagnosed with psychiatric disorder and under medical treatment	
No	201 (81.4)
Yes	46 (18.6)

Table 1. The reliability index of the tests in our study was: April BDI-II α = 0.857, December BDI-II α = 0.939; April CAGE α = 0.673, December CAGE α = 0.680; PSRS April α = 0.815, PSRS December α = 0.785. The number of students who reported not having psychiatric disorders was 201, while those with a diagnosis of psychiatric disorders were 46.

3.1. Beck Depression Inventory

The prevalence of depression in April was 19.84%, being statistically significantly higher in women (23.67%) than in men (11.54%) ($\chi2$ = 0.026). In December the prevalence of depression increased to 40.08%, in women 42.60% and in men 34.62% ($\chi2$ = 0.234). There are significant differences in the prevalence of depression between April and December in women (April 23.67% and December 42.6%, $\chi2$ = 0.000) and in men (April 11.64% and December 34.62%, $\chi2$ = 0.001) (Table 2).

Of the total of 247 students, 201 (81.4%) were without medication and 46 (18.6%) were medicated. Of the non-medicated students who had depression, there were 34 (16.92%) and 15 (32. 61%) of the drugs detected and the total was 19.84%, the result is statistically significant ($\chi2$ = 0.016).

Of the students without medication, 119 without depression and 82 with depression, representing 40.8% of the students. Of the medicated 29 without problems, 17 with problems represent 36.95%. The total number of students with disorders was 40.32%, the results are not statistically significant ($\chi2$ = 0.632).

Comparing the difference between April and December of those students without diagnostic of psychiatric disorders, in April the prevalence of depression was 16.92% and in December it increased to 40.80% ($\chi2$ = 0.000). Regarding medicated students, the prevalence in April was 32.61% and in December it was 36.96% ($\chi2$ = 0.662).

3.2. Plutchik suicide risk scale

The prevalence of suicidal ideation in April was 17.81%, being higher in women (19.53%) than in men (14.10%) ($\chi2$ = 0.300). In December the prevalence of suicidal ideation increased to 18.628%, in women 20.71%, and in men 14.10% ($\chi2$ = 0.215). There are no significant differences in the prevalence of risk of suicidal ideation between April and December in women ($\chi2$ = 0.786) and men ($\chi2$ = 1,000).

On April, 29/201 (13.43%) of the students without a diagnosis of psychiatric illness and who were not taking drugs had suicidal ideation, of the students diagnosed with disorders who were taking drugs with suicidal ideation 17/46 (36.96%) Chi 2 = 0.000.

For December without drugs with suicidal ideation, the percentage was 34/201 (16.921%), of those on drugs with ideation 12/46 (26.09%) Chi 0.149.

We are going to compare those without medication between April and December. Increase from 13.43% to 16.92%, from 27 to 34 students. Chi 2 = 0.330.

Now of the medicated between April and December. It decreased from 36.96% to 26.09%, from 17 to 12 students ($\chi2$ = 0.262).

3.3. Cage

The prevalence of risky alcohol consumption was 11.74% in April and 13.77% in December ($\chi2$ = 0.500). There are also no significant differences between the sexes, or between the medicated and non-medicated.

4. Discussion

In the present work, we investigated the state of mental health of undergraduate medical students from a private school in Mexico City, where the tests used for the investigation yielded good results on their reliability. We found a significant increase between April to December 2020 in the prevalence of depression symptoms, which increased from 19.84% at the beginning of the pandemic to 40.08% in December. The risk of suicidal ideation did not show significant changes, varying from 17.81% in April to 18.62% in December. The April results are similar to those reported before the COVID-19 pandemic in medical students (Rotenstein et al., 2016). A cross-sectional study conducted in the United States in May 2020 shows that the prevalence of moderate to severe depression in college students was 38.48% and that 18.04% presented suicidal ideations (X. Wang et al., 2020b). In France, another study conducted around the same dates showed that 16.1% of university students presented severe depression, 74.4% medium and severe depression, and 11.4% suicidal ideation (Wathelet et al., 2020). The high prevalence values in depression found in this latest study may be related to the fact that in Europe the onset of restrictions due to the pandemic started earlier than in Mexico.

The depression rate was higher in women than in men in both surveys, in women, it went from 20.67% in April to 42.6% in December; in the case of men, it went from 11.54% in April to 34.62%. These results confirm the higher prevalence of depression in women, which has been observed in the general population (Lim et al., 2018), in college students (Auerbach et al., 2018), and particularly in medical students (Pacheco et al., 2019; Tadeo-Álvarez et al., 2019), which manifests itself in pre-pandemic studies and is confirmed during the pandemic by COVID-19 (Wathelet et al., 2020).

The risk of suicidal ideation in medical students was within the ranges described in the literature (Rotenstein et al., 2016), without significant variations between April and December, despite the significant increase in the rate of depression observed in December. Unlike the results presented in other studies, no significant differences were observed in the rate of suicidal ideation between men and women (Czeisler et al., 2020).

Medical students diagnosed with an illness of the emotional sphere, who were in psychiatric treatment at the time of the evaluation, represented 18.6% of the study population. The results of the April survey show that at the beginning of the pandemic rates of depression and suicidal ideation are much higher than that of undiagnosed students, data that corroborate that mental disorders are important predictors of suicidal ideation (Kessler et al., 1999; Veisani et al., 2017). However, the results of the survey in December show interesting results, observing a significant increase in the rate of depression in students not diagnosed with mental disorders, which is not manifested in the population of students with mental disorders under treatment. The psychiatric treatment of students with mental disorders served as a protective factor against confinement derived from the COVID-19 pandemic that prevented the significant increase in the rate of students with depression and suicidal ideation, compared to the group of students without mental disorders.

The main limitations of the study detected are that the sample is relatively small and comes from a single educational institution, so it is not representative of the general population of medical students and this may undermine the generalizability of the results and limit the interpretation of size of the effect. Therefore, future studies should

Table 2. Prevalence of psychiatric disorders.

	Female	Male	Without psychiatric disorder	With psychiatric disorder	Total
April					
Depression	23.67	11.54*	16.92	32.61 ***	19.84
Suicide Risk	19.53	14.10	13.43	36.96 ***	17.81
Alcohol Consumption	11.83	11.54	10.44	17.39	11.74
December					
Depression	42.60**	34.62**	40.80**	36.95	40.08**
Suicide Risk	20.71	14.10	16.92	26.09	18.62
Alcohol Consumption	11.83	17.94	12.93	17.39	13.77

*p < 0.05 vs. Female, **p < 0.001 vs. April, ***p < 0.05 vs. Without psychiatric disorder.

incorporate a larger sample and from different universities. Also, this study mainly used self-reported questionnaires to measure psychiatric symptoms and did not make clinical diagnosis. The gold standard for establishing psychiatric diagnosis involved structured clinical interview and functional neuroimaging (Ho et al., 2020; Husain et al., 2020a, b).

Mexico is a middle-income country with a relatively high incidence of mental disorders (Medina-Mora et al., 2003), where a low proportion of the population seeks mental health care and even fewer receive treatment (Heinze et al., 2019; Lagunes-Cordoba et al., 2021). Today, the issue of psychiatric illness continues to be stigmatized by our society, especially among doctors and medical students where the proportion of medical students with depression seeking treatment is very low (Puthran et al., 2016).

The stigma towards mental disorders is one of the most urgent global problems of today (Rodríguez-Rivas et al., 2021) that generate high levels of social exclusion (Thornicroft et al., 2007) and low quality of life (Corrigan and Shapiro, 2010) that generate feelings of shame and guilt in those affected and worsen depressive symptoms and a high prevalence of suicidal ideation and behaviors is associated. Because medical students have high levels of stigma, this not only affects them, but also determines the care they give to patients affected by mental illness (Rodríguez-Rivas, 2021).

In this sense, adherence to psychiatric treatment has been seen to allow patients to better cope with the confinement conditions imposed by the contingency derived from the current pandemic. It is urgent to generate programs that reduce the stigmatization of people with psychiatric illnesses, especially in the medical environment, and to promote the mental health of students with institutional support services.

To help students manage stressful situations it is necessary to equip them with effective emotional coping resources. The most evidence-based treatment is cognitive behavioral therapy, either alone or in combination with other therapies, is useful for treating mental health disorders such as depression, and has the advantage that it can be applied online (Ho et al., 2020).

Declarations

Author contribution statement

Alejandro Dominguez-Gonzalez and Fernando Sebastián Ángeles-Téllez: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Gilberto Guzmán-Valdivia Gómez and Ricardo Secín-Diep: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

María Manjarrez-Ángeles: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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