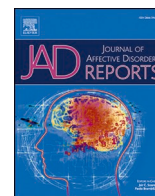




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Research Paper

Assessment of burnout syndrome and associated factors among medical students during the COVID-19 pandemic

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Background: Overwhelming requirements, a high degree of work, and prolonged exposure to emotionally demanding circumstances in work and life settings can lead to burnout syndrome. The purpose of the study is to assess burnout syndrome and its associated factors among medical students during the COVID-19 pandemic.

Methods: A cross-sectional, prospective, descriptive study was conducted in a Mexican medical school during the last week of the spring semester of 2021 using the Maslach Burnout Inventory-Student Survey (MBI-SS) and an associated factors survey.

Results: Based on the MBI-SS definition, most students (54.2%, $n = 332$) had burnout symptoms and high emotional exhaustion (79.6%, $n = 448$), high cynicism (57.3%, $n = 351$), and low academic effectiveness (36.4%, $n = 223$). After adjusting the associated factors, a significant correlation between the school year and the presence of burnout was identified (OR 1.127, 95% CI [1.023–1.241], $p < 0.05$). Regarding the current pandemic, the death of a family member by COVID-19 also put students at risk of developing burnout (OR 1.598*, 95% CI [1.080–2.363], $p < 0.05$).

Limitations: The main limitation of this study was the lack of a control group (before the pandemic); therefore, the high prevalence of burnout can only be hypothesized due to the pandemic but cannot be objectively evidenced. A prospective study after the pandemic is needed to resolve this question.

Conclusion: The coronavirus pandemic represents a challenge to the academic and psychological stability of students. It is essential to continue assessing burnout levels in medical students and the general population to treat them in time and improve mental health.

1. Introduction

Overwhelming requirements, a high degree of work, and prolonged exposure to emotionally demanding circumstances in work and life settings can lead to burnout syndrome. This condition is based on three dimensions: emotional exhaustion, depersonalization, and low personal accomplishment (Maslach et al., 1996; Thomas, 2004). The Maslach Burnout Inventory (MBI) is a validated and frequently used tool to measure this syndrome. A general version, the MBI-General Survey (MBI-GS), was developed, in which the burnout components are

conceptualized in broader terms. It has also been adapted for use in students, the MBI-Student Survey (MBI-SS), which consists of three subscales to evaluate the three dimensions of burnout: emotional exhaustion, cynicism, and academic efficacy (Hu and Schaufeli, 2009; Schaufeli et al., 2002; Galán et al., 2011).

Burnout among students refers to feeling exhausted due to study demands (emotional exhaustion), having a detached attitude toward one's study (cynicism), and feeling incompetent as a student (low academic efficacy) (Schaufeli et al., 2002; Bresó Esteve et al., 2003; Salanova et al., 2005). Compared to the general population, medical

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students have a higher prevalence of emotional exhaustion, depersonalization, and burnout (Dyrbye et al., 2014). Burnout prevalence among medical students is near or exceeds 50% (West et al., 2016; Dyrbye et al., 2008, 2011; Jezzini-Martinez et al., 2022; Saucedo-Uribe, et al., 2022). First-year students present the lowest frequency of burnout. According to previous literature, the prevalence increases as students advance through medical school (Galán et al., 2011; Meo et al., 2020).

Several studies have shown that having at least one burnout symptom can negatively affect medical students interfering with the teaching/learning process, causing drowsiness, fatigue, eating disorders, migraine, emotional instability, and even illicit drug use (Boni et al., 2018; Ashton and Kamali, 1995; Arora et al., 2016). An association between burnout, depression (Chiu et al., 2015; Njim et al., 2019), and anxiety (Talih et al., 2016) has also been described. Additionally, recent depressive episodes correlate with a higher prevalence of severe burnout (Njim et al., 2019; Ahola et al., 2005), with anxiety as a significant predictor (Talih et al., 2016).

The risk of infection from COVID-19 forced the implementation of isolation policies to minimize the spread of the disease (Usher et al., 2020). The quarantine conditions closed universities and suspended face-to-face teaching and learning sessions, causing stress, changes in learning behaviors, deterioration in work performance and study, worsening mental health, and increased depression in medical students (Meo et al., 2020; Zis et al., 2021; Debowska et al., 2020). This study aims to assess burnout syndrome and its associated factors among medical students during the COVID-19 pandemic.

2. Methods

2.1. Design, setting, and participants

A cross-sectional study was conducted to establish the prevalence and associated factors of burnout among medical students during the COVID-19 pandemic. An online survey was sent to all the students in a Mexican medical school with a 7-year program during the last week of the spring semester of 2021. The Institutional Review Board of the University previously approved the survey and study with registration number AH20-0003.

Through their institutional email, an individual link was provided to access the survey and answer anonymously. Students enrolled during the spring semester of 2021 were included. Those who were suspended, or not active students were excluded. Incomplete surveys were eliminated. Demographic data included age, sex, school year, and grade point average (GPA).

2.2. Assessment instrument

To evaluate burnout syndrome, we applied the MBI-SS. This instrument consists of 15 questions corresponding to the evaluation of emotional exhaustion, cynicism, and academic efficacy (Hederich-Martínez and Caballero-Domínguez, 2016; Hu and Schaufeli, 2009). The scores describe the frequency with which the student felt identified with each expression, ranging from 0 (never) to 6 (always). Results from the three domains were classified as emotional exhaustion, low (0–9), moderate (10–14), or high (>14); cynicism, low (0–1), moderate (2–6), or high (>6); and academic effectiveness, low (<22), moderate (23–27), or high (>28). An associated factors survey was applied in the last part of the study to survey their confidence in medical knowledge, fear of academic failure, concern for their professional future, family support and pressure, frequency of exercise, substance use, previously diagnosed psychiatric disorder, economic crisis, clinical rotations, fear of getting infected with COVID-19, and the death of a family member during the pandemic due to COVID-19.

Due to the anonymity of the survey, all participants who had bidimensional burnout (high emotional exhaustion and high cynicism) were provided with the results of their burnout risk and were given contact

information for psychological support. The medical school has several student mental healthcare programs provided by the University through the Department of Psychiatry of the University Hospital for easy access to all enrolled students.

2.3. Data analysis

Responses from all questionnaires were registered in a database using Microsoft Excel 2020 for Mac, version 16.43 (Microsoft Corp., Redmond, WA). These were analyzed using SPSS statistical package, version 25.0 (IBM Corp., Armonk, NY). Quantitative variables were summarized in central tendency and dispersion measures, and qualitative variables in frequencies and percentages. Student's *t*-test was used to compare quantitative variables. Associations in qualitative variables were tested using Pearson's Chi-Squared test, calculating the odds ratio (OR) and associated 95% confidence intervals (CI) to measure the degree of association. Variables with a *p*-value <0.05 in the univariate analysis were included in the multivariate. A statistical threshold of <0.05 was used throughout. A logistic regression model was performed with predetermined covariables. The reverse conditional method was used to introduce the covariates into the model. Model 1 is a "total effect model" that includes the variables that directly intervene in the relationship between burnout and associated factors. Model 2 is partially adjusted, and Model 3 is fully adjusted.

3. Results

A total of 613 medical students participated; of these, 62.3% (*n* = 382) were women. The demographic data showed that 72.8% (*n* = 446) of the students were between 20 and 25 years with participation from all the academic years. The most prevalent GPA (69.3%, *n* = 425) was between 80 and 90, and 18.1% (*n* = 111) had a previously diagnosed psychiatric disorder (Table 1).

Based on the MBI-SS definition, the majority of the sample had burnout symptoms (54.2%, *n* = 332). Results showed 79.6% (*n* = 448)

Table 1
Demographic data of the medical students.

Total <i>N</i> = 613 (%)	
Age	
<20	155 (25.3)
20–25	446 (72.8)
>25	12 (2.0)
Sex	
Men	231 (37.7)
Women	382 (62.3)
School Year	
1st-year	103 (16.8)
2nd-year	102 (16.6)
3rd-year	104 (17.0)
4th-year	126 (20.6)
5th-year	85 (13.9)
6th-year	42 (6.9)
7th-year (Social-Service)	51 (8.3)
Average grade	
<70	14 (2.3)
70–80	95 (15.5)
80–90	425 (69.3)
>90	79 (12.9)
Psychiatric disorders	
None	502 (81.9)
Major depressive disorder	59 (9.6)
General anxiety disorder	64 (10.4)
Attention deficit hyperactivity disorder	14 (2.2)
Borderline personality disorder	8 (1.3)
Post-traumatic stress disorder	6 (0.9)
Bipolar disorder II	6 (0.9)
Others	5 (0.8)

Psychiatric disorders: 41 students had 2 or more psychiatric disorders.

scored high on emotional exhaustion, 57.3% (n = 351) high on cynicism, and 36.4% (n = 223) low on academic effectiveness. Female students presented a higher incidence of burnout (60.2% vs 44.2%, p = 0.00), emotional exhaustion (79.6% vs 72.7%, p = 0.003) and increased cynicism (62.3% vs 48.5%, p = 0.003) than men who were statistically more prevalent towards lower academic effectiveness (p = 0.017) (Table 2). According to the domain, severity, and school year, the students who presented higher burnout levels (66.7%, n = 26) and cynicism (66.7%, n = 28) were enrolled in the 6th-year. The highest emotional exhaustion was in 3rd-year students (87.5%, n = 91), and the lowest academic efficacy was seen in first-year students (45.6%, n = 47) (Table 2).

The correlation of associated factors between the burnout and the non-burnout categories was significantly different in almost all factors, except clinical rotations during COVID-19, exercise, and fear of being infected with COVID-19 (Table 3). In questions regarding the influence of the pandemic in burnout, only the death of a family member during the pandemic (63.4% vs. 36.6%, p = 0.006), and experiencing an economic crisis in the family due to the pandemic (56.0% vs. 44.0%, p = 0.01) were significant (Table 3).

After adjusting the associated factors, we found a significant correlation between the school year and the presence of burnout (OR 1.127, 95% CI [1.023–1.241], p<0.05). Women were almost one time more likely to develop burnout than men (OR 1.902, 95% CI [1.341–2.698], p<0.001), and the students who smoked were one time more likely than those who did not (OR 2.117, 95% CI [1.177–3.806], p<0.05). Regarding the current pandemic, the death of a family member by COVID-19 also placed the students at risk of developing burnout (OR 1.598*, 95% CI [1.080–2.363, p<0.05] (Table 4).

4. Discussion

4.1. Main findings

A high prevalence of burnout had been previously identified; therefore, the objective was to determine the possible associated factors, family factors, free time, drug use, and COVID-19 pandemic-related factors (Jezzini-Martinez et al., 2022). This study demonstrated a steady increase in burnout in relation to the academic year, with a spike in the

third-year. This was comparable to the prevalence among sixth-year students, which may be due to the difficulty of the courses and the transition from basic sciences to clinical rotations during third-year. This study's findings show that females are more likely to experience burnout symptoms reporting higher levels of emotional exhaustion and cynicism than male students. Inconsistencies exist among studies regarding sex differences in burnout, however, a systematic review reported that female medical students are at a higher risk for mental health conditions, and identified female sex as one of the major risk factors for developing burnout syndrome (Peng et al., 2023). It is complex to identify the reasons for these differences. However, this may be due to women being more prone to mental distress, even before the pandemic; nevertheless, gender bias and discrimination could also influence (Barners et al., 2019; Chesak et al., 2020; Jezzini-Martinez et al., 2021).

4.2. Associated factors

A lack of trust in medical knowledge, fear of academic failure, concern for the professional future, family pressure, not having enough leisure time, experiencing a family economic crisis, and abuse of substances were associated with burnout syndrome among medical students. The death of a family member by COVID-19 was related to the risk of suffering from the syndrome. However, the fear of becoming or being already infected and performing clinical rotations during the pandemic did not result in a significant difference between burnout and non-burnout participants. Previous studies have shown that poor lifestyle and health behaviors as well as high levels of burnout are prevalent among medical students. However, few have associated burnout with health behaviors (Howie et al., 2022; Nteveros et al., 2020). Smoking has been reported as an issue in university settings, but it is not typically reported as a risk factor to develop burnout (Cecil et al., 2014). Our findings show that students who smoke are more likely to have burnout. Likewise, substance abuse is another lifestyle behavior common among medical students, which our results associate with burnout.

4.3. Burnout among healthcare workers during the pandemic

The first studies evaluating burnout during the pandemic were on health workers and reflected that they are a population at risk. During

Table 2
Categorization by domain, severity and school year of Burnout Syndrome.

Domain	Level	Total	Male	Female	p-value	1st-year n = 103	2nd-year n = 102	3rd-year n = 104	4th-year n = 126	5th-year n = 85	6th-year n = 42	7th-year n = 51	p-value
Emotional exhaustion	Low	52(8.5)	29	23(6.0)	0.003*	17	6(5.9)	1(1.0)	17	5(5.9)	5(11.9)	1(2.0)	0.000*
	ModerateHigh	73	(12.6)	39(10.2)		(16.5)	12	12	(13.5)	10	1(2.4)	11	
		(11.9)	34	488		16	(11.8)	(11.5)	11(8.7)	(11.8)	36	(21.6)	
		488	(14.7)	(79.6)		(15.5)	84	91	98	70	(85.7)	39	
		(79.6)	168		79	(82.4)	(87.5)	(77.8)	(82.4)		(76.5)		
			(72.7)		(68.0)								
Cynicism	Low	58(9.5)	25	33(8.6)	0.003*	22	12	7(6.7)	8(6.3)	6(7.1)	1(2.4)	2(3.9)	0.001*
	Moderate	204	(10.8)	110		(21.4)	(11.8)	31	41	28	13	16	
		(33.3)	94	(28.8)		32	43	(29.8)	(32.5)	(32.9)	(31.0)	(31.4)	
		351	(40.7)	239		(31.1)	(42.2)	66	77	51	28	33	
		(57.3)	112	(62.3)	49	47	(63.5)	(61.1)	(60.0)	(66.7)	(64.7)		
			(48.5)		(47.6)	(46.1)							
Academic efficacy	Low	223	74	149	0.017*	47	38	44	40	25	12	17	0.003*
	Moderate	(36.4)	(32.0)	(39.0)		(45.6)	(37.3)	(42.3)	(31.7)	(29.4)	(28.6)	(33.3)	
		213	75	138		38	41	38	46	21	13	16	
		(34.7)	(32.5)	(36.1)		(36.9)	(40.2)	(36.2)	(36.5)	(24.7)	(31.0)	(31.4)	
		(28.9)	(35.5)		18	23	22	40	39	17	18		
			(35.5)		(17.5)	(22.5)	(21.2)	(31.7)	(45.9)	(40.5)	(35.3)		
Burnout	No	281	129	152	0.000*	58	55	40	53	38	16	21	0.068
	Yes	(45.8)	(55.8)	(39.8)		(56.3)	(53.9)	(38.5)	(42.1)	(44.7)	(38.1)	(41.2)	
		332	102	230		45	47	64	73	47	26	30	
		(54.2)	(44.2)	(60.2)	(43.7)	(46.1)	(61.5)	(57.9)	(55.3)	(61.9)	(58.8)		

All values expressed in number of participants and percentages between parenthesis (%). Female gender is the first comparator. School year is the second comparator. *Statistically significant with a p-value of <0.05. Burnout two-dimensional (Defined as high emotional exhaustion and cynicism).

Table 3
Categorization of burnout and non-burnout by associated factors.

Associated factors	Non-burnout	Burnout	p-value
Confidence in medical knowledge	184(59.7)	124 (40.3)	0.000 *
Clinical rotations during COVID-19	27(40.3)	40(59.7)	0.335
Fear of academic failure	254(43.9)	324 (56.1)	0.000 *
Concern for the professional future	261(44.1)	331 (55.9)	0.000 *
Family pressure	100(37.0)	170 (63.0)	0.000 *
Family support	272(47.2)	304 (52.8)	0.023 *
Enough leisure time	194(50.7)	189 (49.3)	0.002 *
Practice exercise regularly			
<i>Never</i>	30(39.0)	47(61.0)	
<i>Almost never</i>	58(40.0)	87(60.0)	
<i>Some times</i>	103(46.2)	120 (53.8)	0.060
<i>Almost every day</i>	68(51.1)	65(48.9)	
<i>Every day</i>	22(62.9)	13(37.1)	
Cigarette smoking			
<i>Never</i>	241(47.6)	265 (52.4)	
<i>Almost never</i>	20(52.6)	18(47.4)	0.045
<i>Some times</i>	10(25.6)	29(74.4)	*
<i>Almost every day</i>	7(35.0)	13(65.0)	
<i>Every day</i>	3(30.0)	7(70.0)	
Alcohol consumption			
<i>Never</i>	118(55.9)	93(44.1)	0.001
<i>Almost never</i>	64(44.1)	81(55.9)	*
<i>Some times</i>	99(39.6)	151 (60.4)	
<i>Almost every day</i>	0(0.0)	6(100.0)	
<i>Every day</i>	0(0.0)	1(100.0)	
Drug use (marijuana, LSD, cocaine)	4(22.2)	14(77.8)	0.041 *
Previously diagnosed psychiatric disorder	41(36.9)	70(63.1)	0.037 *
Family experiencing an economic crisis			
<i>Not sure</i>	1(50.0)	1(50.0)	
<i>No</i>	209(49.3)	215 (50.7)	0.01*
<i>Yes, since the COVID-19 pandemic</i>	51(44.0)	65(56.0)	
<i>Yes, since before the COVID-19 pandemic</i>	20(28.2)	51(71.8)	
Fear of getting infected with COVID-19			
<i>Not afraid and have not been infected</i>	88(51.2)	84(48.8)	
<i>Not afraid and already got infected</i>	32(48.5)	34(51.5)	
<i>Afraid and have not been infected</i>	131(42.3)	179 (57.7)	0.28
<i>Afraid and already got infected</i>	30(46.2)	35(53.8)	
Death of a family member by COVID-19	59(36.6)	102 (63.4)	0.006 *

* Statistically significant with a p-value of <0.05.

the pandemic, it took only a few months to acknowledge the importance of the physician's work, putting their well-being and coexistence with their families at risk to treat the sick. Wu et al. explored the prevalence of burnout amongst medical staff in China. Only 23% of physicians felt more burnout during the COVID-19 pandemic compared with before. One quarter (25%) of the participants felt increased emotional exhaustion and depersonalization, with almost half reporting decreased personal accomplishment (Wu et al., 2020). In contrast, Guisti et al. surveyed healthcare professionals working in Northern Italy and reported that more than two-thirds of the participants had moderate to severe levels of emotional exhaustion and reduced personal accomplishment, with a 76% prevalence of burnout (Kannampallil et al., 2020; Guisti et al., 2020; Amanullah and Ramesh Shankar, 2020).

4.4. Burnout among medical students during the pandemic

It is important to evaluate burnout among medical students considering the high demands and pressures of the career and academic load. High prevalences of burnout have already been reported and may worsen with the added factors of the COVID-19 pandemic (West et al., 2016; Dyrbye et al., 2008, 2011). Due to the pandemic, an exclusive online academic program became a novel and non-optional environment for students around the globe, creating new challenges for students and educators, causing stress, fear, and uncertainty (Muñoz-Leija et al., 2020; Krebs et al., 2021).

A comparison of pre- and post-pandemic burnout syndrome made by Zis et al., 2021, reported that the overall burnout prevalence among medical students did not differ significantly between the two periods (pre-COVID-19 18.1% vs. COVID-19 18.2%). The burnout prevalence dropped significantly in year 4 (pre-COVID-19 40.7% vs. COVID-19 16.7%, $p = 0.011$), whereas it increased significantly in year 6 (pre-COVID-19 27.6% vs. COVID-19 50%, $p = 0.01$) (Zis et al., 2021). However, the overall burnout prevalence reported by Zis et al., 2021 is much lower than the results from this study (18.2% vs. 54.2%), and associated factors were not measured. These differences could be due to the differences between academic courses, online teaching methods, the number of COVID-19 cases, death toll, hospital saturation, or even cultural differences. A study made among Kazakhstan medical students reported a decrease in burnout levels between traditional learning (pre-pandemic) and online learning (during the pandemic) (27.6% vs. 16.7%), concluding that online learning had a positive impact on the mental health of students (Bolotov et al., 2020).

The pandemic became a world problem without warning, forcing everyone to adopt changes to their everyday lives, and implementing social distancing as a health initiative. Facing this represents a challenge to students' academic and psychological stability due to the changes it can cause in daily life, interpersonal interaction, learning methods, and mental health.

5. Limitations and future directions

The main limitation of this study was the lack of a control group (before the pandemic); therefore, the high prevalence of burnout can only be hypothesized due to the pandemic but cannot be objectively evidenced. A prospective study after the pandemic is needed to resolve this question. The online-learning method should be evaluated deeply and considered as a possible associated factor, as well as the implications it may have for future generations (Krebs et al., 2021). Although the survey was made available to students through their institutional emails and social media, the response was low, with 613 participants in a school with over 7000 students.

Although the University already has psychological support programs available to all students through mental health programs on request, these may present a challenge. The programs were designed for face-to-face interaction with trained psychologists, and when necessary, a psychiatrist. Mental health programs need to achieve greater dissemination and adapt to new social distancing standards. It is also essential to continue assessing burnout levels in medical students and the general population to treat them in time and improve mental health.

In conclusion, the results of this study demonstrate the significance of studying burnout prevalence and associated factors in diverse academic institutions, particularly in the context of medical education, and further emphasize the need to devise and implement comprehensive strategies aimed at improving the psychological well-being of future physicians.

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Table 4
Risk to develop burnout according to associated factors.

Variable	Model 1 OR	95%CI	Model 2 OR	95%CI	Model 3 OR	95%CI	
School Year	1.127*	1.023–1.241	1.180*	1.064–1.309	1.194**	1.074–1.327	
Gender	1.902**	1.341–2.698	1.519*	1.051–2.195	1.449	0.993–2.11	
Death of a family member by COVID-19		1.598*	1.080–2.363	1.645*	1.092–2.478	1.612*	1.067–2.437
Cigarette smoking		2.117*	1.177–3.806	1.976*	1.072–3.644	1.871	0.992–3.530
Concern for the professional future		20.067*	2.632–152.987	23.664*	3.042–184.066	20.861*	2.645–164.515
Family Pressure		1.921**	1.365–2.705	1.764*	1.235–2520	1.620*	1.127–2.327
Enough leisure time			0.619*	0.425–0.902	0.648*	0.443–0.948	
Confidence in medical knowledge			0.318**	0.222–0.455	0.334**	0.233–0.481	
Fear of academic failure					2.009	0.818–4.935	
Family Support					0.544	0.237–1.253	
Practice exercise regularly					0.773	0.531–1.124	
Drug use (marijuana, LSD, cocaine)					2.452	0.631–9.520	

Reverse conditional method for introducing the covariates into the model was used. Model 1 is a “total effect model” which includes the variables that directly intervene with the relationship between the presence of burnout and associated factors. * $p < 0.05$.

** $p < 0.001$. Model 2 is partially adjusted, and Model 3 is fully adjusted.

Ethical considerations

The study was approved by the Ethics and Research Committees of the Hospital Universitario "Dr. Jose Eleuterio Gonzalez" with registration number AH20–0003.

Declaration of Competing Interest

No potential competing interest was reported by the authors.

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