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ASSESSING BURNOUT LEVELS: A COMPARATIVE ANALYSIS BETWEEN CLINICAL RESIDENTS AND MEDICAL STUDENTS AMIDST THE COVID-19 PANDEMIC IN A REFERRAL HOSPITAL

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Abstract

Background: The COVID-19 pandemic has significantly affected healthcare workers, leading to increased stress and burnout.

Objectives: A comparative study of burnout syndrome in the residents as frontlines and medical students as a control group.

Methods: This study conducted in Tehran, Iran, investigates burnout syndrome among specialized clinical residents and medical students during the pandemic, focusing on prevalence, contributing factors, and potential implications. Data was collected through an online survey, including demographic information and the Maslach Burnout Inventory (MBI), with statistical analyses using T-tests, ANOVA, and ANCOVA.

Results: Surveying 109 specialized residents and 109 medical students, the study reveals significant differences in burnout components. Specialized residents showed higher emotional exhaustion, depersonalization, and overall burnout compared to medical students (P-value<0.05). Working times and involvement in COVID patient care were identified as significant contributors to burnout, with gender differences associated with depersonalization. The impact of working times on emotional exhaustion, depersonalization, and burnout syndrome was also noted.

Conclusion: The study highlights the high prevalence of burnout among specialized residents and calls for targeted interventions. It emphasizes the importance of regulating work hours and introducing stress-reducing activities. The research calls for health authorities to implement measures to promote mental well-being among healthcare professionals, emphasizing the complex nature of burnout during pandemics.

Key words: Burnout syndrome, COVID-19, Internship and residency

Introduction

The COVID-19 pandemic as a bone of contention for the intelligentsia and academia has significantly impacted healthcare workers (1), leading to increased stress and anxiety due to increased workload, restrictions on social relations, fear of contracting the virus, sadness over patient deaths, and sleep deprivation. This has resulted in decreased mental and physical performance, problem-solving ability, and concentration, ultimately leading to burnout syndrome (2–6).

Burnout syndrome is a pathological syndrome more common in people whose jobs are accompanied by continuous stress. Studies have investigated burnout syndrome in healthcare workers abroad and within the country (7). One study found that 53% of healthcare workers experienced high levels of burnout, with emotional exhaustion, depersonalization, and lack of personal accomplishment being the main components (7). Another study at Verona University Hospital in Italy found that 38.3% had emotional exhaustion, 46.5% had personal accomplishment, and 26.5% had depersonalization (8).

A cross-sectional study in Spain found that the prevalence of burnout syndrome was 43.4%, higher in frontline department employees compared to regular department employees. A study in Italy found that many healthcare professionals reported high scores on at least one Maslach Burnout Inventory (MBI) domain, specifically more than 1 in 3 high emotional exhaustions scores and 1 in 4 high depersonalization scores. In contrast, only 15% reported low levels of job satisfaction in this field (9).

Medical residents are more at risk of burnout syndrome and damage to their quality of life due to higher levels of work and professional responsibility from the beginning of their course, while also benefiting from less social and economic support and less coherent education in the field of professionalism (10–15). Statistics show that the level of suicidal thoughts among medical students and young doctors is higher than the average of society (16).

The World Health Organization and the European Medical Association have been warning about the increase in burnout syndrome for years, and with the spread of the coronavirus, medical associations have called for increased awareness, investigation, and effective measures in this field (17–19).

Since the beginning of the COVID-19 pandemic, there have been speculations in the medical community regarding the possible increase in suicide cases and depression among specialized residents, and the possibility of its association with burnout syndrome (20).

Due to importance of burnout syndrome and its complications, in present study, medical students were used as a control group to investigate the effects of the pandemic on these issues.

Material and Methods

This retrospective study compared two groups of specialized clinical residents and incoming medical students in Imam Khomeini Hospital Complex (IKHC), Tehran, Iran, during the COVID-

19 pandemic. The study included residents from various disciplines who were involved in caring for COVID-19 patients in hospitals affiliated with medical sciences in Tehran, as well as incoming medical students who were willing to participate.
The data collection was conducted by creating and distributing an online survey to relevant internet communities, which consisted of two parts: 1) a data sheet that included age, sex, working hours in 24 hours, marital status, involvement in caring for COVID-19 patients, working months involved in caring for COVID-19 patients, placement in special care conditions such as cardiopulmonary resuscitation (CPR) of patients, and vaccination; 2) The MBI questionnaire, an international and valid tool, was used to measure the intensity of job burnout in the workplace using three dimensions: emotional exhaustion, depersonalization, and personal accomplishment.
The results of these three MBI subscales represent job burnout, with scores ranging from 9 to 45 for emotional exhaustion, 5 to 25 for depersonalization, and 8 to 40 for personal accomplishment subscales.

The study received approval from the ethics committee of the Tehran University of Medical Sciences (ethics number: IR.TUMS.IKHC.REC.1400.488). After the completion of the study period, the data was downloaded from the online survey tool, and the names of the individuals were removed and coded. The sample size was estimated to be 22 people in each group, with 0.2 added to compensate for missing cases, but to assume confounding variables, 80 people were added to each group despite the limitation of resident numbers. Finally, to increase power of study, the sample size in each group was considered.
To statistically compare the two groups of specialized residents and medical students by age, sex, working hours, marital status, involvement in caring for COVID-19 patients, the number of months of caring for COVID-19 patients, and special working conditions such as intubation and vaccination with the burnout syndrome variable and its components, a hypothesis test statistic (T-test) was used, and the analysis of variance (ANOVA) test was used to investigate other variables that could have skewed the results.

Results

The study surveyed 109 specialized residents and 109 medical students, with the 20-25 age group having the highest frequency (33.5%), followed by the over 45 age group (1.8%). Out of the total participants, 48.2% were women, and 28.4% were married. (Table 1).

Table 1-Frequency distribution of demographic information

Factor	**Cofactor**	**Total Participants N (%)**	**Resident (N=109) -50%**	**Medical student (N=109) -50%**
Age	20-25years	73(33.5%)	0	73(67%)
	25-30years	64(29.4%)	34(31.2%)	30(27.5%)
	30-35years	68(31.2%)	63(57.8%)	5(4.6%)
	35-45years	9(4.1%)	9(8.3%)	0
	>45years	4(1.8%)	4(3.7%)	0
Gender	Female	105(48.2%)	57(52.3%)	48(44%)
	Male	113(51.8%)	54(49.5%)	59(54.1%)
Work time	0-6hours	51(23.4%)	6(5.5%)	45(41.3%)
	6-12hours	60(27.5%)	21(19.3%)	39(35.8%)
	12-18hours	62(28.4%)	42(38.5%)	20(18.3%)
	18-24hours	45(20.6%)	43(39.4%)	2(1.8%)
Marital status	Single	156(71.6%)	72(66%)	84(77%)
	Married	62(28.4%)	40(36.7%)	22(20.2%)

Involving at medical care of COVID-19 patients	Yes	181(83%)	100(91.7%)	81(74.3%)
	NO	37(17%)	12(11%)	25(22.9%)
Months of COVID-19 patients' care	0-3months	88(40.4%)	18(16.5%)	70(64.2%)
	3-6months	13(6%)	6(5.5%)	7(6.4%)
	6-9months	30(13.8%)	18(16.5%)	12(11%)
	>9months	78(35.8%)	69(63.3%)	9(8.3%)
Involving at COVID-19 patients' intensive care (CPR[a] & Intubation)	Yes	146(67%)	95(87.2%)	51(46.8%)
	No	72(33%)	16(14.7%)	56(51.4%)
Vaccination status	Yes	213(97.7%)	107(98.2%)	106(97.2%)
	No	5(2.3%)	5(4.6%)	0

[a]CPR: Cardiopulmonary resuscitation

The subjects under investigation were categorized into groups according to their working hours within a 24-hour period, specifically 0-6, 6-12, 12-18, and 18-24 hours. The 12–18-hour group has the largest frequency, consisting of 62 individuals (28.4%), while the 18–24-hour group has the lowest frequency, with 45 individuals (20.6%). Furthermore, out of the total participants, 181 individuals (83%) were engaged in providing care for COVID-19 patients, while 37 participants (17%) were not active in caregiving activities. (Table 1)

The study categorized the duration of providing care for COVID-19 patients into four groups: 0-3 months, 3-6 months, 6-9 months, and more than 9 months. The 0-3 months group had the highest frequency (40.4%), while the 3-6 months group had the lowest (6%). (Table 1)
In total, 146 participants, accounting for 67% of the sample, have encountered unique circumstances such as resuscitation and intubation of COVID-19 patients. In addition, 97.7% of the 218 participants (213 people) were immunized, as shown in Table 1.
The study shows that specialized residents experience higher levels of emotional exhaustion, depersonalization, and burnout syndrome compared to medical students, while medical students have a higher average in terms of personal achievements. These differences are statistically significant (P-value<0.05). (Table 2).

Table 2. Comparison of Mean (SD) in two groups of residents and medical students based on Maslach burnout inventory

Factor	Group (N)	Mean (SD[a])	T[b](P-value)
Emotional Exhaustion	Medical student (106)	25.8(6.2)	-6.03(<0.001)
	Resident (111)	30.9(6.2)	
Depersonalization	Medical student (107)	11.7(3.52)	-3.13(.002)
	Resident (110)	13.38(4.35)	
Personal Accomplishment	Medical student (108)	27.68(5.45)	+2.12(.036)
	Resident (108)	26.32(3.85)	
Total	Medical student (105)	65.33(8.46)	-4.36(<0.001)
	Resident (107)	70.53(8.89)	

[a]**SD** (Standard Deviation): In statistics, the standard deviation measures the variation or dispersion of a set of values.

[b]**T**(T-test): In statistics, the t-value measures the size of the difference relative to the variation in sample data or compares the means of two groups.

Based on the ANOVA test (Table No. 3), there was a statistically significant disparity in the mean emotional exhaustion scores across emotional exhaustion scores among specialized residents and medical students, age, working times, and specific work conditions. (P-value<0.05). The average ratings of depersonalization exhibited statistically significant variations across several groups, including specialist residents and medical students, gender, working times, and the duration of COVID-19 patient care (P-value<0.05). Personal accomplishment scores were only significant among specialist residents, medical students, and those caring for COVID-19 patients (P-value<0.05). The mean scores of burnout syndrome varied between the four groups, except for gender and marital status (P-value<0.05).

Table 3. Analysis of Variance (ANOVA) test of burnout syndrome between residents and medical students during COVID-19 pandemic

Variables	Emotional Exhaustion F (P-value)	Depersonalization F (P-value)	Personal Accomplishment F (P-value)	Total F (P-value)
Groups (resident/ medical students)	36.41 (<0.001)	9.74 (0.002)	4.476 (0.036)	19 (<0.001)
Age	11.57 (<0.001)	2.57 (0.056)	0.755 (0.521)	7.44 (<0.001)
Gender	0.004 (0.95)	4.48 (0.035)	0.0 (0.989)	1.47 (0.227)
Work time	22.22 (<0.001)	10.42 (<0.001)	1.47 (0.223)	19.21 (<0.001)
Marital status	0.21 (0.642)	1.39 (0.24)	0.203 (0.653)	0.165 (0.685)
Involving at medical care of COVID-19 patients	0.712 (0.4)	0.199 (0.656)	11.44 (0.001)	6.18 (0.014)
Months of COVID-19 patients' care	11.96 (<0.001)	2.92 (0.035)	1.43 (0.236)	13.71 (<0.001)
Involving at COVID-19 patients' intensive care (CPR & Intubation)	11.19 (<0.001)	3.76 (0.054)	1.42 (0.236)	20.95 (0.029)
Vaccination status	7.88 (0.005)	2.2 (0.139)	1.53 (0.217)	4.31 (0.039)

These findings highlight the need for better understanding and management of emotional exhaustion and burnout syndrome.

The ANCOVA test found no significant difference in the effects of age, working times, COVID-19 patient care, special conditions, and vaccination between specialized residents and medical students

(P-value=0.276). However, the working time variable gained significance in a different analysis (Table 4).

Table 4. Analysis of Covariance (ANCOVA) test of Burnout Syndrome between residents and medical students during the COVID-19 pandemic

Source	**Emotional Exhaustion** F(P-value)	**Depersonalization** F(P-value)	**Personal Accomplishment** F(P-value)	**Total** F(P-value)
Groups (resident/ medical students)	1.18(0.278)	0.119(0.731)	7.65(0.006)	1.084(0.299)
Age	0.336(0.8)	0.681(0.565)	-[a]	0.317(0.813)
Gender	-	3.43(0.065)	-	-
Work time	6.84(<0.001)	5.52(<0.001)	-	9.026(<0.001)
Marital status	-	-	-	-
Care of COVID-19 patients	-	-	14.69(<0.001)	0.024(0.876)
The month of COVID-19 patients' care	2.05(0.108)	1.42(0.214)	-	4.22(0.006)
Intensive care of COVID-19 patients	0.21(0.884)	0.145(0.705)	-	1.123(0.291)
Vaccine	3.07(0.081)	0.147(0.702)	-	1.11(0.292)

[a]Variables that P value is greater than or equal to two-tenths in the univariate test were therefore not included in the model and multiple tests.

Age, gender, working hours, the number of months spent caring for COVID-19 patients, the special conditions of caring for COVID-19 patients, and vaccination do not make a significant difference between the two groups of specialized residents and medical students, even when the depersonalization variables are considered (P-value = 0.731). Similarly, in a separate analysis, only working times have become significant (Table 4).

By managing the impact of caring for COVID-19 patients, there is a notable distinction in the mean scores of personal successes between specialist residents and medical students (P-value = 0.006). Significant findings were observed in a separate analysis regarding the variable of caring for COVID-19 patients, as indicated in Table 4.

There is no significant difference between specialization and medical student (P-value=0.299) when controlling for variables like age, working hours, caring for COVID-19 patients, the number of months spent providing care, and special circumstances of providing care for patients like intubation and vaccination. However, a separate study has revealed that the factors of working hours and the duration of caring for COVID-19 patients have emerged as statistically significant variables (Table 4).

This study also found the variable of working times has been found to have a significant impact on emotional exhaustion, depersonalization, and burnout syndrome, even after controlling for other confounding variables. As working times increased, the average scores for these factors also increased (P-value<0.001). However, working times did not affect personal accomplishment, as it was not a confounding variable. The only confounding variable for personal accomplishment was caring for COVID-19 patients, which showed a significant difference when controlled (P-value<0.001). Residents had a higher frequency of caring for COVID-19 patients compared to medical students (89% versus 77%) (Table 4)

Discussion

The study found that burnout syndrome was more prevalent among specialized residents during the COVID-19 era than among medical students. Factors such as age, gender, marital status, working times, vaccinations, conflict with care COVID-19, and the number of months related to it were investigated. Gender was found to be the most associated with depersonalization and did not affect emotional exhaustion, personal accomplishment, or burnout syndrome. Working times were found to be a significant risk factor for burnout syndrome and its components.

Marital status did not significantly affect burnout syndrome and its components. The conflict of caring for COVID-19 patients caused significant differences in personal accomplishment, while care involvement did not affect other burnout components. The number of months involved in caring for COVID-19 patients had no significant difference in personal accomplishment but caused significant differences in burnout syndrome and its other components. Age variables and special care for COVID-19 patients, such as intubation and vaccination, caused significant differences in job burnout syndrome and emotional exhaustion but did not impact depersonalization or personal accomplishment.

Our study found that depersonalization was more prevalent among men than women, but not in other aspects of job burnout. Age and its progression resulted in disparities in emotional exhaustion and burnout syndrome. Specialized residents had a higher prevalence of burnout syndrome compared to medical students.

Healthcare professionals who had direct interaction with COVID-19-infected patients experienced heightened emotional weariness and depersonalization (8). Like our study, the likelihood of experiencing job exhaustion was significantly elevated across all three dimensions of job burnout syndrome (almost 2.5 times) among residents.

According to our findings, job burnout is more prevalent among residents than medical students, with age only affecting emotional exhaustion and burnout syndrome, not personal success, or depersonalization. A similar study found a significant global prevalence of burnout syndrome among medical trainees, with a higher prevalence among doctors under the age of 35 (21). Employees in ordinary departments are more likely to have burnout syndrome occupations than those in COVID-19 frontline departments, such as emergency and intensive care units (86% vs. 66%, p-value<005).

Research on burnout among medical personnel in Iran during the COVID-19 pandemic is limited (22–24). One of the most precise research projects assessed cross-sectional surveys of burnout among the treatment personnel (7). Conversely, we have conducted a comparison between two groups consisting of specialist residents and medical students who had limited exposure to COVID-19 patients. Several demographic characteristics, including age, sex, marital status, working hours, number of months of care, number of months of experience caring for COVID-19 patients, and specific conditions of care such intubation and cardiac resuscitation, have also been considered in

this study. Although they had not been looked into in earlier research, the treatment box and vaccine option were also included in the demographic questions.

The study employed ANCOVA test analysis in both univariate and multivariate formats, which is a robust and accurate statistical method for analyzing many factors alongside qualitative and quantitative dependent variables. Nevertheless, this analysis has not been employed in prior investigations. Furthermore, this study utilized the Iranianized version of MBI.

The participants received the questionnaire in April 2022, during the sixth surge of COVID-19 in Iran caused by the omicron variant, which occurred in late February 2022. The seventh surge took place in July 2022. The questionnaire was delivered during two distinct periods, with a 30-day interval between the sixth peak. It is possible that the exhaustion experienced by the treatment personnel was alleviated within one month due to a decrease in the number of patients.
Examining psychological aspects such as depression, anxiety, suicidal thoughts, and other related emotions could potentially enhance the validity of the study.

Conclusion

Burnout syndrome is a serious health issue that can lead to irreversible difficulties. According to the present study, specialized residents have a higher prevalence of burnout compared to medical students. Factors such as age, working hours, COVID-19 patient treatment, care duration, and specific situations like intubation and vaccination increase the risk. Working hours are considered a primary contributor to burnout. Health authorities should implement measures to regulate working hours and incorporate fun activities like exercise into their daily routines. This study can serve as a foundation for future intervention studies.

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Conflict of interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be constructed as a potential conflict of interest.

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