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Burnout and Associated Factors among Medical Residents in Ahvaz Jundishapur University of Medical Sciences, Iran (2021)

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Abstract

Background: Burnout is a common psychological state among medical residents, which may affect their training, safety, and clinical performance. This study aimed to examine burnout, and its associated factors among the medical residents in university hospitals of Ahvaz Jundishapur University of Medical Sciences, Iran.

Material and Methods: This was a cross-sectional study conducted on 300 medical residents from teaching hospitals in March 2021, using a web-based questionnaire. The validated Persian version of Maslach Burnout Questionnaire was used to collect the data. Multivariate linear regression analysis was used to identify factors significantly associated with burnout.

Results: From 300 medical residents, 291(97%) responded. The participants' mean age was 32.9± 4.4, and over half (60.1%) were females, and 140(48.1%) were married. Burnout was reported by 77.3% of the medical residents. As far as emotional exhaustion (EE) was concerned, 25.1% reported high levels of burnout. In addition, high levels of depersonalization (DP) were reported by 19.9% of the participants, and 32.3% indicated a sense of low professional accomplishment (PA). There were notable differences in burnout and its dimensions among medical residents specializing in various fields, with surgical-specialty residents reporting the highest levels (p=0.000). Moreover, burnout was significantly associated with age (p=0.036), residency year (p=0.001), and specialty type (p=0.000). Based on multiple linear regression model, higher burnout scores were predicted by age (p=0.001), and specialty type (p=0.001).

Conclusions: Based on our findings, there is a relatively high rate of burnout among medical residents. Therefore, it is essential that stakeholders urgently take effective measures to protect medical residents' mental health.

Keywords: Burnout, Occupational Health, Medical Residents, Prevalence

Introduction

Burnout is a condition of physical, emotional, and mental exhaustion resulting from excessive and persistent stress. It is a negative response to stress, where the individual often feels emotionally tired in terms of high demands beyond their ability. Burnout is a syndrome involving of emotional exhaustion (EE), depersonalization (DP), and diminished personal accomplishment (PA), which result from the accumulation of stress in the workplace. The most significant component of burnout is energy exhaustion (EE), which is characterized by extreme physical and mental tiredness, a sense of mental tiredness, a lack of energy to finish activities, and the inability to replenish lost energy [1, 2]. Burnout is a major health problem

among the medical residents in different countries. Residency is a demanding education program that is associated with high rates of stress [3]. It is quite well known that various stages that a medical resident goes through, have always been regarded as highly stressful. However, the stress that the residents experience during their specialty training is amplified several folds by various factors. Such stressors negatively affect the psychological state of these future residents. This includes feeling more cynical, less humanistic, and "burning out" during residency training [4].

Based on previous studies, the prevalence of burnout among the medical residents is significantly affected by the work environment. Previous studies identified various factors that could enhance burnout in medical residents [5, 6]. The results of a study in Saudi Arabia in 2022 showed that the work environment affected the prevalence of burnout among medical residents. The researchers noted that the environment in which medical residents are placed is susceptible to exhaustion due to the high patient burden, lengthy study hours, lack of social life, and intensive programs [3]. This situation is particularly alarming in hospitals because it can have a negative effect on patient care.

Based on the literature, the rate of burnout in medical residents varies between 27 and 75%, depending on the specialty field [7]. According to a review study, the rate of burnout was 50.13% in the medical residents [8]. In a survey conducted in Pakistan, the prevalence of burnout was reported to be 78% among medical residents [9]. A study carried out in Isfahan University of Medical Sciences in Iran [10] found that the rate of overall burnout among medical residents was 71.15%.

Although several studies addressing burnout were conducted in Iran, few were conducted on burnout among medical residents in Iranian universities of medical sciences [10-14]. The health of physicians is crucial to the work of medicine and its outcomes; however, there are certain stressors in the medical profession that are unavoidable and pose a threat to the health of physicians. Regarding insufficient information on the occupational burnout in medical residents in Ahvaz, we assessed occupational burnout, and its related factors in a sample of medical residents at Ahvaz Jundishapur University of Medical Sciences (AJUMS), in 2021.

Materials and Methods

This study was performed at AJUMS, Iran, from January 4 to March 7, 2021. The study participants were medical residents who were studying in three hospitals in AJUMS. In this cross-sectional study, a total number of 300 medical residents were recruited via convenience sampling method. The sample size was estimated by Rao Soft® sample size calculator at 80% power and 5% margin of error [15]. The study was conducted with the assurance of participant anonymity, and participation was voluntary. The inclusion criterion was the willingness to engage in the research. Participants who were unwilling to participate or who provided an inadequate response to the questionnaire were excluded from the study. Data were collected by a questionnaire comprising of two sections. The first section included the participants' demographic factors, including age, sex, marital status, specialty, and year of residency. The second section included the validated Persian version of Maslach Burnout Inventory [16, 17]. This instrument consists of 22 items covering 3 dimensions of burnout: emotional exhaustion (EE, 9 items; possible score range 0–54), depersonalization (DP, 5 items; possible score range 0–30), and personal accomplishment (PA, 8 items; possible score range 0–48). Each item was rated on a 7-point Likert scale, from never (score 0) to every day (score 6). The scores of each dimension were further classified as low, moderate, and high: low EE = ≤ 17, moderate EE = 18–29, high EE ≥ 30; low DP = ≤ 5, moderate DP = 6–11, high DP ≥ 12; and low PA ≥ 40, moderate PA = 34–39, high PA ≤33. High levels of burnout were associated with high scores of EE and DP and a low score of PA [15]. We defined burnout as the presence of at least one of the following: high score 31 regarding EE; high score 13 regarding depersonalization; and low scorer 32 regarding personal accomplishment [3].

The validity and reliability of this instrument had already been examined in various studies. All three dimensions (i.e., EE, DP, and AP) showed high internal consistency, with Cronbach's alpha coefficient values of 0.837, 0.869, and 0.881, respectively [18, 19]. The reliability coefficient of instrument had been already done in Iran, and its reliability was determined a Cronbach's alpha coefficient of 0.78 [20]. In our study the Cronbach's Alpha coefficients for the instrument for the dimensions of EE, DP, and PA were 0.88, 0.61 and 0.69, respectively, and the Cronbach's Alpha coefficient of the whole questionnaire was 0.88, indicating an acceptable internal consistency reliability of the tool.

The residents were categorized based on their specialty type into Medical and Surgical since these are the categories used in prior studies [9, 10]. Medical specialties included: internal medicine, pediatrics, cardiology, neurology, psychiatry, dermatology, pathology, and radiology. Surgical specialties included general surgery, neurosurgery, orthopedic surgery, obstetrics and gynecology, ophthalmology, ENT, and anesthesiology.

SPSS version 18.0 was used to analyze the data. To test the normality of data, the Shapiro–Wilk test was used. Groups were compared using the independent t-test and ANOVA. The Pearson correlation coefficient (r) was computed to examine the relationships between variables. A multiple linear regression analysis was used to investigate the relationship between burnout and the

participants' characteristics, and to derive the predictive model for burnout. The odds ratios (OR) and 95% confidence intervals (95% CI) were also calculated. Statistical significance was set at 0.05.

Results

Among 300 eligible residents, 291 volunteered and completed the questionnaire (response rate 97%). Mean age of the residents was 32.92± 4.46 years. More than half of respondents 175(60.1%) were female, 151(51.9%) were single, and most of them were residents with medical specialty (58.4%). Most of the residents were in the 2nd residency year (32%). Participants' characteristics are given in Table 1.

Table 1. Demographic characteristics of study participants

Variable		N (%)
Age	≤30 years old	124 (42.5)
	>30 years old	167 (57.5)
Gender	Male	116 (39.9)
	Female	175 (60.1)
Marital Status	Single	151 (51.9)
	Married	140 (48.1)
Residency Year	1st year	64 22.0)
	2nd year	93 (32.0)
	3rd year	72 (24.7)
	4th year	62 (21.3)
Specialty type	Medical	170 (58.4)
	Surgical	121 (41.6)

We reported burnout in medical residents based on the Maslach instrument [17] according to which high rates of burnout among physicians are defined as EE ≥ 30, DP ≥ 12, and PA ≤ 33. Among the medical residents, 73 (25.1%) had high EE, 58 (19.9%) had high DP, and 94 (32.2) had low PA. We found that 225 out of 291 (77.3%) residents had high scores on at least 1 dimension, and suffered from burnout. The mean EE score was 32.89±11.77 which is lower than the cutoff for high EE (≥ 30), while the mean PA score was 27.86±7.05 which is lower than the suggested cutoff point (≤ 33). Besides, the mean DP score was 7.05±4.75 which is lower than the suggested cutoff point (≥12) (Table 2).

Table 2. The frequency of medical residents by levels of burnout in three dimensions

	EE		DP		PA	
	N	%	N	%	N	%
Low	120	41.2	127	43.6	94	32.3
Moderate	98	33.7	106	36.4	44	15.1
High	73	25.1	58	19.9	153	52.6
Overall mean ± SD	32.89±11.77		7.05±4.75		27.86±7.05	

Table 3. Association between burnout and its dimensions among medical residents

Variables		n (%)	EE	DP	PA	Overall burnout
			mean ± SD	mean ± SD	mean ± SD	mean ± SD
Age	≤30 years old	124 (42.5)	31.60±11.93	7.71±4.70	27.02±6.81	80.91±19.80
	>30 years old	167 (57.5)	33.84±11.59	6.55±4.74	28.48±7.18	85.78±19.28
F(p)			**0.110)(1.60**	**0.038) (2.08**	**0.082) (1.74**	**0.036)(2.10**
Gender	Male	116 (39.9)	34.22±11.12	7.11±4.84	28.33±6.82	85.43±19.01
	Female	175 (60.1)	32.01±12.13	7.01±4.71	27.55±7.20	82.56±19.98
t (p)			**1.57(0.12)**	**0.186(0.85)**	**0.922(0.35)**	**1.22(0.22)**
Marital Status	Single	151 (51.9)	31.74±12.50	7.21±4.82	27.52±6.87	82.05±20.10
	Married	140 (48.1)	34.13±10.83	6.86±4.69	28.23±7.24	85.49±18.99
t (p)			**(0.08) 1.74**	**(0.52) 0.634**	**(0.39) 0.860**	**1.50 (0.13)**
Year of residency training	1st year	64 22.0)	32.34±11.23	6.81±4.36	27.97±6.65	85.50±19.04
	2nd year	93 (32.0)	30.08±12.35	7.88±4.99	26.72±6.65	78.91±19.82
	3rd year	72 (24.7)	33.69±10.90	5.24±3.80	30.08±7.66	83.31±18.14
	4th year	62 (21.3)	36.73±11.49	7.04±4.75	27.86±7.05	91.56±19.54
	F(p)		**(0.006) 4.26**	**4.65 (0.003)**	**3.06 (0.28)**	**5.41 (0.001)**
Type of specialty	Medical	170 (58.4)	29.95±11.38	22.41±4.51	26.86±6.28	79.22±18.14
	Surgical	121 (41.6)	37.01±11.09	23.71±5.01	29.26±7.82	90.00±19.95
	t (p)		**5.26 (0.000)**	**(0.024) 2.31**	**(0.006) 2.79**	**4.79 (0.000)**

Table 3 displays the burnout rate among medical residents categorized by demographic variables. There was a notable disparity seen in the degrees of burnout and its aspects based on age (p = 0.036), residency year (p = 0.001), and specialty course (p < 0.001). A higher rate of burnout was observed among final-year, and surgical residents (Table 3). However, no significant difference was found between burnout, and its dimension levels and gender (p = 0.22) and marital status (p = 0.13).

We evaluated different factors associated with burnout. The multivariate linear regression analysis showed that surgical residents were at a higher risk for burnout compared to medical residents (AOR = 10.863, 95% CI = 6.16–15.56; p= 0.000). Elder residents were considerably more prone to burnout compared to their younger counterparts (AOR = 2.287, 95% CI = 0.806–4.94; p = 0.007). However, associations of burnout with age, sex, marital status, residency year and specialty type were not statistically significant (Table 4).

Table 4. Linear regression analysis for burnout and students' demographics

Variables	B	S. E	Beta	t	P value	95% C.I.	
						Lower	Upper
Age (per year)	0.997	0.254	0.227	3.926	**0.001**	0.497	1.496
Sex (male)	-0.156	2.348	-0.004	-0.067	0.947	-4.777	4.465
Marital (single)	0.451	2.194	0.011	0.205	0.837	-3.868	4.769
Residency year (1st year)	1.887	1.055	0.102	1.789	0.075	-0.189	3.964
Specialty type (Surgical)	11.847	2.344	0.298	5.054	**0.001**	7.233	16.461

Discussion

Medical residency is a challenging period that calls for a great amount of psychosocial energy, and given the considerable stress between patient and physician, this period is a highly stress-inducing profession. Hence, it is important to evaluate the degree of burnout experienced during the duration of the residency program. This research uncovered a significant prevalence of burnout among medical residents at AJUMS. Our findings indicate that medical trainees are very vulnerable to burnout due to heightened exposure to psychosocial stresses throughout their residency.

Considering the findings of similar studies reporting increased burnout rate among physicians during the COVID‑19 pandemic [21, 22], the high rate of burnout mentioned by the residents in our study could be in terms of high workload and harsh conditions prevailing in the hospitals during the pandemic since this study was conducted during the COVID-19 pandemic. Therefore, further studies on this topic can be enlightening.

Based on our findings, 77.3% of the studied medical residents have higher level of burnout compared with the rates reported in some European and Asian countries [23, 24]. It is higher than the rate (51%) reported in a systematic review carried out by Low et al. in 2019 which included 22778 residents from different countries [25]. Our findings are lower than a study conducted in Mazandaran, Iran [26] where an overall prevalence of 52% was reported. Based on the same criteria and evaluation methodology as our investigation, a related study including medical residents in Tehran, Iran in 2019 found that the overall prevalence of burnout was 92.2% [27]. This study's burnout percentage was comparable to one done in Pakistan among medical residents, when 78% of them reported having burnout [9]. Furthermore, a cross-sectional study in Riyadh, Saudi Arabia found that 81.2% of medical resident physicians had a high level of burnout [3]. Another study in Singapore found an 80.7% prevalence rate of burnout among medical residents [28]. In different countries and even within the same country, the prevalence of burnout among medical residents varies. Prins et al. in their systematic literature review reported that the rate of burnout among medical residents varies between 18% and 82% [29]. The differences could be in terms of the difference in higher workload, night shifts, stressful situations, physical and social support, and resilience of the residents. Since a large number of medical residents may be affected by burnout during the residency period, it is crucial to develop burnout prevention measures for medical residents.

Considering the important implications of medical residents' burnout, predictors that may affect this situation should be identified. Acquiring an understanding of the predictors of burnout may allow for decisions to be made that target the major factors. In case of identification of the most significant causes, reduction of burnout rate would be possible, which will improve future physicians' well-being. Based on our results, there was a significant association between older age of residents and higher prevalence of burnout. This may be attributed to the possibility that older residents may begin their residency later because to the challenges they face in selecting a specialty. In contrast to younger residents, elder residents may have challenges in managing the academic requirements and postgraduate exams. This result is consistent with that obtained by Ahmadi pour et al. [12], but it contradicts the findings of Khalid et al., [9] and Calani et al., [10] who did not find any association in burnout scores based on medical residents' age. A previous study found

that younger residents had higher rates of burnout in all three dimensions, which is inconsistent with the results of our study [26]. These discrepancies could somewhat be affected by cultural factors such as beliefs, social behaviors, as well as psychological characteristics within the target population or the workplace organization structure across different settings.

A number of studies found that there is an association between residency year and rates of burnout and its dimensions [3, 7]. They reported that junior residents experienced more burnout compared with their senior counterparts. A study conducted on neurosurgery residents revealed a negative correlation between burnout and the residency year. The incidence of burnout decreased by 33.2% for each one-year increase in the academic program [30]. Martini and colleagues [31] indicated that there was an association between first year of residency and higher burnout rate. Furthermore, our study showed that burnout was more common amongst residents in their 1st and 4th year of residency when compared to those who had spent 2–3 years. This is consistent with a study done in Nigeria [32] where burnout was more common amongst 1st-year residents. These results can be explained by multiple factors, such as a greater number of night shifts during the first year of residency, greater professional insecurity, and lack of adaptation to the work routine. The higher rate of burnout among first-year residents may indicate their vulnerability. Therefore, program directors may need to pay special attention to reduce the high rate of burnout among this vulnerable group. Contrary to our results, Elhaida et al. and Daryanto et al. reported that academic year of residency training was not associated with burnout [33, 34]. Another finding of our study showed a higher rate of burnout in the fourth-year residents compared to 2nd- and 3rd-year residents. This is consistent with a similar study conducted in Spain in which the authors found a significantly higher risk of burnout among sixth-year students as opposed to third-year students [35]. Lugazia et al. found that senior residents in Tanzania, during their last year of study, had a higher likelihood of experiencing burnout [36]. During their last year, medical residents often endure extended working hours and increased workload. It is a time when they are working on their dissertations, and this along with all their responsibilities, imposes much pressure on them and may worsen burnout.

As far as burnout dimensions are concerned, our results showed that EE was observed in 41.2%, low PA was observed in 45.1%, and DP was the least prevalent across all burnout dimensions (13.7%). Studies showed that patient care is significantly affected by burnout syndrome (especially DP) [37] However, our EE rate is considerably high, with 41% of the residents in this study experiencing it. A previous study by Shadid et al. in 2021 on 51 dermatology residents showed a 41.2% rate of high EE, which is consistent with our findings [37]. Based on a study in Sudan, there was a 70.7% rate of EE among resident physicians [33], which is in line with previous research indicating higher prevalence rates of burnout, EE, and DP, with lower PA among resident physicians in KSA [38] and UAE [39].

In general, the majority of studies have reported varying levels of exhaustion among different specialties (with surgical residents typically experiencing higher rates) and various levels of residency [9, 31, 32]. In the present study, the rate of burnout was higher in surgical residents than in medical residents. This finding is consistent with the findings of Ogboghodo et al., who reported that the rate of burnout was higher among surgical residents [32]. This may be largely in terms of emotional and psychological exertions expended in these specialties. A study on physicians of surgery and gynecology in Germany found high personal burnout [35]. However, in a 2021 study that compared the burnout rate between different specialties of medical residency programs in Pakistan, showed that compared to surgical residents, internal medicine residents were more likely to suffer from burnout [9]. In another study carried out by Bone et al., residents in surgical specialties were less associated with severe burnout [40]. Meanwhile, Low et al. reported that medical and surgical residents have similar prevalence of burnout [25]. It is possible that the different rates of burnout found in different specialties could be attributed to the unique demands of different specialties. Considering their higher interaction with patients, medical residents may suffer from higher patient-related burnout as opposed to surgical residents. One possible explanation would be the fact that surgical medicine is an area that demands more workload and has more demanding instructors.

As far as the association of gender, and marital status with burnout was concerned, burnout and its dimensions had no association with gender or marital status. Although male and married residents reported a higher level of burnout, this was not statistically significant compared with female and single residents, which confirms the findings of previous studies [1, 9, 26, 27]. Hence, there are conflicting results in this respect reported in different studies. For instance, Khosravi showed significantly lower burnout levels in male physicians [41]. However, according to Shahi et al., female physicians experienced significantly higher burnout rate compared with male physicians [5]. Furthermore, Shawahna et al. showed that married residents had higher burnout scores as opposed to single residents [42]. Given these inconsistent findings, further research is needed to study the relationship between

gender and marital status and academic burnout. The factors most likely to predict residents' burnout in our study were age and specialty type. Older residents and surgical residents experienced higher levels of burnout, which is consistent with the results of previous studies [5, 43]. In our sample, surgical residents were more likely to develop burnout as compared to the medical residents. Our results are in line with a systematic review done in Nigeria by Rodrigues et al., which reported that the prevalence of burnout syndrome was significantly higher among surgical residencies compared with medical specialties [7]. The age of inhabitants was another significant predictor, with older residents reporting higher levels of burnout. In line with other research, burnout did not correlate with either gender or marital status [7, 25]. Preventing burnout is important not only for the health care professionals who suffer from it but also for the health service users who can become its victims.

The main finding was the high levels of burnout among medical residents, which should be planned to reduce, because residents graduating from medical school with high levels of burnout may result in the detrimental repercussions in careers and patient healthcare [6]. Several strategies have been proposed to manage stressors and burnout in academic environments. Strategies involving the engagement process (e.g., problem-solving, positive reflection, and expression of emotion) enable residents' adaptation that reduces depression and its impacts on residents' mental integrity and physical well-being [1, 5, 23]. Furthermore, it is essential to modify the educational and clinical settings to mitigate preventable stresses and provide more positive conditions for both therapeutic and educational practices. This study was conducted at AJUMS, which limits the generalization of the study findings to medical residents in other universities. Another limitation of the study is its cross-sectional design which does not allow causation. Although there was a good response rate, another limitation was small sample size, so future studies are recommended to take this into serious consideration.

Conclusion

Burnout rate among medical residents in AJUMS was relatively high. Burnout was found to be associated with some factors such as age, residency year, and specialty type. Based on our results, burnout is common in all medical specialties, yet some specialties (surgical) have much higher rates compared with others. It is essential that hospital administrators and directors of residency programs address fatigue and enhance the well-being of residents. The results indicate that the incidence of exhaustion among residents must be reduced through the implementation of significant changes to residency programs, particularly in the context of the training environment and other demographic factors. There is a need for further studies to determine the effectiveness of interventions in reducing the rate of burnout among medical residents. Considering the high rate of occupational burnout, it is recommended that managers consider ways to reduce it.

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Conflict of interest

None declared.

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Ethical Considerations

All ethical considerations were followed in this study. The participants were informed about the objectives of the study, and a written consent was obtained. All personal data were protected and kept anonymous.

Code of Ethics

The study protocol was approved by Ethics Committee of AJUMS with code No: IR.AJUMS.REC.1399.420. All personal data were protected and kept anonymous.

Authors' Contributions

Mehrnoosh Zakerkish: Conceptualization, Writing-Review & Editing. Abdolhussein Shakurnia: Conceptualization, Statistical Analysis, Writing-Original Draft, Writing-Review & Editing. Ali Hafezi: Conceptualization, Data Collection, Writing-Original Draft. Mahmood Maniati: Writing - Review & Editing.

References

1. Daud N, Pa MNM, Rahim AFA, Ahmad A, Hassan NM. Academic factors associated with burnout in Malaysian medical students: a cross-sectional study. Educ Med J. 2020;12(2):49-58.
2. El Mouedden I, Hellemans C, Anthierens S, Michels NR, DeSmet A. Experiences of academic and professional burn-out in medical students and residents during first COVID-19 lockdown in Belgium: a mixed-method survey. BMC Med Educ. 2022;22(1):631.
3. Karim Alenezi N, Hamad Alyami A, Omar Alrehaili B, Adnan Arruhaily A, Kareem Alenazi N, Abdo Radman Al-Dubai S. Prevalence and Associated Factors of Burnout among Saudi Resident Doctors: A Multicenter Cross-Sectional Study. Alpha Psychiatry. 2022;23(4):173-83.

4. Aljadani AH, Alsolami A, Almehmadi S, Alhuwaydi A, Fathuldeen A. Epidemiology of Burnout and its association with academic performance among medical students at Hail University, Saudi Arabia. Sultan Qaboos Univ Med J. 2021;21(2):e231-6.
5. Shahi S, Paudel DR, Bhandari TR. Burnout among resident doctors: An observational study. Ann Med Surg (Lond). 2022;76:103437.
6. McTaggart LS, Walker JP. The Relationship Between Resident Physician Burnout and its' Effects on Patient Care, Professionalism, and Academic Achievement: A Review of the Literature. Health Sci Rev. 2022;4:100049.
7. Rodrigues H, Cobucci R, Oliveira A, Cabral JV, Medeiros L, Gurgel K, et al. Burnout syndrome among medical residents: A systematic review and meta-analysis. PLoS One. 2018;13(11):e0206840.
8. Low ZX, Yeo KA, Sharma VK, Leung GK, McIntyre RS, Guerrero A, et al. Prevalence of burnout in medical and surgical residents: a meta-analysis. Int J Environ Res Public Health. 2019;16(9):1479.
9. Khalid MH, Ishtiaq R, Fatima L, Ahmed H, Masood A, Khan TM, et al. Burnout and Empathy: A Cross-Sectional Study among Resident Physicians in Public Sector Hospitals of a Developing Country. Eur J Med Health Sci. 2021;3(4):121-4.
10. Kalani SD, Azadfallah P, Oreyzi HR, Azizkhani R, Adibi P. Prevalence of burnout syndrome among the residents in Isfahan University of Medical Sciences, Isfahan, Iran. J Isfahan Med Sch. 2017;35(442):993-9.
11. Bastami E, Sayehmiri K, Bastami T, Cheraghizadegan B. Prevalence of burnout in Iran: A systematic review and meta-analysis. J Health Saf Work. 2020;10(3):301-5.
12. Ahmadipour H, Salari E. Investigating Burnout in Medical Residents at Kerman University of Medical Sciences. J Health Based Res. 2020;6(2):129-37.
13. Jalili M, Sadeghipour Roodsari G, Bassir Nia A. Burnout and associated factors among Iranian emergency medicine practitioners. Iran J Public Health. 2013;42(9):1034-42.
14. Gouveia PADC, Ribeiro MHC, Aschoff CAM, Gomes DP, Silva NAFD, Cavalcanti HAF. Factors associated with burnout syndrome in medical residents of a university hospital. Rev Assoc Med Bras (1992). 2017;63(6):504-11.
15. Altannir Y, Alnajjar W, Ahmad SO, Altannir M, Yousuf F, Obeidat A, et al. Assessment of burnout in medical undergraduate students in Riyadh, Saudi Arabia. BMC Med Educ. 2019;19(1):34.
16. Moalemi S, Kavosi Z, Beygi N, Deghan A, Karimi A, Parvizi MM. Evaluation of the Persian version of Maslach burnout inventory-human services survey among Iranian nurses: Validity and reliability. Galen Med J. 2018;7:e995.
17. Maslach C, Jackson SE. The measurement of experienced burnout. J Organ Behav. 1981;2(2):99-113.
18. Forné C, Yuguero O. Factor structure of the Maslach Burnout Inventory Human Services Survey in Spanish urgency healthcare personnel: a cross-sectional study. BMC Med Educ. 2022;22(1):615.
19. Wickramasinghe ND, Dissanayake DS, Abeywardena GS. Validity and reliability of the Maslach Burnout Inventory-student survey in Sri Lanka. BMC Psychol. 2018;6(1):52.
20. Rasoulian M, Elahi F, Afkham Ebrahimi A. The relationship between job burnout and personality traits in nurses. Iran J Psychiatry Clin Psychol. 2004;9(4):18-24.
21. Abraham A, Chaabna K, Sheikh JI, Mamtani R, Jithesh A, Khawaja S, et al. Burnout increased among university students during the COVID-19 pandemic: a systematic review and meta-analysis. Sci Rep. 2024;14(1):2569.
22. Navinés R, Olive V, Hidalgo-Mazzei D, Langohr K, Vieta E, Martin-Santos R. Burnout in medical residents during the first-wave of COVID-19 pandemic: A systematic review and meta-analysis. Front Psychiatry. 2024;14:1286101.
23. Chan MK, Chew QH, Sim K. Burnout and associated factors in psychiatry residents: a systematic review. Int J Med Educ. 2019;10:149-60.
24. Zis P, Anagnostopoulos F, Sykioti P. Burnout in medical residents: a study based on the job demands-resources model. ScientificWorldJournal. 2014;2014:673279.
25. Low ZX, Yeo KA, Sharma VK, Leung GK, McIntyre RS, Guerrero A, et al. Prevalence of burnout in medical and surgical residents: a meta-analysis. Int J Environ Res Public Health. 2019;16(9):1479.
26. Sheikhmoonesi F, Khani F, Khademloo M, Bahari Saravi SF. Prevalence of burnout among resident physicians in Mazandaran University of Medical Sciences, Iran. Glob J Health Sci. 2017;9(4):50-6.
27. Maghbouli N, Sohrabpour AA, Fatehi F. The prevalence of burnout in Iranian residents: a cross-sectional study. Future Med Educ J. 2019;9(1):3-8.
28. Lee PT, Loh J, Sng G, Tung J, Yeo KK. Empathy and burnout: a study on residents from a Singapore institution. Singapore Med J. 2018;59(1):50-4.
29. Prins JT, Gazendam-Donofrio SM, Tubben BJ, Van der Heijden FM, Van de Wiel HB, Hoekstra-Weebers JE. Burnout in medical residents: a review. Med Educ. 2007;41(8):788-800.
30. Khalafallah AM, Lam S, Gami A, Dornbos DL, Sivakumar W, Johnson JN, et al. A national survey on the impact of the COVID-19 pandemic upon burnout and career satisfaction among neurosurgery residents. J Clin Neurosci. 2020;80:137-42.
31. Martini S, Arfken CL, Churchill A, Balon R. Burnout comparison among residents in different medical specialties. Acad Psychiatry. 2004;28(3):240-2.
32. Ogboghodo EO, Edema OM. Assessment of burnout amongst resident doctors in Benin City, Edo State, Nigeria. Niger Postgrad Med J. 2020;27(3):215-23.
33. Elhadi YAM, Ahmed A, Salih EB, Abdelhamed OS, Ahmed MHH, El Dabbah NA. A cross-sectional survey of burnout in a sample of resident physicians in Sudan. PLoS One. 2022;17(3):e0265098.

34. Daryanto B, Rahmadiani N, Amorga R, Kautsarani I, Susilo H, Isma SP. Burnout syndrome among residents of different surgical specialties in a tertiary referral teaching hospital in Indonesia during COVID-19 pandemic. Clin Epidemiol Glob Health. 2022;14:100994.
35. Klein J, Grosse Frie K, Blum K, von dem Knesebeck O. Burnout and perceived quality of care among German clinicians in surgery. Int J Qual Health Care. 2010;22(6):525-30.
36. Lugazia ER, Sway HC, Boniface RL, Abdullah A. Prevalence and Factors Associated with Burnout Syndrome among Resident Doctors at Tertiary Teaching Hospitals in Dar es Salaam, Tanzania. Int J Clin Med. 2022;13(1):36-49.
37. Shadid AM, Aldosari BM, Algarni AM, Dahmash AB, Altalhab S, Alharithy R. Burnout syndrome in dermatology residents: A cross-sectional study. J Dermatol Dermatol Surg. 2022;26(1):31-7.
38. Abdulrahman M, Nair SC, Farooq MM, Al Kharmiri A, Al Marzooqi F, Carrick FR. Burnout and depression among medical residents in the United Arab Emirates: a multicenter study. J Family Med Prim Care. 2018;7(2):435-41.
39. Agha A, Mordy A, Anwar E, Saleh N, Rashid I, Saeed M. Burnout among middle-grade doctors of tertiary care hospital in Saudi Arabia. Work. 2015;51(4):839-47.
40. Bond MM, Oliveira MS, Bressan Júnior B, Bond MM, Silva AL, Merlo ÁR. Prevalence of burnout among resident physicians at a university hospital. Rev Bras Educ Méd. 2018;42(3):97-107.
41. Khosravi M. Burnout among Iranian medical students: Prevalence and its relationship to personality dimensions and physical activity. Eur J Transl Myol. 2021;31(1):9711.
42. Shawahna R, Maqboul I, Ahmad O, Al-Issawy A, Abed B. Prevalence of burnout syndrome among unmatched trainees and residents in surgical and nonsurgical specialties: a cross-sectional study from different training centers in Palestine. BMC Med Educ. 2022;22(1):322.
43. Ishak WW, Lederer S, Mandili C, Nikravesh R, Seligman L, Vasa M, et al. Burnout during residency training: a literature review. J Grad Med Educ. 2009;1(2):236-42.