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Prevalence and correlates of depression and anxiety among nursing staff in the post-COVID-19 era: a cross-sectional study from southern Iran

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Abstract

Background The COVID-19 pandemic had a significant negative impact on the mental health of healthcare workers globally, with some studies reporting increase in depression and anxiety rates. While the acute phase of the pandemic has subsided, concerns remain about the long-term psychological effects on frontline staff. This study aimed to assess the prevalence and correlates of depression and anxiety among nursing staff in the post-COVID-19 era.

Methods This cross-sectional study was conducted between January 2023 and March 2023 among nursing staff at government teaching hospitals affiliated with Shiraz University of Medical Sciences in southern Iran. All nursing staff willing to participate and provide written informed consent were included. Participants completed questionnaires assessing demographics (age, gender, marital status, education level) and using Beck's Depression and Anxiety Inventories. Nurses who had left the workplace or submitted incomplete questionnaires were excluded.

Results A total of 890 nurses participated. The mean age was 34.89 ± 7.84 years, and 88% were female. The mean depression and anxiety scores were 20.79 ± 13.69 and 22.0 ± 13.38 , respectively, with 26.7% exhibiting severe depression and 38.4% experiencing severe anxiety. Stepwise regression analysis revealed significant associations between anxiety scores and psychiatric drug usage ($P < 0.001$), working hours per week ($P < 0.001$), department ($P = 0.02$), and gender ($P = 0.028$). Similarly, depression scores were significantly correlated with psychiatric drug usage ($P < 0.001$), working hours per week ($P = 0.001$), and gender ($P = 0.018$).

Conclusion The prevalence and severity of anxiety and depression among nursing staff in this post-COVID-19 setting appear elevated compared to pre-pandemic levels/national averages. These findings highlight the need for specific organizational and policy interventions. However, interpretation should consider the cross-sectional design, sampling bias, and absence of prepandemic baseline data.

Keywords Anxiety, Depression, Healthcare workers, Health policy, COVID-19, Mental health, Nursing

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Introduction

The emergence of a novel coronavirus, SARS-CoV-2, in Wuhan, China, in December 2019, and the subsequent pandemic of COVID-19, has presented unprecedented challenges to global health systems [1–3]. Beyond the immediate strain on medical and public health facilities, the pandemic has compelled economists, researchers, and policymakers to address financial instability, expedite vaccine development, and manage widespread public anxieties. While the lethality of the virus rightly commanded early attention, the long-term psychological and social repercussions, extending even beyond the acute pandemic phase, continue to impact communities and individuals significantly. Indeed, the rapid spread of COVID-19 acted as a profound stressor, disrupting daily life and significantly impacting mental well-being [4–8].

This widespread emotional distress stems from a confluence of factors, including the fear of viral infection, public anxiety, restrictive public health measures, increased economic hardship, and the unrelenting pressures faced by healthcare workers [9, 10]. Within this context, healthcare workers have been particularly vulnerable, experiencing elevated rates of anxiety, depression, physical symptoms, and burnout. Increased workloads, the perceived severity of COVID-19, anticipated shortages of essential supplies, concerns about providing adequate care, fear of infection, and anxieties regarding the health and safety of their families and patients have all contributed to this heightened stress [11–14].

The mental health of healthcare workers directly influences the quality of patient care they provide, underscoring the critical need for healthcare organizations to prioritize employee well-being through comprehensive organizational plans [15]. Research consistently demonstrates a higher prevalence of depression and anxiety among healthcare workers during the COVID-19 pandemic compared to other mental health conditions [16–18].

In Iran, many nurses are facing significant challenges. Attracted by better opportunities abroad and dealing with the pressures of inflation at home, a growing number are choosing to emigrate. This, combined with staffing levels that often fall short of international benchmarks, means those who remain are handling heavier workloads. Unsurprisingly, these professional and economic pressures are taking a toll, contributing to increased stress within the nursing community [19, 20].

Despite substantial international literature, few studies have examined the mental health of Iranian nurses during the postCOVID-19 period, and no largescale studies from southern Iran exist. This study addresses this gap by quantifying depression and anxiety prevalence and

identifying sociodemographic correlates among a broad hospitalbased nursing population.

Methods

Study design and setting

This cross-sectional study was conducted in the post-COVID-19 era defined here as January to March 2023, approximately nine months after the official end of emergency pandemic measures in Iran. The study population comprised all nursing staff employed at government hospitals affiliated with Shiraz University of Medical Sciences in southern Iran. The estimated total number of nurses eligible for participation was approximately 6400.

Participants and sampling

A census sampling approach was initially intended; however, due to practical constraints and response rates, consecutive sampling was employed. The inclusion criteria were: (a) current employment as nursing staff at one of the participating hospitals; and (b) willingness to provide written informed consent. Exclusion criteria were: (a) resignation or leave of absence during the study period; and (b) submission of incomplete questionnaires.

Based on Morgan's table for sample size determination, a sample size of 363 was initially calculated as sufficient to represent the estimated population of 6464 nurses. To maximize statistical power and account for potential non-response, data collection continued until 890 completed questionnaires were obtained.

Data collection

Data were collected using an online questionnaire distributed to eligible nursing staff. The questionnaire consisted of two sections:

- **Demographic Information:** This section included 13 items collecting information on age, gender, employment status (e.g., full-time, part-time), job category (e.g., registered nurse, nurse assistant), level of education, department of employment (e.g., emergency, ICU, medical-surgical), presence of underlying medical conditions, and average weekly working hours.
- **Mental Health Assessment:** This section included the Beck Depression Inventory-II (BDI-II) and the Beck Anxiety Inventory (BAI).

The Beck inventories were selected due to their strong psychometric properties, prior validation in Persian, and widespread use in Iranian clinical and research settings, enabling comparability with national and international studies [21, 22].

Instruments

- Beck Depression Inventory-II (BDI-II): The BDI-II is a 21-item self-report questionnaire used to assess the severity of depressive symptoms. Each item is rated on a four-point scale ranging from 0 to 3, with higher scores indicating greater depression severity. Total scores range from 0 to 63 and are categorized as follows: 0–7 (minimal), 8–15 (mild), 16–25 (moderate), and 26–63 (severe). The BDI-II has demonstrated good internal consistency (Cronbach's alpha = 0.93) and convergent validity (correlation with the Hamilton Depression Rating Scale = 0.74) in its original form. The Persian version of the BDI-II

used in this study has also shown acceptable internal consistency (Cronbach's alpha = 0.82) [23, 24].

- Beck Anxiety Inventory (BAI): The BAI is a 21-item self-report questionnaire designed to measure the intensity of anxiety symptoms in adolescents and adults. Each item reflects a common anxiety symptom (e.g., nervousness, sweating) and is rated on a four-point scale from 0 to 3. Total scores range from 0 to 63 and are interpreted as follows: 0–13 (low), 14–19 (mild), 20–28 (moderate), and 29–63 (severe). The BAI has demonstrated strong internal consistency, with Cronbach's alpha coefficients of 0.93 and 0.92 reported in previous studies [23, 24].

Table 1 Participants' demographic characteristics

Factors	Value
Age Mean ± SD	34.89 ± 7.84
Gender (Female) n (%)	783 (88)
Education n (%)	
Associate degree	53 (6.0)
BS	781 (87.8)
MSc	54 (6.1)
PhD	2 (0.2)
Job categories n (%)	
Nurse	740 (83.1)
Anesthesiology technician	72 (8.1)
Operating room technician	35 (3.9)
Practical nurse (one month educated)	25 (2.8)
Practical nurse (three months educated)	18 (2.0)
Employment relationship n (%)	
Official hiring	562 (63.1)
Fixed employment contract	113 (12.7)
Hiring through contracting companies	46 (5.2)
Service obligations	169 (19.0)
Department n (%)	
Emergency	234 (26.3)
Surgery	153 (17.2)
Surgery room	123 (13.8)
Adult internal medicine	105 (11.8)
Adult ICU	97 (10.9)
Pediatric internal medicine	57 (6.4)
CCU	44 (4.9)
Neurology	39 (4.4)
Pediatric ICU	38 (4.3)
Having underlying diseases n (%)	116 (13)
Psychiatric drug usage n (%)	185 (20.8)
Infected with Covid-19 at least once n (%)	78 (78.7)
Working in Covid-19 wards n (%)	482 (54.2)
Working hours per week mean ± SD	46.23 ± 7.13
Depression mean ± SD	20.79 ± 13.69
Anxiety mean ± SD	22.0 ± 13.38

BS: Bachelor of Science; CCU: critical care unit; ICU: intensive care unit; MSc: Master of Medical Science; PhD: Doctor of Philosophy; SD: standard deviation

Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 19 (SPSS Inc., Chicago, IL, USA). Quantitative data are presented as means ± standard deviations (SD), and qualitative data are presented as numbers and percentages. Stepwise multiple regression analyses were conducted to identify demographic variables that significantly predicted anxiety and depression scores. For each regression model, anxiety or depression score served as the dependent variable, and the demographic variables collected in the questionnaire served as independent variables. All statistical tests were two-tailed, with a significance level of $p < 0.05$, and 95% confidence intervals were calculated.

Ethical considerations

This study was approved by the Vice-Chancellor of Research and Technology and the Local Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.MED.REC.1400.574). The study was conducted in accordance with the Declaration of Helsinki and its later amendments. All participants provided written informed consent prior to participation. Data confidentiality was maintained by restricting access to the data to the research team.

Results

A total of 982 nurses initially participated in the study. After excluding 92 participants with incomplete questionnaires, data from 890 nurses were analyzed. The sample's mean age was 34.89 ± 7.84 years, with 783 (88%) participants identifying as female. Most participants worked in COVID-19 wards (54.2%) or the Emergency Department (26.3%). A majority (63.1%) held official employment positions. A substantial portion (78.7%) of respondents reported prior COVID-19 infection during the pandemic. Over half (54%) had experience working in COVID-19 patient care departments. The mean BDI-II score was 20.79 ± 13.69 , and the mean BAI score was 22.0 ± 13.38 (Table 1).

Table 2 presents the distribution of anxiety and depression severity levels among participants. A high proportion experienced severe anxiety (38.4%), while a significant number showed severe depression (26.7%).

Stepwise multiple regression analysis was conducted to explore the relationship between demographic variables and anxiety and depression scores. For anxiety (Table 3), psychiatric drug use ($p < 0.001$), weekly working hours ($p < 0.001$), department ($p = 0.020$), and gender ($p = 0.028$) showed significant associations. Psychiatric drug use explained 4% of the variance in anxiety scores, while working hours accounted for 6% of variance. Gender was associated with a positive 6% change in anxiety score, whereas department showed a negative 7% association (note that working in the emergency department had a significant negative correlation with anxiety ($r = -0.092$, $p < 0.01$)).

Similarly, for depression (Table 4), significant correlations were found with psychiatric drug use ($p < 0.001$), weekly working hours ($p = 0.001$), and gender ($p = 0.018$). Psychiatric drug use was the strongest predictor, explaining approximately 5% of the variance in depression scores. Working hours and gender explained approximately 6% and 7%, respectively.

Discussion

This study aimed to determine the prevalence of depression and anxiety among nursing staff in the post-COVID-19 pandemic era. Our findings reveal a concerning high prevalence of severe anxiety (38.4%) and severe depression (26.7%) within this population. Furthermore, we identified significant correlations between anxiety and psychiatric drug use, weekly working hours, department of work, and gender. Similarly, depression was significantly associated with psychiatric drug use, weekly working hours, and gender. The association between extended weekly working hours and poorer mental health outcomes likely reflects systemic understaffing policies aimed at cost containment. Similarly,

Table 2 Distribution of anxiety and depression severity levels among participants

Distribution of anxiety and depression severity levels among participants	Value
Anxiety Severity n (%)	
Low	141 (15.8)
Mild	177 (19.9)
Moderate	230 (25.8)
Severe	342 (38.4)
Depression Severity n (%)	
Low	307 (34.5)
Mild	138 (15.5)
Moderate	207 (23.3)
Severe	238 (26.7)

psychiatric drug use among nurses may partly reflect constrained access to affordable, stigma-free mental healthcare services, a known issue in Iran's health system.

The modest R^2 values indicate that measured variables explain a limited proportion of variation in depression and anxiety, suggesting that additional unmeasured factors warrant investigation.

This study benefits from a larger sample size compared to many previous investigations, enhancing the generalizability of the findings, albeit within the context of Iranian government hospitals.

Our findings align with previous research highlighting the increased psychological burden experienced by healthcare workers during and after the pandemic. Zhou et al. emphasized the importance of organizational strategies to prevent job burnout and provide psychological support [11]. Similarly, Tuna and Özdin identified female gender and a history of mental illness as predictors of anxiety and depression among physicians, consistent with our findings [25]. The concurrence of these factors across different healthcare professions and geographical locations underscores their robust influence on mental health.

In contrast, Ślusarska et al. reported substantially lower post-COVID-19 prevalence in Polish nurses. Disparities

Table 3 The correlation between anxiety and patients' characteristics factors

Steps	Variables	R	R ²	B	β	t	P-value
1	Psychiatric drug usage	0.198	0.039	6.533	0.198	6.029	<0.001*
2	Working hours per week	0.238	0.057	0.248	0.132	4.045	<0.001*
3	Gender	0.249	0.062	2.995	0.073	2.206	0.028*
4	Department	0.260	0.068	-0.385	-0.076	-2.330	0.020*

* Statistically significant

Table 4 The correlation between depression and patients' characteristics factors

Steps	Variables	R	R ²	B	β	t	P-value
1	Psychiatric drug usage	0.227	0.052	7.668	0.227	6.959	<0.001*
2	Working hours per week	0.252	0.064	0.210	0.110	3.365	0.001*
3	Gender	0.264	0.070	3.269	0.078	2.362	0.018*

* Statistically significant

may reflect differences in staffing levels, economic pressures, and availability of mental health resources.

However, some studies present contrasting perspectives. Buğra İlhan and Küpeli found that younger age and being female were associated with anxiety among emergency workers, while having children and being vaccinated against COVID-19 were protective factors [26]. Unlike their study, we did not examine the impact of vaccination status or family status. Furthermore, while they did not find a relationship between working night shifts and mental health outcomes, we identified working hours per week as a significant predictor of both anxiety and depression. These differences may reflect variations in the specific stressors faced by healthcare workers in different settings or cultural contexts. It's also worth noting that Buğra İlhan and Küpeli reported coping strategies such as hobbies, healthy eating, and reading were associated with reduced levels of secondary trauma syndrome, anxiety, and depression. Addressing such coping mechanisms was beyond the scope of our study, but represents a potential area for intervention in our population.

In contrast to Sharifi et al., who found a significant relationship between employment status and mental health, our study did not observe such an association [27]. This discrepancy could be attributed to differences in the categorization of employment status or variations in the job security and support systems available to nurses in different hospitals. Kolivand et al., also reported a positive relationship between female gender and depression, anxiety, and stress, which aligns with our findings [28]. However, our study further identified psychiatric drug use and working hours as more influential factors in predicting depression and anxiety than gender alone.

Notably, Sabbaghi et al., found that age, education level, experience, and employment relationship were related to anxiety and depression among prehospital emergency staff [29]. These factors were not significantly associated with depression and anxiety scores in our study population, suggesting that the predictors of mental health outcomes may vary depending on the specific characteristics of the healthcare workforce.

Ślusarska et al.'s systematic review reported lower prevalence rates of anxiety and depression among nurses post-COVID-19 compared to our findings [30]. They reported the majority of anxiety at 29–57% in different studies, and the prevalence of depression was reported as 21% on average, which is markedly lower than the 65% for moderate to severe anxiety and 50% for depression observed in our study. This discrepancy highlights the possibility that Iranian healthcare workers may be experiencing a disproportionately higher psychological burden in the aftermath of the pandemic. The reasons for this disparity could be multifactorial, including differences in healthcare systems, resource availability, cultural norms,

and the specific challenges faced by Iranian nurses during the pandemic.

While our data indicate high rates of anxiety and depression among Iranian nurses, these findings should be interpreted in light of regional variations. For instance, Abuhammad et al. (2023) reported moderate declines in health-related quality of life among Jordanian COVID-19 recovered individuals, and their national study found varying mental health outcomes in post-COVID populations. Such results highlight the importance of healthcare system context, cultural factors, and population-specific stressors in shaping postpandemic mental health trajectories. Our statements regarding the severity of burden in Iran have been moderated to reflect these complexities [31, 32].

Limitations

This study has several limitations. First, the overrepresentation of nurses from COVID-19 wards and underrepresentation from critical care units (e.g., CCU) may have biased findings toward higher anxiety and depression prevalence, given the greater trauma exposure of COVID-ward nurses. Future research should focus on obtaining more representative samples from these areas. Second, we did not assess external factors such as economic pressures, family dynamics, or spiritual well-being, which may have contributed to the observed levels of anxiety and depression. Future studies should incorporate these variables to provide a more comprehensive understanding of the factors influencing mental health. Additionally, the cross-sectional design precludes any conclusions regarding causality. Longitudinal studies are needed to examine the temporal relationships between the identified predictors and mental health outcomes. Also, the reliance on self-report measures may have introduced bias, as participants may have been reluctant to disclose sensitive information.

Moreover, we did not collect or control for participants' prior psychiatric diagnoses, type and duration of psychiatric drug use, or other substance use. These unmeasured variables could confound our observed associations. Other potential confounders such as vaccination status, family COVID-19 exposure, and prepandemic mental health status were not assessed. Protective factors and coping strategies were not measured; incorporating these may help design resilience-building interventions. Subgroup analyses (e.g., ICU vs. general wards, official vs. contract staff) were not performed due to statistical power considerations.

Finally, no baseline pre-COVID-19 data were collected in our sample, limiting our ability to directly attribute observed prevalence rates to postpandemic conditions. While previous Iranian studies (e.g., Sharifi et al., 2022) reported lower prevalence levels among nurses,

differences in design and setting warrant cautious interpretation [12].

Conclusion

This study highlights a substantial and alarmingly high prevalence of anxiety and depression among Iranian nursing staff following the COVID-19 pandemic, surpassing levels reported in many previous international studies. Our analysis revealed strong correlations between both mental health conditions and factors such as psychiatric drug use, extensive weekly working hours, and female gender. The significant association between anxiety and department of work further underscores the need for context-specific interventions. The present findings urgently call for the development and implementation of comprehensive organizational wellness programs aimed at mitigating these risk factors and promoting the mental well-being of nursing staff. Targeted interventions should include legislation to establish safe staffing ratios, provision of hazard pay during health crises, mandated paid mental health leave, and institution-sponsored free confidential counseling services for nurses.

Acknowledgements

The current study was extracted from the thesis written by Ali Jahedi for the degree of Medical Doctor, which was supported and financed by Shiraz University of Medical Sciences (grant No. 24821). The authors acknowledge the use of AI language models, specifically ChatGPT, in improving the clarity and readability of the manuscript. The authors affirm that all analyses and interpretations were conducted by the authors and that they retain full responsibility for the content and integrity of the published work. Any use of AI was limited to editorial assistance.

Author contributions

SR H. and SM F participated in the study concept and design, as well as project supervision. A J participated in the acquisition of data. M F, SH M and RS M participated in the analysis and interpretation of data. SR H, M F, and RS M participated in the drafting of the manuscript. A J, N ZJ, SH M and M N helped in drafting the manuscript and revising the manuscript. All authors read and approved the final manuscript.

Funding

This study was financially supported by Shiraz University of Medical Sciences (Grant No. 24821).

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was approved by the Vice-Chancellor of Research and Technology and the Local Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.MED.REC.1400.574). The study was conducted in accordance with the Declaration of Helsinki and its later amendments. All participants provided written informed consent prior to participation. Data confidentiality was maintained by restricting access to the data to the research team.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 15 April 2025 / Accepted: 26 August 2025

Published online: 01 September 2025

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