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Prevalence of depression, anxiety, and stress among Iranian nurses during the COVID-19 outbreak and their related factors

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ABSTRACT:

Background: Psychological conditions such as stress, anxiety, and depression are emerging challenges in healthcare systems. These disorders are recognized as very common problems among the nursing staff. During the COVID-19 period, nursing staff has been exposed to the highest risk of psychological disorders. The study aimed to examine the prevalence of depression, anxiety, and stress amongst Iranian nurses throughout the pandemic and to explore the possible factors related to each mental condition.

Methods: A cross-sectional and web survey done from September 15 to December 15, 2020 amongst 1135 Iranian nurses. Stress, anxiety, and depression were measured using the Depression Anxiety Stress Scale-21 Items (DASS-21) during the COVID-19 pandemic. A logistic regression analysis was performed to recognize the predictors.

Results: The prevalence of stress, anxiety, and depression was 75.6%, 79.2%, and 59.1%, respectively, among nurses. The outcomes of the multivariable logistic regression indicated that potential factors contributing to stress included female gender (odds ratio [OR] = 1.52), younger age (OR = 0.48), and work overload (OR = 1.73). Female gender (OR = 1.56), younger age (OR=0.27), and lower levels of education (OR = 0.50) were associated with high levels of anxiety. Also, lower education (OR=0.56), longer working hours (OR = 1.81), and working in intensive care units (OR = 1.67) significantly predicted a higher risk of depression symptoms in nurses.

Conclusion: The present results showed that stress, anxiety, and depression were common amongst nurses working in public hospitals throughout the COVID-19 pandemic. Preventive measures, like psychological interventions, are suggested to decrease the risk of stress, anxiety, and depression among nurses; the identification of risk factors may also allow for more targeted interventions. There is an imperative need for diverse implementation strategies at all levels to decrease the psychological effect of the pandemic such as social support and psychological support in the workplace



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Introduction

Coronavirus disease (COVID-19) is caused by severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2) (Organization 2008). By the end of December 2019, the WHO described more than 40 conditions of pneumonia of an undiscovered cause, originating from Wuhan, China, and declared the COVID-19 pandemic in March 2020 (Shehada et al. 2021, Cucinotta and Vanelli 2020). Currently, COVID-19 has spread to all Middle Eastern states, including Iran (Albelbeisi et al. 2020).

Iran is recognized as the second-largest country in Middle Eastern states. Based on the World Bank classification, Iran placed amongst the upper-middle-income economies (Abdoli 2020, World Bank 2019). In late February 2020, a first infected with COVID-19 virus was detected in Qom. The infection spread rapidly to all provinces of Iran, leading to the largest figure of discovered cases and deaths in the Eastern Mediterranean region (Abdoli 2020, Azarafza, Azarafza, and Akgün 2021). In response to the pandemic, multiple actions have been taken everywhere in the world to limit the extent of this disease, including the use of masks, social distancing, lockdowns, and quarantines (World Health Organization 2020, Shehada et al. 2021). However, these interventions have negatively influenced the people's lifestyles and their psychological and emotional well-being. Studies conducted in China reported that more than a quarter of the people suffered from moderate to severe levels of anxiety or stress throughout the COVID-19 (Qiu et al. 2020, Wang et al. 2020).

Evidence shows that healthcare providers, especially those who are directly responsible for detecting, diagnosing, and treating COVID-19, have been exposed to the highest risk of psychological health disorders, such as posttraumatic stress disorder (PTSD) throughout the COVID-19 (Tzeng 2003, Carmassi et al. 2020, Braquehais et al. 2020). Nurses as key healthcare providers are at the heart of any healthcare system (Courbage, Abu Hamad, and Zagha 2016). During the current pandemic, they have played a dynamic role in establishing health interventions and overcoming the challenges. Overall, they have been one of the most important contributors to pandemic management and control (Chen et al. 2020, Fawaz, Anshasi, and Samaha 2020). As frontline health professionals, nurses may face various challenges, such as the risk of infection, lack of protective supplies, and absence of essential drugs; these challenges may raise the risk of insomnia, frustration, fear, stress, anxiety, and depression amongst them (Fawaz, Anshasi, and Samaha 2020, Li et al. 2020, Mamun and Griffiths 2020, Salari et al. 2020).



In Iran, the fast expansion of COVID-19 in 31 provinces has enlarged the load on the understaffed health organizations (Heidarijamebozorgi et al. 2021). Compared to other healthcare professionals, nurses have the most patient contact time, and most infections have been informed in this group (Sabetian et al. 2021, Shahriarirad et al. 2021). They are aware of disease complications and mortality and have immediate touch with COVID-19 patients (Shehada et al. 2021). The lack of training courses during academic studies, besides the lack of adequate skills to deal with the disease, has contributed to the high prevalence of psychological disorders (Kalateh Sadati et al. 2021).

Generally, depression and anxiety are public disorders everywhere in the world. The WHO projected that around 300 million persons complain of depression globally. Almost the same figure of persons have anxiety disorders (World Health Organization 2017b).

Depression is the most prevalent mental health condition and is predictable to be the primary worldwide cause of death by 2030 (World Health Organization 2008). Developing countries report the top prevalence of symptoms related to depression and anxiety (Tran, Tran, and Fisher 2013). These Psychological conditions are directly related to social and physical harms, like poor family relations, poor performance, and the use of prohibited medications (World Health Organization 2017a, Gobbi et al. 2019, Lai et al. 2015). The Depression Anxiety Stress Scale (DASS) is one of tools prepared to assess depression, anxiety, and stress (Lovibond and Lovibond 1995).

DASS-21 is a novel short version of DASS with three sub metrics (seven items for each one). It is a low-cost, easy-to-use tool, which permits for a quick assessment (Ali et al. 2017, Zanon et al. 2021). Depression, anxiety, and stress are the most common mental health conditions amongst nurses, which need to be reflected in health studies (Ghazwin et al. 2016, Hashemian et al. 2015). The study aimed to examine the prevalence of depression, anxiety, and stress amongst Iranian nurses throughout the pandemic and to explore the possible factors related to each mental condition.



the time”). The scores of depression, anxiety, and stress were calculated by summing the scores of relevant items for each subcase, multiplied by two, based on the instructions (Lovibond and Lovibond 1995). Overall, higher scores showed a higher severity of each dimension. The scores were categorized as “normal”, “mild”, “moderate”, “severe”, and “extremely severe” for each subscale (Lovibond and Lovibond 1995). Table 1 presents the classification of DASS severity scores, with cutoff scores >9 indicating depression, >7 indicating anxiety, and >14 indicating stress.

Table 1. Classification of DASS severity levels

| Category | Depression | Anxiety | Stress |
|------------------|------------|---------|--------|
| Normal | 0–9 | 0–7 | 0–14 |
| Mild | 10–13 | 8–9 | 15–18 |
| Moderate | 14–20 | 10–14 | 19–25 |
| Severe | 21–27 | 15–19 | 26–33 |
| Extremely severe | 28+ | 20+ | 34+ |

DASS-21 has been translated and validated in non-clinical Iranian people (Samani and Jokar 2001, Yazdanpanahi et al. 2018, Asghari, Saed, and Dibajnia 2008). Moreover, it has been widely used for healthcare and nursing populations, and its reliability and validity have been described (Heidarijamebozorgi et al. 2021, Mousavi et al. 2017). In the present study, Cronbach’s alpha coefficients for the total scale was .89.

Data collection

An online questionnaire available on the Avalform website (<https://www.avalform.com/>), which is a well-known online survey platform in Iran, was accessible to all eligible nurses in each hospital. The questionnaire was distributed online, and the study link was sent to nurses through online medical university groups and nursing channels. Before the survey, informed consent form was gained from each contributor. To encourage participation, all nurses were told that this web-based survey was voluntary, anonymous, and confidential. Also, the nurses were requested to submit the link to their colleagues in hospitals. To reach a high response rate, in collaboration with the online channels and



group administrators, the questionnaire was sent several times, and the study link remained obtainable for around three months.

Data analysis

Descriptive statistics were used to summarize the characteristics of the nurses and the status of stress, anxiety, and depression. Variables were then dichotomized to facilitate a comparison of the outcomes. The cutoff scores of >9, >7, and >14 indicated depression, anxiety, and stress, respectively, according to DASS-21 (Lovibond and Lovibond 1995). Independent *t*-test and ANOVA test were performed. Furthermore, a multivariate logistic regression was used to identify significant predictors of the outcomes evaluated in this study. Data analysis was conducted in SPSS version 22. Statistical significance was defined as $P < 0.05$.

Ethical approval

The protocol of the study was approved by the Ethics Committee of Hamadan University of Medical Sciences, Hamadan, Iran (ethical code: IR.UMSHA.REC.1399.569). Before the survey, informed consent form was gained from each contributor. To encourage participation, all nurses were told that this web-based survey was voluntary, anonymous, and confidential.

Results

Characteristics of the study population

The characteristics of the nurses are presented in Table 2. 1135 nurses answered the questionnaire. The mean age of the nurses was 33.3 years (SD=7.8). More than three-quarters of the participants were female, worked rotating shifts, and worked more than 42 hours weekly.

Table 2. Characteristics of the sample (N =1135)

| Variable | Sub-category | N (%) | Mean (SD) |
|-------------------|-----------------|-------------|------------|
| Gender | Male | 276 (24.3) | |
| | Female | 859 (75.7) | |
| Age | ≤30 | 526 (46.3) | 33.3 (7.8) |
| | 31-40 | 371 (32.7) | |
| | >40 | 238 (21.0) | |
| Marital status | Single | 365 (32.2) | |
| | Married | 770 (67.8) | |
| Educational level | Bachelor degree | 1037 (91.4) | |



| | | | |
|-----------------------------------|---------------------|------------|-------------|
| | Master or PhD | 98 (8.6) | |
| Work experience in nursing | ≤10 | 704 (62.0) | 9.1 (7.1) |
| | >10 | 431 (38.0) | |
| Current working unit | Emergency | 220 (19.3) | |
| | Critical care units | 281 (24.8) | |
| | General wards | 634 (55.9) | |
| Shift work | Fixed | 256 (22.6) | |
| | Rotating | 879 (77.4) | |
| Work hours per week | ≤42 | 334 (29.4) | 51.41(13.2) |
| | >42 | 801 (70.6) | |

Depression, anxiety, and stress levels

Table 3 displays the mean DASS scores and the prevalence of each mental disorder among the participants. The means scores of the participants were 19.16 ± 12.18 for depression, 22.98 ± 10.95 for stress, and 42.57 ± 11.18 for anxiety.

Regarding stress, 75.6% of the participants scored above normal as follows: 30.7% of whom classified as mild/moderate categories, 24.1% into the severe category, and 20.8% into the extremely severe category. Regarding anxiety, 79.2% of the participants scored above the normal threshold as follows: 23.7% of whom classified as mild/moderate categories, 12.1% into the severe category, and 43.4% into the extremely severe category. Considering depression, 59.1% of the participants scored above normal for depression as follows: 23.6% of whom classified as mild/moderate categories, 18.6% into the severe depression category, and 17.0% into the extremely severe category.

Table 3. Depression, anxiety, and stress levels

| Category | Mean ± SD | Normal | Mild | Moderate | Severe | Extremely severe |
|-------------------|-------------------|------------|------------|------------|------------|------------------|
| | | N (%) | N (%) | N (%) | N (%) | N (%) |
| Stress | 22.98 ± 10.95 | 277 (24.4) | 140 (12.3) | 209 (18.4) | 273 (24.1) | 236 (20.8) |
| Anxiety | 42.57 ± 11.18 | 236 (20.8) | 64 (5.6) | 205 (18.1) | 137 (12.1) | 493 (43.4) |
| Depression | 19.16 ± 12.18 | 464 (40.9) | 120 (10.6) | 147 (13.0) | 211 (18.6) | 193 (17.0) |

Relationships between the respondents' characteristics and the mean scores of stress, anxiety, and depression

Table 4 presents the nurses' stress, anxiety, and depression scores in terms of the demographic variables. The results displayed that the mean scores of stress were significantly different regarding



sex, age, education, work experience, shift work, and working hours per week. Female nurses stated higher mean stress scores compared to male ($P=0.025$). Nurses above the age of 40 years experienced less stress compared to other age groups ($P<0.001$). Further, nurses with a bachelor's degree reported higher mean stress scores compared to nurses with postgraduate degrees ($P=0.008$).

Based on the findings, nurses with Less than 10 years of working reported higher mean stress scores compared to nurses with more than 10 years of working ($P=0.004$). Moreover, nurses who worked rotating shifts stated higher mean stress scores compared to those working fixed shifts ($P=0.006$). Finally, nurses who on duty more than 42 hours per week experienced significantly higher stress levels compared to nurses with ≤ 42 hours of work per week ($P\leq 0.001$).

In terms of anxiety, the mean scores were significantly different in terms of age, education, shift work, and working hours per week ($P<0.05$). There was a significant relationship between age and anxiety ($P=0.002$), with lower levels of anxiety reported in the older age group (>40 years) compared to the two younger age groups. Nurses with a bachelor's degree reported higher mean anxiety scores compared to nurses with postgraduate degrees ($P<0.001$). Nurses working rotating shifts reported higher mean anxiety scores compared to those with fixed shifts ($P=0.023$). Nurses with more than 42 hours of work per week reported higher mean anxiety scores compared to nurses with ≤ 42 hours of work per week ($P<0.001$).

In terms of depression, the nurses' mean scores were significantly different in terms of age, marital status, education, current hospital department, shift work, and working hours per week ($P < 0.05$). The age group of >40 years reported lower mean depression scores compared to the other age groups ($P = 0.012$). Moreover, single nurses obtained higher mean depression scores compared to married nurses ($P = 0.023$). Nurses with a bachelor's degree reported higher mean depression scores compared to nurses with postgraduate degrees ($P = 0.009$). Nursing working in ICU departments reported higher mean depression scores compared to nurses working in emergency departments ($P = 0.033$). Besides, rotating shift nurses had higher mean depression scores compared to those working fixed shifts ($P = 0.014$). Nurses working >42 hours per week reported higher mean depression scores compared to nurses working ≤ 42 hours per week ($P < 0.014$).



Binary logistic regression models

Table 5 presents the results of logistic regression analyses, which were performed to define the predictors of the prevalence of stress, anxiety, and depression. An omnibus test was also performed to evaluate the regression models, which indicated their adequate goodness of fit ($P < 0.001$).

The logistic regression model for stress was significant ($P < 0.001$), explaining 4.3% (Nagelkerke's R^2) of variance in stress; it could accurately classify 75.6% of cases. The findings showed that three demographic variables, including age, gender, and working hours, were predictors of the prevalence of stress ($P < 0.05$). In other words, stress was more common among female nurses compared to male (odds ratio [OR] = 1.52). On the other hand, stress was less likely to occur in nurses > 40 years compared to ≤ 30 years (OR = 0.48). Moreover, nurses working overtime were more likely to experience high levels of stress (OR = 1.73).

The logistic regression model for anxiety was significant ($P < 0.001$), explaining 7.2% (Nagelkerke's R^2) of variance in depression; in other words, it could accurately classify 79.2% of cases. The present findings showed that three demographic variables, namely, age, gender, and education, were predictors of the prevalence of anxiety ($P < 0.05$). The prevalence of anxiety was higher among female nurses compared to male nurses (OR = 1.56). Besides, anxiety was less probable in nurses > 40 years of age compared to nurses ≤ 30 years (OR = 0.27). Also, nurses with a postgraduate degree were less likely to experience high levels of anxiety (OR = 0.50).

The logistic regression model for depression was significant ($P < 0.001$), explaining 4.5% (Nagelkerke's R^2) of variance in depression; it could accurately classify 59.1% of cases. The results showed that three demographic variables, including education, hospital department, and working hours, were predictors of the prevalence of depression ($P < 0.05$). Depression was less likely to occur in postgraduate nurses (OR = 0.56). The prevalence of depression was higher in the ICU nurses unit compared to nurses working in the emergency department (OR = 1.67). Also, nurses working overtime were more likely to experience high levels of depression (OR = 1.81).



Table 4. Comparison of the mean stress, anxiety, and depression scores in terms of demographic variables

| Variable | | Stress | Anxiety | Depression |
|----------------------------|---------------------|-------------------------|-------------------------|-------------------------|
| | | Mean \pm SD | Mean \pm SD | Mean \pm SD |
| Gender | Male | 21.7 \pm 11.4 | 18.0 \pm 11.7 | 19.4 \pm 12.8 |
| | Female | 23.4 \pm 10.8 | 16.9 \pm 11.0 | 19.1 \pm 11.9 |
| | p-value | 0.025 | 0.077 | 0.746 |
| Age | \leq 30 | 24.2 \pm 10.7 | 18.5 \pm 10.8 | 20.1 \pm 12.0 |
| | 31-40 | 23.0 \pm 10.8 | 17.7 \pm 11.1 | 19.1 \pm 12.0 |
| | $>$ 40 | 20.3 \pm 11.3 | 15.4 \pm 11.8 | 17.3 \pm 12.5 |
| | p-value | <i><0.001</i> | 0.002 | 0.012 |
| Marital status | Single | 23.5 \pm 0.41 | 17.3 \pm 11.3 | 20.4 \pm 12.0 |
| | Married | 22.7 \pm 0.44 | 17.7 \pm 11.1 | 18.6 \pm 12.2 |
| | p-value | 0.256 | 0.514 | 0.023 |
| Educational level | Bachelor degree | 23.2 \pm 10.9 | 17.9 \pm 11.1 | 19.5 \pm 12.1 |
| | Master or PhD | 20.2 \pm 10.8 | 14.1 \pm 11.0 | 16.0 \pm 12.2 |
| | p-value | 0.008 | 0.001 | 0.009 |
| Work experience in nursing | \leq 10 | 23.7 \pm 10.8 | 18.0 \pm 10.9 | 19.7 \pm 12.2 |
| | $>$ 10 | 21.7 \pm 11.1 | 16.8 \pm 11.6 | 18.3 \pm 12.2 |
| | p-value | 0.004 | 0.78 | 0.74 |
| Current working unit | Emergency | 21.8 \pm 10.4 | 16.6 \pm 11.3 | 17.3 \pm 11.4 |
| | Critical care units | 23.6 \pm 10.8 | 18.2 \pm 11.1 | 20.1 \pm 12.3 |
| | General wards | 23.1 \pm 11.2 | 17.6 \pm 11.2 | 19.4 \pm 12.4 |
| | p-value | 0.170 | 0.255 | 0.033 |
| Shift work | Fixed | 21.3 \pm 10.7 | 16.2 \pm 11.1 | 17.5 \pm 11.8 |
| | Rotating | 23.5 \pm 12.0 | 18.0 \pm 11.2 | 19.6 \pm 12.2 |
| | p-value | 0.006 | 0.023 | 0.014 |
| Work hours per week | \leq 42 | 20.7 \pm 10.9 | 15.6 \pm 10.7 | 16.6 \pm 11.6 |
| | $>$ 42 | 23.9 \pm 10.8 | 18.4 \pm 11.3 | 20.2 \pm 3 |
| | p-value | <i><0.001</i> | <i><0.001</i> | <i><0.001</i> |

Italic: < 0.01, bolditalic: < 0.05

**Table 5.** Logistic regression models on factors affecting stress, anxiety, and depression

| Variables | Having stress disorder | | Having Anxiety disorder | | Having Depression disorder | |
|----------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|----------------------------|-----------------|
| | OR | P | OR | P | OR | P |
| Gender (Reference= male) | 1.52 | .012 | 1.56 | .011 | 1.12 | .461 |
| Age (reference= ≤30 years) | | | | | | |
| 31-40 | .72 | .116 | .58 | .017 | .80 | .221 |
| > 40 | .48 | .012 | .27 | <.001 | .70 | .171 |
| Marital status (Reference=single) | .91 | .583 | 1.40 | .051 | 0.82 | .165 |
| Education (Reference=Bachelor's degree) | .73 | .194 | .50 | .003 | .56 | .008 |
| Work experience in nursing (reference: ≤10 years) | 1.22 | .387 | 1.29 | .307 | 1.22 | .345 |
| Shift work (Reference= Fixed) | .91 | .601 | .97 | .891 | 1.04 | .812 |
| Wards (Reference: Emergency department) | | | | | | |
| critical care units | 1.14 | .554 | 1.50 | .080 | 1.67 | .007 |
| General wards | 1.12 | .564 | 2.39 | .096 | 1.34 | .081 |
| Work hours (Reference: normal ☐ 44 h) | 1.73 | <.001 | 1.35 | .072 | 1.81 | <.001 |
| Nagelkerke pseudo-R ² | .043 | | .073 | | .045 | |

Discussion

Throughout the current COVID-19 pandemic, nurses have played a dynamic role in health interventions, and they have been key contributors to the management of the pandemic and disease prevention (Chen et al. 2020, Fawaz, Anshasi, and Samaha 2020). Nurses may face various challenges, these challenges which lead to insomnia, frustration, fear, stress, anxiety, and depression (Fawaz, Anshasi, and Samaha 2020, Li et al. 2020, Mamun and Griffiths 2020, Salari et al. 2020). Therefore, this study examined the prevalence of depression, anxiety, and stress amongst Iranian nurses throughout the pandemic and to explore the possible factors related to each mental condition

The findings showed that the prevalence of stress, anxiety, and depression was very high. Before COVID-19 Pandemic, previous studies on nurses reported considerably lower prevalence rates of stress, anxiety, and depression compared to the current study (Maharaj, Lees, and Lal 2019, Tran et al. 2019). A study on Vietnamese nurses revealed that the prevalence of stress, anxiety, and depression was 18.5%, 39.8%, and 13.2%, respectively (Tran et al. 2019). Among Australian nurses, the prevalence of



stress, anxiety, and depression was 41.2%, 4.2%, and 32.4%, respectively (Maharaj, Lees, and Lal 2019). In Iran, the prevalence of Stress, anxiety, and depression was 8.5%, 25.5%, and 22.3% respectively (Ghazwin et al. 2016). During the COVID-19 pandemic, a recent review amongst nurses showed that the overall prevalence of stress, anxiety, and depression was 43%, 37%, and 35%, respectively (Al Maqbali, Al Sinani, and Al-Lenjawi 2020). A possible explanation for the high prevalence of mental conditions amongst Iranian nurses may be the sanctions that have affected different aspects of life, including the healthcare system, and have indirectly caused a shortage of basic medical supplies and personal protective equipment (Abdoli 2020, Albelbeisi et al. 2020, Murphy et al. 2020, Gharebaghi and Heidary 2020).

Moreover, the fast expansion of COVID-19 in 31 provinces has enlarged the load on the understaffed health organizations (Heidarijamebozorgi et al. 2021). Compared to other healthcare professionals, nurses have the most patient contact time, and most infections have been informed in this group (Sabetian et al. 2021, Shahriarirad et al. 2021). They are aware of disease complications and mortality and have immediate touch with COVID-19 patients (Shehada et al. 2021). The lack of training courses during academic studies, besides the lack of adequate skills to deal with the disease, has contributed to the high prevalence of psychological disorders (Kalateh Sadati et al. 2021).

Policymakers should pay special consideration to the high prevalence of psychological conditions among the nursing staff, as these mental health conditions are directly related to social and physical harms, like poor family relations, poor performance, and the use of prohibited medications, and may decline the quality of care delivered to the patient (World Health Organization 2017a, Gobbi et al. 2019, Lai et al. 2015). Moreover, psychological disorders may result in individuals' poor concentration and performance, which can threaten their lives and increase the risk of medical errors in the healthcare system (Berland, Natvig, and Gundersen 2008, Johnson et al. 2018). The present results revealed that some demographic variables were predictors of the prevalence of stress, anxiety, and depression. Three demographic variables, namely, age, gender, and working hours, were predictors of the prevalence of stress. Three demographic variables, namely, age, gender, and education, were predictors of the prevalence of anxiety, and three demographic variables, namely, education, work department, and working hours, were predictors of the prevalence of depression. According to previous studies, several



functional and demographic variables are related to the high prevalence of mental disorders in the nursing staff, such as age, marital status, and years of work (Welsh 2009, Kavari 2006, Cheung and Yip 2015, Ruggiero 2005).

The current outcomes are in line with the results of a study carried out in China, that demonstrated that nurses working in isolation units were more likely to experience stress, anxiety, and depression (Wang et al. 2021). However, this study did not report the significant impacts of age, hours of work, and education on stress, anxiety, or depression (Wang et al. 2021). Additional study revealed that nurses working in isolation units were more likely to experience anxiety (Zheng, Zhou, Fu, et al. 2021). This finding is in line with other study that identified heavy workloads and working in isolation units (COVID-19 units) as risk factors for depression among nurses (Zheng, Zhou, Qiu, et al. 2021). A Possible explanation for the lower Emergency Department (ED) score may be that patients pass through the ED and therefore nurses may have less exposure versus nurses working with admitted in-patients

Additionally, a study among healthcare professionals, including nurses (24.2%) in Egypt and Saudi Arabia, showed that being female, shift work, and age <30 years were associated with stress, anxiety, and depression; these results are in line with the current results (Arafa et al. 2021). However, the present findings are not in line with a study conducted in Australia, which did not indicate the significant effects of age, gender, hours of work, shift work, shift type, shift duration, and education on stress, anxiety, or depression (Maharaj, Lees, and Lal 2019).

Limitations

A possible limitation of the current study is the use of the convenience sampling method, which could lead to selection bias. Also, other healthcare professionals, such as physicians, paramedics, X-ray technicians, and laboratory technicians, were not included in this study. Finally, only nurses with access to the Internet could contribute to this study.

Conclusions

The present study revealed that stress, anxiety, and depression were common amongst nurses working in public hospitals throughout the COVID-19 pandemic. Preventive measures, like psychological interventions, are suggested to decrease the risk of stress, anxiety, and depression among nurses; the



identification of risk factors may also allow for more targeted interventions. There is an imperative need for diverse implementation strategies at all levels to decrease the psychological effect of the pandemic such as social support and psychological support in the workplace. However, further studies are required to recognize the effective strategies and interventions that may enhance the health of nursing professionals and consequently, increase the quality of care delivered.

List of abbreviations

COVID-19: Coronavirus disease 2019, DASS-21 Depression Anxiety Stress Scale-21 Items, OR: odds ratio, SARS-CoV-2: Severe acute respiratory syndrome-coronavirus 2, WHO: World Health Organization, PTSS: Posttraumatic stress symptoms, PTSD: Posttraumatic stress disorder, SD: standard deviation.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no conflict of interest.

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