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# Psychological impact of the coronavirus 2019 (COVID-19) pandemic on nurses

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**Abstract**

**Aim:** The new coronavirus disease (COVID-19) pandemic has laid unprecedented stress on healthcare workers and especially nurses. The main objective of this study is to determine the prevalence of stress, anxiety, depression and sleep disturbance among nurses in Oman during the COVID-19 pandemic, and to explore the contributing factors.

**Methods:** A cross-sectional and descriptive correlational design using Qualtrics® software was performed. Data were collected using the Pittsburgh Sleep Quality Index, the Hospital Anxiety and Depression Scale and the Perceived Stress Scale.

**Results:** Of the 1,130 nurses who participated, 75.6% (n = 854) reported stress, 44.2% (n = 499) reported anxiety, 38.5% (n = 435) reported depression and 73.7% (n = 833) reported poor sleep. Stress, anxiety, depression and sleep disturbance ($p < .05$) were significantly associated with age, marital status, comorbidity and whether family members or relatives were suspected or confirmed with COVID-19. The stress, anxiety, depression and sleep disturbance were significantly positively corelated with each other. Logistic regression showed nurses in the age group between 18 and 30, who worked at the frontline, were at a higher risk of stress, anxiety, depression and sleep disturbance.

**Conclusions:** Stress, anxiety, depression and sleep disturbance are significant problems for nurses working in Oman during the COVID-19 pandemic. Appropriate interventions to monitor and reduce psychological problems and sleep disturbance among nurses are needed, which can help to support nurses' work during contagious disease outbreaks.

**KEYWORDS**

anxiety, COVID-19, depression, nurses, sleep disturbance, stress

## 1 | INTRODUCTION

At the end of December 2019, the new coronavirus disease (COVID-19) emerged in Wuhan City, Hubei province, China, and has since spread worldwide (Li et al., 2020). COVID-19 has seriously threatened human health. As of January 30, 2020, a public health emergency was declared by the World Health Organization (WHO), and it was considered the novel coronavirus disease (COVID-19) was a pandemic (World Health Organization, 2020). Globally, the WHO has reported 109.5 million confirmed cases worldwide with nearly 2.4 million deaths up until February 18, 2021 (WHO, 2021). This extreme number of confirmed cases can overwhelm healthcare systems with thousands of patients needing urgent care. This increases the workload on healthcare workers, especially nurses who are in direct

  

contact with patients with COVID-19. The International Council of Nurses (ICN) reported more than 600 nurses have died from COVID-19 worldwide (ICN, 2020). Therefore, working with a high risk of infection from patients can lead to mental health problems, for example, stress, anxiety and depression among nurses.

Previous studies have been published which explore the prevalence of psychological outcomes among healthcare workers during infectious disease outbreaks (Chew et al., 2020b; Chew et al., 2020a; Kim, 2018; Lee et al., 2007; Su et al., 2007; Tan et al., 2020). However, to date, the impact of the COVID-19 outbreak on the psychological health of nurses has not yet been systematically reported. Therefore, the aim of this study is to examine the present status of the COVID-19 outbreak on the prevalence of phycological distress, depression, anxiety and sleep disturbance among nurses working in Oman. The first individuals infected with COVID-19 appeared in Oman on February 24, 2020. A national lockdown began in April to better contain the spread of COVID-19 and to prevent hospitals from being overwhelmed with COVID-19 patients (Ministry of Health, 2020). Healthcare workers, particularly nurses, are at high risk of being infected because they are in the closest proximity to patients. Current research has already shown that nurses are suffering from psychological distress due to the COVID-19 pandemic (Hu et al., 2020).

To date, the mental health status of nurses during the COVID-19 pandemic in Oman are still unknown. This study will help to elucidate the mental health status of nurses, which is crucial to better controlling and planning for COVID-19 or similar diseases in the future. The aim of this study is to describe the prevalence of mental health problems (stress, anxiety, depression and sleep disturbance), and their contributing factors, among nurses in Oman during the COVID-19 pandemic.

## 2 | METHOD

### 2.1 | Study design

The study employed a large-scale cross-sectional, descriptive correlational design. The survey was developed using the online platform Qualtrics®. Participants were invited through a link to complete the questionnaire, which was sent by social media.

### 2.2 | Setting and sampling

The participants were recruited from all Ministry of Health institutions in Oman. The Ministry of Health currently operates 50 hospitals with 5,039 beds and 207 health centers (Ministry of Health, 2019). The study was performed from the August 7, 2020 to August 17, 2020. The inclusion criterion was being a nurse who worked in a Ministry of Health institution. The exclusion criterion was a history of psychiatric or neurological disorders that could interfere with study participation.

### 2.3 | Instrument

The questionnaire included detailed demographics, background history and psychometric scales including the Pittsburgh Sleep Quality Index (PSQI), the Hospital Anxiety and Depression Scale (HADS) and the Perceived Stress Scale (PSS).

### 2.4 | Demographics

Information about participants' age, gender, marital status, years of experience, types of institutions (hospital or primary setting) and comorbidities were obtained in the survey. In addition, participants were asked the three following questions. (a) Do you have confirmed COVID-19? (b) Do any family members have suspected or confirmed COVID-19? (c) Do you come into contact with confirmed or suspected COVID-19 patients in your workplace?

### 2.5 | Stress scale

The PSS (Cohen, Kamarck, & Mermelstein, 1983), a self-administration questionnaire, was used to measure post-traumatic stress disorder. The PSS consisted of 10 items; each item's response ranged from 0 (never) to 4 (very often), with scores ranging from 0 to 40 for the total score of the scale. Scores ≥14 are recognized as the presence of stress (Jahrami et al., 2020). The PSS Arabic version revealed an internal consistency of .90 (Almadi, Cathers, Hamdan Mansour, & Chow, 2012).

### 2.6 | Depression and anxiety scale

The HADS includes 14 items assessing anxiety (seven items) and depression (seven items), which are rated on a four-point Likert-type response (from 0 to 3) (Zigmond & Snaith, 1983). The scores in each subscale are computed by summing the corresponding items, with maximum scores of 21 for each subscale. The recommended cut-off values are ≥8 either for anxiety or depression (Bjelland, Dahl, Haug, & Neckelmann, 2002). The HADS Arabic

**TABLE 1** Demographic and clinical characteristic of participants (N = 1,130)

| | | | Depression (n = 435, 38.5%) | | Non-depression (n = 695, 61.5%) | | | Anxiety (n = 499, 44.2%) | | Non-anxiety (n = 631, 55.8%) | | | Stress (n = 854, 75.6%) | | Non-stress (n = 276, 24.4%) | | | Poor sleeper (n = 650, 57.5%) | | Good sleeper (n = 480, 42.5%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | *p* | n | % | n | % | *p* | n | % | n | % | *p* | n | % | n | % | *p* |
| Gender | | | | | | | .81 | | | | | .916 | | | | | .808 | | | | | .82 |
| Male | 99 | 8.8 | 37 | 8.5 | 62 | 8.9 | | 43 | 8.6 | 56 | 8.9 | | 74 | 8.7 | 25 | 9.1 | | 58 | 8.9 | 41 | 8.5 | |
| Female | 1,031 | 91.2 | 398 | 91.5 | 633 | 91.1 | | 456 | 91.4 | 575 | 91.1 | | 780 | 91.3 | 251 | 90.9 | | 592 | 91.1 | 439 | 91.5 | |
| Age | | | | | | | .007 | | | | | .00 | | | | | .000 | | | | | .007 |
| 22–30 | 187 | 16.5 | 88 | 20.2 | 99 | 14.2 | | 104 | 20.8 | 83 | 13.2 | | 165 | 19.3 | 22 | 8.0 | | 123 | 18.9 | 64 | 13.3 | |
| 31–40 | 679 | 60.1 | 264 | 60.7 | 415 | 59.7 | | 308 | 61.7 | 371 | 58.8 | | 516 | 60.4 | 163 | 59.1 | | 390 | 60 | 289 | 60.2 | |
| 41–50 | 225 | 19.9 | 73 | 16.8 | 152 | 21.9 | | 75 | 15.0 | 150 | 23.8 | | 150 | 17.6 | 75 | 27.2 | | 122 | 18.8 | 103 | 21.5 | |
| More than 50 | 39 | 3.5 | 10 | 2.3 | 29 | 4.2 | | 12 | 2.4 | 27 | 4.3 | | 23 | 2.7 | 16 | 5.8 | | 15 | 2.3 | 24 | 5 | |
| Marital status | | | | | | | .024 | | | | | .002 | | | | | .023 | | | | | .00 |
| Married | 968 | 85.7 | 357 | 82.1 | 611 | 87.9 | | 407 | 81.6 | 561 | 88.9 | | 719 | 84.2 | 249 | 90.2 | | 532 | 81.8 | 436 | 90.8 | |
| Single | 144 | 12.7 | 69 | 15.9 | 75 | 10.8 | | 83 | 16.6 | 61 | 9.7 | | 122 | 14.3 | 22 | 8.0 | | 105 | 16.2 | 39 | 8.1 | |
| Others | 18 | 1.6 | 9 | 2.1 | 9 | 1.3 | | 9 | 1.8 | 9 | 1.4 | | 13 | 1.5 | 5 | 1.8 | | 13 | 2 | 5 | 1 | |
| Institution type | | | | | | | .146 | | | | | .198 | | | | | .721 | | | | | .64 |
| Hospitals | 830 | 73.5 | 309 | 71.0 | 521 | 75.0 | | 357 | 71.5 | 473 | 75.0 | | 625 | 73.2 | 205 | 74.3 | | 474 | 72.9 | 356 | 74.2 | |
| Primary health care | 300 | 26.5 | 126 | 29.0 | 174 | 25.0 | | 142 | 28.5 | 158 | 25.0 | | 229 | 26.8 | 71 | 25.7 | | 176 | 27.1 | 124 | 25.8 | |
| Years of experience | | | | | | | .287 | | | | | .297 | | | | | .524 | | | | | .00 |
| <2 | 111 | 9.8 | 42 | 9.7 | 69 | 9.9 | | 41 | 8.2 | 70 | 11.1 | | 87 | 10.2 | 24 | 8.7 | | 57 | 8.8 | 54 | 11.3 | |
| 3–5 | 148 | 13.1 | 51 | 11.7 | 97 | 14.0 | | 71 | 14.2 | 77 | 12.2 | | 116 | 13.6 | 32 | 11.6 | | 73 | 11.2 | 75 | 15.6 | |
| 6–10 | 330 | 29.2 | 118 | 27.1 | 212 | 30.5 | | 140 | 28.1 | 190 | 30.1 | | 250 | 29.3 | 80 | 29.0 | | 195 | 30 | 135 | 28.1 | |
| 11–15 | 225 | 19.9 | 89 | 20.5 | 136 | 19.6 | | 101 | 20.2 | 124 | 19.7 | | 165 | 19.3 | 60 | 21.7 | | 119 | 18.3 | 106 | 22.1 | |
| 15–20 | 215 | 19.0 | 97 | 22.3 | 118 | 17.0 | | 105 | 21.0 | 110 | 17.4 | | 166 | 19.4 | 49 | 17.8 | | 152 | 23.4 | 63 | 13.1 | |
| >20 | 101 | 8.9 | 38 | 8.7 | 63 | 9.1 | | 41 | 8.2 | 60 | 9.5 | | 70 | 8.2 | 31 | 11.2 | | 54 | 8.3 | 47 | 9.8 | |
| Comorbidities | | | | | | | .012 | | | | | .00 | | | | | .031 | | | | | .001 |
| Yes | 165 | 14.6 | 78 | 17.9 | 87 | 12.5 | | 99 | 19.8 | 66 | 10.5 | | 136 | 15.9 | 29 | 10.5 | | 114 | 17.5 | 51 | 10.6 | |
| None | 965 | 85.4 | 357 | 82.1 | 608 | 87.5 | | 400 | 80.2 | 565 | 89.5 | | 718 | 84.1 | 247 | 89.5 | | 536 | 82.5 | 429 | 89.4 | |

(Continues)

**TABLE 1** (Continued)

| | | | Depression (n = 435, 38.5%) | | Non-depression (n = 695, 61.5%) | | | Anxiety (n = 499, 44.2%) | | Non-anxiety (n = 631, 55.8%) | | | Stress (n = 854, 75.6%) | | Non-stress (n = 276, 24.4%) | | | Poor sleeper (n = 650, 57.5%) | | Good sleeper (n = 480, 42.5%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | *p* | n | % | n | % | *p* | n | % | n | % | *p* | n | % | n | % | *p* |
| Families or relatives suspected or confirmed | | | | | | | .005 | | | | | .002 | | | | | .003 | | | | | .00 |
| Yes | 257 | 22.7 | 118 | 27.1 | 139 | 20.0 | | 136 | 27.3 | 121 | 19.2 | | 212 | 24.8 | 45 | 16.3 | | 178 | 69.3 | 472 | 54.1 | |
| No | 873 | 77.3 | 317 | 72.9 | 556 | 80.0 | | 363 | 72.7 | 510 | 80.8 | | 642 | 75.2 | 231 | 83.7 | | 79 | 30.7 | 401 | 45.9 | |
| Are you confirmed re COVID-19? | | | | | | | .501 | | | | | .176 | | | | | .413 | | | | | .20 |
| Yes | 71 | 6.3 | 30 | 6.9 | 41 | 5.9 | | 37 | 7.4 | 34 | 5.4 | | 55 | 6.4 | 16 | 5.8 | | 46 | 7.1 | 25 | 5.2 | |
| No | 1,059 | 93.7 | 405 | 93.1 | 654 | 94.1 | | 462 | 92.6 | 597 | 94.6 | | 799 | 93.6 | 260 | 94.6 | | 604 | 92.9 | 455 | 94.8 | |
| Contacting confirmed OR suspected COVID-19 patient in workplace | | | | | | | .06 | | | | | .077 | | | | | .05 | | | | | .04 |
| Frontline | 920 | 81.4 | 366 | 84.1 | 554 | 79.7 | | 416 | 83.4 | 504 | 79.9 | | 709 | 82.7 | 214 | 77.5 | | 541 | 83.2 | 379 | 79 | |
| Non-frontline | 210 | 18.6 | 69 | 15.9 | 141 | 20.3 | | 83 | 16.6 | 127 | 20.1 | | 148 | 17.3 | 62 | 22.5 | | 109 | 16.8 | 101 | 21 | |

**TABLE 2** Relationships between stress, anxiety, depression and sleep disturbance

| | Stress | Anxiety | Depression | Global PSQI |
|---|---|---|---|---|
| Stress | 1 | .538** | .543** | .493** |
| Anxiety | | 1 | .594** | .423** |
| Depression | | | 1 | .401** |
| Global PSQI score | | | | |

**$p < .001$.
Abbreviation: PSQI, Pittsburgh Sleep Quality Index.

**TABLE 3** Logistic regression analyses of factors associated with depression, anxiety, stress, sleep disturbance odds ratios (OR) (95% CI)

| | Depression OR (95% CI) | *p* | Anxiety OR (95% CI) | *p* | Stress OR (95% CI) | *p* | Sleep OR (95% CI) | *p* |
|---|---|---|---|---|---|---|---|---|
| Gender | | | | | | | | |
| Male | Ref | | | | | | | |
| Female | 1.029 (0.662–1.599) | .9 | 1.029 (0.663–1.597) | .9 | 1.037 (0.632–1.701) | .8 | 1.013 (0.653–1.57) | .6 |
| Age | | | | | | | | |
| More than 50 | Ref | | | | | | | |
| 22–30 | 6.496 (2.464–17.12) | .00 | 7.987 (3.099–20.59) | .00 | 8.929 (3.333–23.92) | .00 | 6.404 (2.573–15.93) | .00 |
| 31–40 | 3.438 (1.424–8.299) | .01 | 3.673 (1.565–8.621) | .01 | 3.205 (1.410–7.286) | .01 | 3.416 (1.515–7.703) | .00 |
| 41–50 | 1.778 (0.776–4.077) | .17 | 1.497 (0.673–3.331) | .32 | 1.625 (0.755–3.499) | .21 | 2.207 (1.028–4.739) | .04 |
| Marital status | | | | | | | | |
| Married | Ref | | | | | | | |
| Single | 1.569 (1.068–2.306) | .02 | 1.955 (1.319–2.896) | .00 | 1.554 (0.934–2.583) | .09 | 0.526 (0.173–1.601) | .00 |
| Others | 1.521 (0.570–4.062) | .40 | 1.130 (0.416–3.071) | .81 | 0.800 (0.266–2.408) | .69 | 1.267 (0.388–4.131) | .36 |
| Working in | | | | | | | | |
| Primary care | Ref | | | | | | | |
| Hospitals | 0.870 (0.655–1.156) | .34 | 0.886 (0.667–1.176) | .4 | 0.957 (0.692–1.323) | .79 | 1.052 (0.789–1.402) | .73 |
| Years of experience | | | | | | | | |
| >20 | Ref | | | | | | | |
| <2 | 0.277 (0.128–0.597) | .00 | 0.168 (0.077–0.367) | .00 | 0.363 (0.159–0.829) | .02 | 0.253 (0.119–0.54) | .00 |
| 3–5 | 0.322 (0.161–0.643) | .00 | 0.412 (0.207–0.818) | .01 | 0.556 (0.266–1.163) | .12 | 0.345 (0.176–0.676) | .00 |
| 6–10 | 0.387 (0.209–0.716) | .00 | 0.377 (0.204–0.698) | .00 | 0.569 (0.299–1.082) | .09 | 0.61 (0.336–1.109) | .10 |
| 11–15 | 0.615 (0.338–1.118) | .11 | 0.608 (0.334–1.105) | .10 | 0.687 (0.368–1.282) | .24 | 0.624 (0.349–1.118) | .11 |
| 15–20 | 0.826 (0.460–1.481) | .52 | 0.776 (0.432–1.394) | .40 | 0.895 (0.479–1.672) | .73 | 1.389 (0.775–2.489) | .27 |
| Comorbidities | | | | | | | | |
| None | Ref | | | | | | | |
| Yes | 1.490 (1.048–2.118) | .03 | 2.107 (1.471–3.018) | .00 | 1.603 (1.026–2.504) | .04 | 1.678 (1.153–2.443) | .00 |
| Families or relatives suspected or confirmed | | | | | | | | |
| No | Ref | | | | | | | |
| Yes | 1.074 (0.782–1.473) | .66 | 1.062 (0.773–1.458) | .71 | 1.265 (0.854–1.873) | .24 | 1.393 (0.999–1.943) | .05 |
| Are you confirmed re COVID-19? | | | | | | | | |
| No | Ref | | | | | | | |
| Yes | 1.024 (0.604–1.737) | .93 | 1.157 (0.682–1.965) | .59 | 0.913 (0.491–1.698) | .77 | 0.932 (0.536–1.619) | .80 |
| Contacting confirmed OR suspected COVID-19 patient in workplace | | | | | | | | |
| Non-frontline | Ref | | | | | | | |
| Frontline | 1.553 (1.117–2.158) | .01 | 1.453 (1.052–2.008) | .02 | 1.535 (1.082–2.179) | .02 | 1.541 (1.118–2.124) | .00 |

version showed very good internal consistency (Cronbach's α = .83) (Terkawi et al., 2017).

### 2.7 | Sleep disturbance scale

The PSQI self-rated questionnaire assesses sleep quality over the past month (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI is a 19-item instrument that is categorized into seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications and daytime dysfunction. The score for each of the seven components can range from 0 to 3. The PSQI global score is calculated by the sum of the seven components, which range from 0 to 21, with a global score of ≥5 indicating poor sleep quality in the previous month. The PSQI has acceptable reliability in Arabic (Cronbach's α = .77) (Al Maqbali et al., 2020b).

### 2.8 | Data analysis

The data were entered into the Statistical Package for Social Sciences (SPSS) version 25. In order to address the research questions, descriptive statistics were calculated in the form of means, *SD*, standard errors, frequencies, percentages of all the scales and subscales and participant variables. Chi-squares (or Fisher's exact test) were used to test whether or not the levels of stress, anxiety, depression and sleep quality differ in terms of demography and treatment. The correlation between stress, anxiety, depression and sleep quality was analyzed used Pearson correlation analyses. Logistic regression analyses were used to identify the predictive risk factors for stress, anxiety, depression and sleep quality, and the independent variables (age, gender, marital status, years of experience, type of institution, i.e. hospital or primary care, confirmed with COVID-19, family member with suspected or confirmed COVID-19, frontline or second line). $p < .05$ was considered to be statistically significant for all analyses.

### 2.9 | Ethical considerations

Ethical permission was sought from the Ministry of Health in Oman (MoH/CSR/20/23761). The confidentiality and privacy of the participants were maintained. The consent statement was obtained as it was presented on the first screen of the survey tool.

## 3 | RESULT

In the study, a total of 1,164 participants were surveyed, and 1,130 (97%) valid questionnaires were included in the final analyses. The majority of the participants were female (91.2%, n = 1,031), and the largest age group was 31–40 years (60.1%, n = 679). Most participants were married (85.7%, n = 968), had worked in hospital (73.5%, n = 830) and 84.5% (n = 965) had no comorbidities. Further, 6.3% (n = 71) of participants reported that they had confirmed COVID-19. Additionally, 81.4% (n = 920) of frontline nurses were directly involved in treating or caring for patients with or suspected to have COVID-19. Participants' characteristics are detailed in Table 1.

### 3.1 | Prevalence of stress, anxiety, depression and sleep disturbance

Overall, the prevalence of depression was 38.5% (n = 435), anxiety was 44.2% (n = 499), stress was 75.6% (n = 854) and poor sleep was 57.5% (n = 650). There were no differences in reporting stress, anxiety, depression and sleep disturbance according to gender, type of institution, and a confirmed COVID-19 diagnosis ($p > .05$).

Comparisons showed that depression was statistically significantly higher in participants aged between 22–30 and 31–40, single individuals, those with comorbidities, and those with family members with suspected or confirmed COVID-19 ($p < .05$). Anxiety was statistically significantly higher in participants aged between 22 and 30, single individuals, those with comorbidities, those with family members with suspected or confirmed COVID-19, and those working on the frontline ($p < .05$) compared to non-anxiety groups.

There were significant differences in reports of stress among those aged between 22 and 30, single individuals, those with comorbidities, and those with family members with suspected or confirmed COVID-19 ($p < .05$) compared with the non-stressed groups. Poor sleepers were significantly higher among participants aged between 22 and 30, single, widowed or divorced individuals, those with between 6–10 and 15–20 years of professional experience, those with comorbidities, and those with family members with suspected or confirmed COVID-19 ($p < .05$) compared to good sleepers.

### 3.2 | Correlation between stress, anxiety, depression and sleep disturbance

Pearson correlation coefficients were performed (Table 2) to assess the associations between stress, anxiety,

depression and the PSQI. There was a positive significant relationship between the anxiety score, depression (r = .594), stress (r = .538) and the PSQI (r = .423), respectively. Depression was positively corelated with stress (r = .543) and the PSQI (r = .493). Statistically significant positive correlations were found between stress and the PSQI (r = .401).

### 3.3 | Predictive factors associated with stress, anxiety, depression and sleep disturbance

The result of the logistic regression analyses showed that none of the independent variables (gender, institution type, family member with suspected or confirmed COVID-19, and participants with confirmed COVID-19) had significant effects on stress, anxiety, depression and poor sleep (Table 3). The 22–30 age group was the strongest predicator (stress odds ratio [OR], 8.929; 95% CI 3.333–23.92; $p < .00$; anxiety OR, 7.987, 95% CI 3.099–20.59 $p < .00$; depression OR, 6.496; 95% CI 2.464–17.12; $p < .00$; and poor sleep OR, 6.404; 95% CI 2.573–15.93; $p < .00$). Being a frontline nurse appeared to be the second predicate (stress OR, 1.535; 95% CI 1.082–2.179; $p = .02$; anxiety OR, 1.453, 95% CI 1.052–2.008; depression OR, 1.553 95% CI 1.117–2.158 $p = .01$; and poor sleep OR, 1.541; 95% CI 1.118–2.124; $p < .00$). The models showed that participants with no comorbidities and less than 2 years and between 3 to 5 years of experience were significant predictors of depression, anxiety, stress and poor sleep.

## 4 | DISCUSSION

To our knowledge, this is the first study to examine the prevalence of depression, anxiety, stress and sleep disturbance among nurses in a Middle-Eastern country during the COVID-19 pandemic. In this study, the prevalence of stress, anxiety, depression and sleep disturbance resulting from the pandemic among nurses working in Oman are 75.6, 44.2, 38.5 and 57.5%, respectively. Those results were higher compared to those of a study conducted in Italy during the COVID-19 pandemic: their results were stress (22%), anxiety (21%) depression (32%) and sleep disturbance (11%) (Rossi et al., 2020). In China, a cross-sectional study, conducted by Lai et al. (2020) involved 764 nurses during the COVID-19 pandemic and found prevalence of stress (74%), anxiety (47%), depression (53%) and sleep disturbance (34%).

However, the prevalence of stress, anxiety and depression among nurses during the COVID-19 outbreak varied between countries. In a recent systematic review and meta-analysis of 53 studies involving 38,189 nurses, Al Maqbali, Al Sinani, and Al-Lenjawi (2020a) found the prevalence of stress, anxiety, depression and sleep disturbance to be 38.9, 37, 37.2 and 38.2%, respectively, during the COVID-19 outbreak. Further, studies included in the systematic review and meta-analysis reported varied prevalence of symptoms as follows: stress (13–79%) anxiety (11.3–91.4%), depression (12.7–88.8%) and sleep disturbance (11.6–87.2%) (Al Maqbali, Al Sinani, & Al-Lenjawi, 2020a). Compared with the general population, Xiong et al. (2020) undertook a systematic review of 19 studies involving 93,569 participants from the general population to identify the psychological outcome during COVID-19. They found ranges in the rates of stress (8.1 to 81.9%) anxiety (6.33 to 50.9%) and depression (14.6 to 48.3%).

This difference may be partially explained by the different isolation measures that were applied by countries to reduce the spread of COVID-19. In addition, the population characteristics and lifestyles with variation of cultural norms, beliefs and values between countries may affect the status of stress, anxiety, depression and sleep disturbance. In our sample, most participants were Muslims which may influence the extent to which mental health symptoms are acceptable to speak about (Mitha, 2020; Vink, Carlsson, Poulsen, & Vindbjerg, 2020). Other possible reasons for the differences are the timing and instruments used between the studies.

The present study indicates that participants aged between 22 and 30 had the highest levels of stress, anxiety, depression and sleep disturbance. Likewise, age, specifically those aged between 22 and 30, was the greatest predicator of depression, anxiety, stress and poor sleep. Several researchers have suggested that a lack of skills, knowledge and experience may have an influence on the increased prevalence of stress, anxiety, depression and sleep disturbance among nurses under 35 years of age (Dong, Zhang, Sun, Sang, & Xu, 2017; Guo, Ni, Liu, Li, & Liu, 2019; Shahrour & Dardas, 2020). Further, other studies have suggested that stress, anxiety and depression decline with increased age (Solomou & Constantinidou, 2020; Tull et al., 2020).

It is seen that single nurses undergo more mental stress than married nurses, which may be due to a lack of social and emotional support. However, in Oman, culturally, a single person lives with parents and grandparents, which may explain why nurses were worried about transmitting the infection to their families, which manifests as stress, anxiety, depression and sleep disturbance. Remarkably, the results of this study show that nurses had significantly increased risk of stress, anxiety, depression and sleep disturbance if their family members were diagnosed with or had suspected COVID-19. The results

of the present study show that stress, anxiety, depression and sleep disturbance were higher in nurses with comorbid conditions. It has been reported that comorbidities are highly prevalent among fatal cases of COVID-19 (Gold et al., 2020; Sanyaolu et al., 2020).

In this study, being a frontline nurse appeared to be the second predicator of stress, anxiety, depression and poor sleep. Previous research has reported similar findings (Hu et al., 2020; Zhou et al., 2020; Zhu et al., 2020). As COVID-19 is a life-threatening disease, frontline nurses are scared of infection and dying as well as spreading the infection to their families and communities (Fawaz & Samaha, 2020; Sun et al., 2020). Moreover, due to the nature of COVID-19, as a highly contagious disease, there have been rapid increases in hospital admission rates, consequently raising nurses' workloads.

Remarkably, in the present study, nurses with confirmed COVID-19 were not statistically significantly associated with stress, anxiety, depression and sleep disturbance ($p > .05$). This may be because nurses realized that COVID-19 survivors develop body immunity, which may reduce the risk of recurrence or re-infection.

The study has a number of limitations. First, this study was conducted in Oman, which may limit generalization to all other countries. Second, the study utilized a cross-sectional design; therefore, it represents the evaluation of stress, anxiety, depression and poor sleep disturbance at one point in time, without longitudinal observation of the participants. Finally, the study relied on the participants' self-reporting questionnaires to assess the psychological problems; however, this may differ from a clinical diagnostic interview. The gold standard for establishing psychiatric diagnosis involved structured clinical interview and functional neuroimaging (Ho et al., 2020b; Husain et al., 2020).

Altogether, stress, anxiety, depression and sleep disturbance are significant problems for nurses during outbreaks. The results of the current study have a number of potential implications for interventions to improve the psychological wellbeing of nurses during crises. For example, organizations should provide counseling support services or online workshops and training material to enable them to overcome any psychological problems. The most evidence-based treatment is online-based cognitive behavior therapy (Ho, Chee, & Ho, 2020a), which has had significant effect in reducing psychiatric symptoms, with several researchers recommending its use (Soh, Ho, Ho, & Tam, 2020; Zhang & Ho, 2017).

In addition, the Ministry of Health should improve the working conditions of nurses by increasing manpower and resource allocation. Nurse managers play a crucial role through effective communication, rotating nurses, implementing flexible schedules and encouraging nurses to use psychosocial and psychological support services (WHO, 2020).

## 5 | CONCLUSION

Stress, anxiety, depression and sleep disturbance are prevalent among nurses working in Oman during the period of the COVID-19 outbreak. This study helps to improve understanding of the psychological status of nurses exposed to an outbreak of a fast-spreading, life-threatening infectious disease, and strengthens preparations for responding to possible future outbreaks or pandemics of infectious diseases. Furthermore, it gives a solid foundation for the next step of research, which should identify appropriate interventions to improve the psychological wellbeing of nurses.

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## AUTHOR CONTRIBUTIONS

M.A.M. conceptualization, methodology, investigation, data curation, software, formal analysis, writing – original draft, writing – review and editing. J.A.K. conceptualization, methodology, investigation, data curation, Writing – review and editing.

## CONFLICT OF INTERESTS

The authors certify there is no actual or potential conflict of interest in relation to this article.

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