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Psychological wellbeing and associated factors among nurses exposed to COVID 19: Findings from a cross sectional study

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ABSTRACT

Background: The coronavirus pandemic known as COVID-2019 poses a global concern. The psychological well-being of front-line nurses and other healthcare providers is a major concern.

Aims: This study evaluated the psychological well-being and the associated factors among nurses in Dr. Soliman Fakeeh Hospital during the COVID-19 pandemic.

Methods: The cross-sectional survey was conducted during the peak period of COVID 19 among 367 nurses recruited from Dr. Soliman Fakeeh Hospital. The online survey was used with the snowballing sampling technique to collect the participants’ socio-demographic data and assess their psychological status using DASS-21; in addition, the major traumatic event was assessed by Impact of Event Scale-Revised, and self-efficacy was evaluated.

Results: 67.7% of the 367 respondents experienced moderate or severe psychological problem; 46.1% reported moderate to severe depressive symptoms; 48.0% moderate to severe anxiety symptoms; and 48.4% moderate to severe stress levels. The psychological status and influence of a major traumatic event and self-efficacy were statistically significant different among nurses according to age, gender, working experience, marital status, working in a COVID 19 unit or with suspected cases.

Conclusions: Nurses had a significantly increased risk of developing psychological problems, negatively impacted by the major traumatic event and poor self-efficacy.

1. Background

The novel virus COVID-19 hit the world in late December 2019 and was soon recognized as a global health problem. It is considered the largest outbreak, causing atypical pneumonia, since the SARS epidemic of 2003. Coronavirus (CoV) are RNA viruses whose symptoms range from simple status “common cold” to severe status “Severe Acute Respiratory Syndrome (SARS-CoV) (Z [1]. COVID-19 is contagious during the incubation period, and its symptoms in the initial stage are non-specific. As a result, the method of transmission from one person to another is direct (i.e., droplets) [24]. The symptoms associated with COVID-19 infection are fever, myalgia, malaise, and respiratory-related symptoms such as cough, shortness of breath, and pneumonia [23].

Healthcare professionals, namely nurses, are the first line in the fight against COVID-19, encountering a high level of workload, prolonged working hours, limited contact with loved ones, and poor psychological status [34]. The results of previous studies suggest...
that healthcare professionals experienced high levels of stress, applied maladaptive coping mechanisms, and reported psychological post-traumatic stress disorder (PTSD) problems during the SARS crisis and the Middle East Respiratory Syndrome (MERS)) [22].

In terms of the mental health of healthcare workers, the study conducted by Fari et al. [10] on Italian health care workers suggested that the incidence of post-traumatic stress symptoms (PTSS) varies during the epidemic (Allan et al., 2020), with a prevalence of 23.3% during and up to 1.5 months post-epidemic, and 11.9% one year or more after the epidemic (Allan et al., 2020). This result is supported by Bassi, Negri, Delle Fave, and Accardi [1]; who examined the mental health impact of COVID 19 on 653 nurses and found that 39.8% received a provisional PTSD diagnosis; 33.4% reported flourishing; 57.7% moderate; and 8.9% languishing mental health. The results varied according to specific factors such as gender, workplace, education, and work setting.

Research on the impact of previous outbreaks of disease on the psychological well-being of healthcare professionals has shown that family caregivers of these professionals avoided them as a result of stigma or fear [11]. There is evidence that communication, physically or online, with loved ones plays a crucial role in improving the psychological status of healthcare providers [27].

Importantly, most of the recent COVID-19 personality research has often looked at correlations between personality characteristics and the COVID-19. De Medeiros Carvalho, Moreira, de Oliveira, Landim, and Neto [8] examined two personality traits, extroversion and conscientiousness, that are associated with engagement with two containment measures (social distancing and handwashing). The findings demonstrate that higher scores for extroversion were associated with lower means for social distancing (p = 0.001) and higher scores for conscientiousness were associated with higher means for social distancing and handwashing (p < 0.05).

In 2020, Nishiura et al. [26] examined the precipitating factors that might contribute to healthcare professionals’ poor psychological status in the SARS and MERS crises. The findings indicated the perception of being infected, the method of impact of work, separation from loved ones, feelings of depression, and working in a high-risk area. In addition, the perception of the risk of being infected was significantly associated with the risk of developing PTSD [31]. Other studies have documented that the psychological status of healthcare professionals could be influenced by social stigmatization, contact with infected patients, and the risk of transmitting the infection to loved ones [3].

Nonetheless, the results of studies have shown that 80% of infected cases of COVID-19 have mild symptoms and recover, with a mortality rate of around 2%. The main characteristic of COVID-19 is rapid transmission, which makes the total mortality rate higher than for SARS or MERS [37,38]. The prevalence rate of confirmed COVID-19 cases among medical healthcare professionals during the SARS crisis reached 21%, and MERS 18.6 [4]. This could contribute to adverse psychological status (depression, stress, and anxiety). The mortality rate among medical health professionals during COVID-19 is high, despite the availability of the vaccine [29].

It has been documented that specific factor could worsen or improve the psychological status of healthcare professionals. In addition, psychological stress may have somatic impacts, such as cardiac arrhythmia [26]. A limited number of studies have investigated the effects of coping strategies among healthcare professionals, although it is now well established that personality type and resilience have a positive impact on reducing perceived psychological stress [40]. Objective measures found to be influencing psychological stress have been explored in several studies, including clear policy and procedure and adherence to personal protective measures (Z [12]).

According to the research on risk-taking attitudes and behaviors in response to life-threatening situations, first-hand experience of severely stressful events may modify risk attitudes by lowering or raising individual risk tolerance, i.e., making individuals more risk-averse. Psychosocial and emotional factors have been shown to influence event perception and to be important determinants in risky decision-making [6,15], particularly in extremely stressful and life-threatening situations.

The impact of COVID-19 is also noted on vulnerable populations such as pregnant women and children. Some studies show that the lifestyle of pregnant women has a fundamental impact on maternal health and fetal development, which is significantly impacted by COVID 19. Thus, it reduces the general quality of life [6,9].

As the frontline healthcare providers, nurses face demanding mental and working pressures that may lead to psychological problems. Therefore, it is crucial to assess the psychological responses of nurses during COVID-19. A study has been conducted in China into the psychological effects of the 4692 nurses in government hospitals. The results demonstrated that frontline nurses experienced poor mental health, with somatic symptoms (42.7%), depression (9.4%), anxiety (8.1%), and suicidal ideation (6.5%). They also reported more severe psychiatric symptoms and poorer quality of sleep than doctors, suggesting both poor physical and psychological health [12,32]. Therefore, this study evaluated the psychological well-being and associated factors among nurses in XXX during the COVID-19 pandemic.

2. Method

2.1. Research design

A descriptive cross-sectional design was used to assess the psychological well-being of nurses during the COVID-19 pandemic.

2.2. Sampling

The survey was conducted online in order to satisfy government conditions by keeping a social distance and minimizing interpersonal interaction. Potential participants were first informed about the purpose of the study and the voluntary nature of their participation. They were asked to confirm their age as over 18 and their willingness to participate and complete the questionnaire. Nurses who suffer from any form of psychological or psychiatric problems were excluded from the study. Data was anonymous and electronic consent was obtained from all participants before taking part. All the outcome measure questions were uploaded to Google Forms 2021 and the link was distributed to nurses in the hospital. The required sample size was calculated based on formula N = \( \frac{Z^2 \times p \times (1-p)}{a^2} \), considering a margin of error of 5% \((a = 0.05)\), a 95% confidence interval \((Z = 1.96)\) and a population proportion of 50% \(P\).
= 0.50). Therefore, the required sample size was 367.

2.3. Setting
The study was conducted at Dr. Soliman Fakeeh Hospital in Jeddah, Saudi Arabia. The DSFH is one of the main hospitals hosting COVID-19 cases in intensive care units. In addition, healthcare providers offer continuous services to patients as well as their families.

2.4. Outcome measure

2.4.1. Socio-demographic data
The study collected sociodemographic data from the study participants, including age, gender, marital status, education level, clinical experience, working in a COVID unit, and managing patients with suspected or confirmed coronavirus.

2.4.2. Depression, anxiety and stress scale (DASS -21)
Depression, anxiety and stress scale were applied to assess mental health status. The scale has 21 items and three subscales. Each scale has seven questions rated on a 4-point Likert scale from 0 to 4. In terms of the depression subscale, the score classification is as follows: normal (0–9), mild depression (10–12), moderate depression (13–20), severe depression (21–27), and extremely severe depression (28–42). Regarding the anxiety subscale, scores are distributed as normal (0–6), mild anxiety (7–9), moderate anxiety (10–14), severe anxiety (15–19), and extremely severe anxiety (20–42) [21]. In addition, the stress subscale is scored as the total stress subscale score is divided into normal (0–10), mild stress (11–18), moderate stress (19–26), severe stress (27–34), and extremely severe stress (35–42). The scale has been widely used in previous studies and has well-established reliability and validity. The scale has good reliability of 0.87 [16]. In the current study, the reliability coefficient was 0.88.

2.4.3. Event scale-revised scale
The Impact of Event Scale-Revised scale has 22 items used to assess the study’s partial response to the major traumatic event. The scale has three: avoidance, intrusion, and hyperarousal. Each question is scored on a Likert scale of 5 points (from 0, not at all, to 4, extremely). The potential scores are ranged from (0–23), (24–32), (33–36) and 37, indicating no post-traumatic symptoms, mild indicating clinically detectable post-traumatic symptoms, moderate indicating the possible presence of post-traumatic stress disorder, and severe indicating severe post-traumatic symptoms, consequentially [39]. High levels of internal consistency have been previously reported (intrusion: Cronbach’s alpha = .87–.94, avoidance: Cronbach’s alpha = .84–.87, hyperarousal: Cronbach’s alpha = .79–.91 (Creamer et al., 2003; Weiss & Marmar, 1997). Test-retest reliability, collected across a 6-month interval, ranged from 0.89 to 0.94 (Weiss & Marmar, 1997). Similar internal consistency and test-retest values have been reported with a Japanese translation of the IES-R [2]. In the current study, the reliability coefficient was 0.89.

The Self-Esteem Scale included 10 items, and each item was scored on a 5-likert scale from 0 (strongly disagree) to 4 (strongly agree) [33]. The higher score reflects high self-esteem. The scale has good psychometric properties, 0.77 to 0.88, and test-retest reliability ranging from 0.82 to 0.85 [33]. In the current study, the reliability coefficient was 0.82.

2.4.4. Ethical consideration
The study obtained ethical approval from the Scientific Research Committee at XXX (215/2020). All the study participants provided informed consent regarding their voluntary nature of the participation. Participants were assured that their information kept confidential.

Table 1
The sociodemographic data of the study participants (n = 367).

| Element                                      | Frequency (%) |
|----------------------------------------------|---------------|
| Gender                                       |               |
| Male                                         | 76 (20.8%)    |
| Female                                       | 291 (79.2%)   |
| Age                                          |               |
| <20 Years                                    | 43 (11.7%)    |
| 21–25 Years                                  | 184 (50.1%)   |
| 26–30 Years                                  | 140 (38.1%)   |
| Marital Status                               |               |
| Single                                       | 157 (42.7%)   |
| Married                                      | 192 (52.3%)   |
| Divorced                                     | 16 (4.3%)     |
| Widow                                        | 2 (0.5%)      |
| Clinical Experience                          |               |
| <5 years                                     | 228 (62.2%)   |
| >5 years                                     | 139 (37.8%)   |
| Work in COVID Unit                           |               |
| Yes                                          | 128 (34.8%)   |
| No                                           | 239 (65.1%)   |
| Manage Patient with Suspected or Confirmed Coronavirus |               |
| Yes                                          | 243 (66.2%)   |
| No                                           | 124 (33.8%)   |
2.4.5. Data analysis

Descriptive statistics were calculated for sociodemographic characteristics and the main study outcomes (DASS-21, impact of self-event, and self-esteem). Percentages of responses were calculated according to the number of respondents per response, with respect to the number of total responses to a question. The scores from the IES-R, self-esteem, and DASS-21 subscales were expressed as mean and standard deviation. Moreover, independent sample t-test and one-way analysis of variance test were used to calculate the means of the main statistical outcomes according to sociodemographic data. Furthermore, the pearson correlation tests were used to examine the relationship between the sociodemographic data and the main study outcomes. Additionally, linear regressions tests were employed to calculate the univariate associations between sociodemographic characteristics and the study outcomes. All tests were two-tailed, with a significance level of \( p < 0.05 \). Statistical analysis was performed using SPSS Statistic 26.0.

3. Results

3.1. Sociodemographic characteristics of the study participants

The participants’ characteristics are summarized in Table 1; the majority of participants were female (79.2%). More than half were aged 21 or older. More than half reported that they were married and 42.7% were single. 228 nurses (62.2%) had clinical experience of less than five years. The proportion of participants working with confirmed cases of COVID-19 was around 45.8% and two-thirds of nurses worked with suspected cases.

3.2. Descriptive results of the main study outcomes

The DASS questionnaire results revealed that the participants suffered from severe depression, as evidenced by a depression average of 28.38 (3.57). The nurses also experienced an extreme level of anxiety, which was clearly evident from the average anxiety subscale score of 26.64. A closer inspection of Table 2 shows that participants indicated a severe level of anxiety as a result of their occupation.

Further analysis showed that the overall DASS score suggested that nurses experienced high levels of psychological problems, reporting distress symptoms such as avoidance, intrusion and hyperarousal as a result of handling COVID-19 cases. The scores for the impact event scale reflected that nurses pass through post-traumatic stress and associated health and well-being consequences. Lastly, the results for self-efficacy pointed out that nurses had poor self-efficacy, as detailed in Table 3.

3.3. Results of correlation test between the main study outcomes according to sociodemographic data

The results of subgroup analysis revealed that female nurses experienced higher levels of psychological problems (depression, anxiety and stress) than male nurses, statistically significant at (t = 3.07; \( p < 0.05 \)). Similarly, female nurses were more likely to report post-traumatic events (avoidance, intrusion and hyperarousal) than male nurses, statistically significant (t = 6.3; \( p < 0.05 \)). However, male nurses exhibited a higher level of self-esteem than female nurses (t = 4.9; \( p < 0.05 \)). Interestingly, the age of nurses was observed to significantly vary in the study outcomes. For instance, older nurses encountered more psychological problems, more negatively impacted by COVID-19, and with low self-esteem (F = 4.9; \( p < 0.05 \)). The difference by marital status indicated that married nurses were more likely to experience psychological problems, negative events, and poor self-esteem (t = 5.3; \( p < 0.05 \)).

Strong evidence from the data suggests that clinical experience is a buffer against the negative impact of COVID-19. This is evident from the high level of psychological problems among nurses who have clinical experience of less than five years. The most surprising aspect of the data is that the nurses who worked in a COVID-19 unit were found to have poor mental health status, were more impacted by negative events and had poor self-efficacy scores, compared with nurses who did not work in COVID-19 units (t = 6.3; \( p < 0.05 \)). Additionally, nurses who had suspected contact with potential COVID-19 cases reported a higher level of psychological problems and poorer self-esteem compared to nurses who did not have contact with suspected cases (t = 3.6; \( p < 0.05 \)). However, this did not influence the perception of impact event (t = 0.8; \( p > 0.05 \)) (p > 0.05). Table 4 summarizes the results of comparison between the main study outcomes and the study participants characteristics.

3.4. Results of correlation test between the main study outcomes according to sociodemographic data

The analysis showed a significant negative correlation between age and psychological status (depression (r = 0.43; \( p < 0.05 \)), anxiety (r = 0.53, \( p < 0.05 \)), stress (r = 0.48; \( p < 0.05 \)). Also, there is a positive correlation between age and the avoidance of impact

Table 2

| Element               | Average | Standard Deviation |
|-----------------------|---------|--------------------|
| DASS - Depression     | 28.38   | 3.57               |
| DASS - Anxiety        | 26.64   | 3.29               |
| DASS – Stress         | 28.72   | 4.25               |
| DASS – Overall        | 111.64  | 7.56               |
| IES-R Avoidance       | 26.67   | 4.65               |
| IES-R Intrusion       | 25.89   | 5.68               |
| IES-R Hyperarousal    | 22.35   | 4.38               |
| IES – R – Overall     | 73.47   | 7.56               |
| Self-Esteem           | 22.77   | 4.59               |
events \((r = 0.59; p < 0.05)\) and a negative correlation with self-efficacy \((r = -0.4; p < 0.05)\). The analysis shows a significant negative correlation between gender and psychological status \((r = -0.32; p < 0.05)\), anxiety \((r = -0.48; p < 0.05)\), and stress \((r = -0.54; p < 0.05)\). This indicates that female nurses were more likely to experience a higher level of psychological problems \(\text{(depression, anxiety, and stress)}\). There was, however, a significant negative correlation between the female gender and hyperarousal impact events \((r = -0.41; p < 0.05)\) and self-efficacy \((r = -0.37; p < 0.05)\). The results demonstrated that married nurses were more likely to experience depression \((r = -0.42; p < 0.05)\) and stress \((r = 0.51; p < 0.05)\).

Furthermore, a negative significant relationship was detected between clinical experience and impact events (avoidance \(r = -0.43; p < 0.05\); intrusion \(r = -0.47; p < 0.05\); hyperarousal \(r = -0.53; p < 0.05\)) as well as self-efficacy \((r = -0.43; p < 0.05)\). However, no significant relationship was found between gender and impact events \((r = 0.28; p > 0.05\); intrusion \(r = 0.12; p > 0.05)\). A correlation analysis was performed to examine the relationship between working in a COVID-19 unit and the study outcomes. There was a positive correlation between handling confirmed cases of COVID-19 and psychological distress \((r = 0.47; p < 0.05)\), anxiety \((r = 0.58; p < 0.05), stress \((r = 0.43; p < 0.05)\), impact events \((r = 0.452; p < 0.05)\); intrusion \(r = 0.38; p < 0.05\); hyperarousal \(r = 0.62; p < 0.05\) and a negative correlation with self-esteem \((r = -0.48; p < 0.05)\). Working with suspected cases of COVID-19 was positively related to anxiety \((r = 0.48; p < 0.05), stress \((r = 0.43; p < 0.05)\), avoidance \((r = 0.58; p < 0.05)\) and self-esteem \((r = -0.39; p < 0.05)\), as indicated in Table 5.

### 3.5. Results of the stepwise regression analysis

The results of stepwise regression analysis on the study outcomes and subdomains are summarized in Table 6. The majority of variables showing a significant relationship were entered into the regression equation. The findings revealed that age, gender, marital status, clinical experience, working in a COVID-19 unit, and contact with suspected cases were significant predictors of the psychological status, impact event, and self-esteem. For instance, the results showed that DASS-Depression is significantly predicted by demographic data of the study participants \((R^2 = 0.71, F = 4.6, p < 0.05)\), DASS-Anxiety \((R^2 = 0.68, adjusted R^2 = 0.63, F = 5.2, p < 0.05)\), and DASS-stress \((R^2 = 0.76, adjusted R^2 = 0.71, F = 7.2, p < 0.05)\). The same results were detected in relation to the impact event avoidance \((R^2 = 0.78, adjusted R^2 = 0.65, F = 6.3, p < 0.05)\), intrusion \((R^2 = 0.64, adjusted R^2 = 0.58, F = 4.7, p < 0.05)\) and hyperarousal \((R^2 = 0.63, adjusted R^2 = 0.58, F = 4.9, p < 0.05)\). Regarding self-esteem \((R^2 = 0.79, adjusted R^2 = 0.72, F = 6.8, p < 0.05)\).

### 4. Discussion

COVID-19 affects more than 10 million people worldwide, and front-line hospital nurses are facing severe stress. However, little is known about psychological changes in nurses’ health during COVID-19. To the best of our knowledge, this is the first study to evaluate the psychological well-being of nurses from XXX during the COVID-19 pandemic. According to the author’s knowledge and based on the literature review, it is the first to investigate psychological status and impact events as well as self-efficacy among nurses during the pandemic. This work provides reliable data on the psychological impact of COVID-19 on a large sample of nurses from XXX. The results show a high prevalence of anxiety, distress, and negative events and their strict association with the demographic data. In this context, only limited data on small samples of nurses is available, highlighting the relevance of our findings [5,13,17].

Regarding the prevalence of depression, anxiety, and stress, our findings are in line with those reported in Asian populations for COVID-19 and previous descriptions for SARS and MERS, where the massive impact of these outbreaks on healthcare workers has been described [7,18].

The results of the current study revealed that nurses who worked in COVID-19 units experienced extreme levels of depression, anxiety and stress. Comparing the psychological with the results of other studies conducted in China, our study nurses experienced a high level of psychological distress [25,32,37,38]. The variation in the scores could be explained by the fact that each study has used various outcome measures to assess psychological status. For instance, Ren et al. [32] used General Anxiety Disorder to assess anxiety and the Patient Health Questionnaire-922 to measure depression, whilst in the current study we applied DASS-21 which has three subscales, depression, anxiety, and stress.

This finding is consistent with that of He et al. [12] who documented that in a study conducted in Wuhan, 44.6% of nurses experienced depression and 24.1% suffered from anxiety. This might be attributed to fact that the data of the current study was collected during the peak of COVID-19 in the Saudi Arabia reaching epidemic proportions. Makkah city was the epicentre of the epidemic with the greatest number of infected cases, and nurses there faced greater challenges than in other places: heavier workloads and higher risk of occupational exposure to the virus [28]. The impact of the pandemic event on the mental health of nurses was strong and unmanageable by themselves; individual resources did not help these professionals to overcome their distress. The nurses were exposed to mental distress and were more negatively impacted by COVID-19 events [30].

This finding broadly supports the work of other studies in this area, linking COVID-19 and the psychological distress of nurses. The
Table 4
The results of comparison between the main study outcomes and the study participants characteristics (n = 367).

|                          | Gender | Age         | Marital status | Clinical Experience | Work in COVID 19 unit | Manage Patient with Suspected or Confirmed Coronavirus |
|--------------------------|--------|-------------|----------------|--------------------|-----------------------|-------------------------------------------------------|
|                          | Male   | Female      | < 20 | 21–30 | > 30 | Single | Married | Others | <5 years | >5 years | Yes | No | Yes | No |
| DASS - Depression        | 22.4   | 29.5*       | 24.5 | 17.4 | 27.6* | 18.4 | 27.1* | 19.2 | 26.4* | 18.7 | 24.7* | 16.8 | 22.7* | 17.7 |
| DASS – Anxiety           | 17.24  | 24.25*      | 13.7 | 19.4 | 23.1* | 14.1 | 20.2* | 17.8 | 25.8* | 16.4 | 23.8* | 17.6 | 23.1* | 15.3 |
| DASS – Stress            | 16.47  | 26.35*      | 11.7 | 19.7 | 24.6* | 12.5 | 22.7* | 14.4 | 28.4* | 17.5 | 26.7* | 16.8 | 25.5* | 13.7 |
| DASS – Overall           | 57.5   | 86.30*      | 47.1 | 64.7 | 84.1* | 47.1 | 64.7  | 84.1* | 87.4  | 69.1  | 82.7* | 66.4 | 79.1* | 64.3 |
| IES-R Avoidance         | 14.37  | 22.2*       | 12.7 | 16.7 | 21.7* | 12.7 | 16.7  | 21.7* | 23.4  | 22.8  | 19.8  | 21.7 | 18.4  | 16.5 |
| IES-R Intrusion         | 13.7   | 24.8*       | 13.5 | 20.7 | 24.8* | 13.5 | 20.7  | 24.8* | 23.7  | 22.1  | 26.8  | 17.6 | 22.8  | 17.8 |
| IES-R Hyperarousal      | 11.7   | 19.8*       | 10.2 | 18.4 | 22.7* | 10.2 | 18.4  | 22.7* | 19.5  | 18.6  | 23.6  | 18.6 | 18.4  | 14.6 |
| IES – R – Overall       | 38.4   | 64.7*       | 37.1 | 51.7 | 67.4* | 37.1 | 51.7  | 67.4* | 64.5  | 61.2  | 67.4  | 47.4 | 56.6  | 47.8 |
| Self-Esteem             | 31.7*  | 24.5        | 24.1 | 29.4*| 27.8  | 24.1 | 29.4* | 27.8 | 19.8  | 32.5* | 20.3  | 31.8* | 19.9  | 27.8* |
results of an age cohort study in 2014 of front-line nurses recruited from two main hospitals in Wuhan, China, found that the vast majority (91.2%) reported moderate to severe levels of fear, and 14.3% and 10.7% experienced moderate to severe levels of anxiety and depression [14].

Moreover, we found that senior nurses had significantly higher anxiety, depression, and stress than among married female junior nurses aged more than 30 years compared to their counterparts. Chen’s research determined nurses who had higher depression and anxiety were aged nurses and received less social support from their families. In addition, these results are supported by Cuiyan Wang et al. [37,38] who reported that female gender, student status, specific physical symptoms (e.g., myalgia, dizziness, coryza), and poor self-rated health status were significantly associated with a greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression (p < 0.05).

In terms of the impact event, the results of the current study demonstrate that nurses experienced a negative event as a result of working in a COVID-19 unit. It has been widely reported that many nurses suffer from PTSD during their careers [35]. Factors such as increased workload, a poor life-work balance and staff shortages contribute to their mental health issues, including PTSD. Limited data is available to show the prevalence of PTSD for front-line nurses during the COVID-19 pandemic. In accordance with the present results, previous studies have demonstrated that the prevalence of PTSD dramatically increased after nurses had worked in COVID-19 units. Our results indicate that 220 of 356 nurses (62%) had PTSD after working in these units, while only 6 (1.6%) experienced PTSD before working in COVID-19 units (X [19].

The results of the present study reveal a significant difference in psychological distress and impact events according to gender and work experience of nurses. Consistent with the literature, this research found that participants who reported working less than two years experienced high levels of stress and anxiety [35]). Also, previous results documented that female and younger nurses showed high levels of psychological distress. Limited data is available to assess the association between working experience and psychological well-being among front-line nurses during the COVID-19 crisis. Nevertheless, the current study’s results are supported by the findings of Tsay, Kao, Wang, and Lin [36]; who compared the psychological status of 5446 nurses with the general population in Australia. The results showed that nurses enjoyed better physical and general health, but poor psychological health, especially among young nurses.

The study has several strong points, such as its size, which suggests that the study is adequately powered. However, the study has some limitations, such as the fact that the study participants were collected from one site, which jeopardises the generalization of the results. In addition, the study is mainly dependent on self-reported questions, which might indicate social desirability bias.

5. Conclusion

COVID-19 is a highly contagious disease causing public concern at an international level. Nurses are the front-line healthcare professionals facing the challenge of COVID-19. Our study confirms that nurses experience a high level of stress, depression, and anxiety as well as being highly impacted by the COVID-19 event after working in a COVID-19 unit. Certain socio-demographic characteristics of the participants (age, gender, work experience, working in a COVID-19 unit) significantly contribute to changes in psychological distress and the risk of negative events among nurses.

Author contributions

Study conception and design, D.W. and A.A.H.; data collection, D.W. and A.A.H.; data analysis and interpretation, A.A.H.; drafting of the article, A.A.H.; critical revision of the article, D.W. and A.A.H. All authors have read and agreed to the published version of the manuscript.

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Institutional review board statement

The study obtained ethical approval from the Scientific Research Committee at DSFH (215/2020). All the study participants provided informed consent regarding their voluntary nature of their participation. Participants were assured that their information kept confidential.

| Table 5 | Bivariate correlation between sociodemographic characteristics and the study outcomes (pearson, spearman coefficient) (n = 367). |
|---------|---------------------------------------------------------------------------------------------------------------|
| Age     | Gender | Marital status | Clinical experience | Working in COVID 19 unit | Working with suspected COVID 19 cases |
| DASS-Depression | 0.43* | −0.32* | −0.42* | −0.45 | 0.47* | 0.19 |
| DASS-Anxiety | 0.53* | −0.48* | 0.14 | −0.29 | 0.58* | 0.48* |
| DASS-Stress | 0.48* | −0.54* | −0.51* | 0.48 | 0.43* | 0.43* |
| IE-Avoidance | 0.57* | 0.28 | 0.33 | −0.43* | 0.52* | 0.58* |
| IE- Intrusion | 0.472 | 0.12 | 0.21 | −0.47 * | 0.38* | 0.22 |
| IE - Hyperarousal | 0.13 | −0.41* | 0.19 | −0.53* | 0.62* | 0.18 |
| Self-efficacy | −0.46* | −0.37* | −0.47* | −0.43* | −0.48* | −0.39* |
Table 6
Stepwise regression of the predictors of psychological status (n = 367).

| Independent Variable | Adjusted $R^2$ | $\beta$ |
|----------------------|---------------|---------|
| DASS -D              |               |         |
| Age                  | 0.68*         | 0.38* * |
| Gender               | 0.53*         |         |
| Marital status       | 0.36*         |         |
| Clinical experience  | 0.34*         |         |
| Working in COVID 19 unit | 0.52*     |         |
| Working with suspected COVID 19 cases | 0.14 |         |
| DASS - Anxiety       | 0.37*         |         |
| DASS - Stress        | 0.48*         |         |
| IR - Avoidance       | 0.08          |         |
| IR - Intrusion       | 0.21          |         |
| IR – Hyperarousal    | 0.11          |         |
| IR -self esteem      | 0.47*         |         |
| DASS- A              |               |         |
| Age                  | 0.63*         | -0.35*  |
| Gender               | -0.53*        |         |
| Marital status       | -0.46*        |         |
| Clinical experience  | -0.63*        |         |
| Working in COVID 19 unit | 0.37*     |         |
| Working with suspected COVID 19 cases | 0.17 |         |
| DASS – Depression    | 0.47*         |         |
| DASS – Stress        | 0.54*         |         |
| IR - Avoidance       | 0.64*         |         |
| IR – Intrusion       | 0.17          |         |
| IR – Hyperarousal    | 0.13          |         |
| IR -self esteem      | 0.11          |         |
| DASS –S              |               |         |
| Age                  | 0.71*         | -0.46*  |
| Gender               | -0.64*        |         |
| Marital status       | -0.38*        |         |
| Clinical experience  | -0.56*        |         |
| Working in COVID 19 unit | 0.21      |         |
| Working with suspected COVID 19 cases | 0.16 |         |
| DASS – Depression    | -0.47*        |         |
| DASS - Anxiety       | -0.52*        |         |
| IR - Avoidance       | 0.15          |         |
| IR – Intrusion       | 0.14          |         |
| IR – Hyperarousal    | -0.21         |         |
| IR -self esteem      | 0.27          |         |
| IR-A                 |               |         |
| Age                  | 0.65*         | -0.45*  |
| Gender               | -0.48*        |         |
| Marital status       | 0.63*         |         |
| Clinical experience  | -0.52*        |         |
| Working in COVID 19 unit | 0.39      |         |
| Working with suspected COVID 19 cases | 0.61* |         |
| DASS – Depression    | 0.52*         |         |
| DASS - Anxiety       | 0.10          |         |
| DASS – Stress        | -0.46*        |         |
| IR – Intrusion       | 0.19          |         |
| IR – Hyperarousal    | 0.13          |         |
| IR -self esteem      | 0.40*         |         |
| IR – Intrusion       |               |         |
| Age                  | 0.58*         | 0.52*   |
| Gender               | -0.48*        |         |
| Marital status       | -0.37*        |         |
| Clinical experience  | -0.43*        |         |
| Working in COVID 19 unit | 0.40*     |         |
| Working with suspected COVID 19 cases | 0.39 |         |
| DASS – Depression    | 0.51*         |         |
| DASS – Anxiety       | -0.43*        |         |
| DASS – Stress        | 0.53*         |         |
| IR – Avoidance       | -0.53*        |         |
| IR – Hyperarousal    | 0.49*         |         |
| IR -self esteem      | -0.48*        |         |
| IR – Hyperarousal    |               |         |
| Age                  | 0.58*         | -0.36*  |
| Gender               | -0.28*        |         |
| Marital status       | -0.43*        |         |
| Clinical experience  | -0.51*        |         |
| Working in COVID 19 unit | 0.40      |         |
| Working with suspected COVID 19 cases | 0.57* |         |
| DASS – Depression    | -0.48*        |         |
| DASS – Anxiety       | 0.37          |         |

(continued on next page)
Data availability statement

The study authors acknowledge that the data are available upon request.

Ethics approval

The study obtained an ethical approval from the Scientific and Research Committee at Fakeeh College for Medical Sciences (215/2020).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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