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Predictors of General Anxiety among Frontline COVID-19 Nurses: A Cross-Sectional Study in Punjab, Pakistan

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Abstract

The COVID-19 pandemic has significantly contributed to the increase in general anxiety among nursing staff. This cross-sectional study was conducted through a questionnaire aimed at assessing generalized anxiety disorders among nurses working in secondary and tertiary care hospitals in Punjab, Pakistan. The GAD-7 scale was used to assess anxiety levels and non-parametric statistical methods were used to compare different groups. A multiple regression model was used to analyze the effect of different covariates on GAD-7 scores. A total of 133 nurses participated in the survey. Findings showed that female nurses (7.38 ± 4.20, $P = 0.032$) and those aged 31 years or older (7.68 ± 5.14) had higher GAD-7 scores. Among the respondents, 19.6% showed significant general anxiety (GAD-7 score ≥ 10), while 49.6% experienced mild anxiety. Female nurses had a 15% higher likelihood of elevated GAD-7 scores [0.148 (-0.450 – 4.697), $P = 0.049$]. In addition, limited work experience (≤ 3 years) was associated with a 14% increased probability of reporting higher anxiety scores. In summary, 19.6% of nurses met the GAD-7 criteria for moderate to severe generalized anxiety and depressive disorder. Key factors influencing anxiety levels included gender, limited professional experience, and lack of training in managing COVID-19 patients. Common stressors among participants included fear of contracting COVID-19, concerns about transmitting the virus to family members, and uncertainty about the impact of the pandemic in Pakistan.

Keywords: Nurses, GAD-7, Anxiety, COVID, Pakistan

Introduction

Healthcare professionals have played a crucial role as frontline warriors in the fight against the COVID-19 pandemic, providing direct patient care [1, 2]. In Pakistan, nurses carry an added responsibility, serving as key communicators between patients, physicians, and family members. Previous research on nursing staff has highlighted the frequent occurrence of stress and related somatic symptoms during their duty shifts [3, 4]. These stressors can eventually lead to psychological challenges such as depression, sadness, reduced self-esteem, poor work attitude, and increased irritability [5].

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Workplace environmental factors, including excessive noise, time constraints, and extended working hours [6], further contribute to stress among nurses. The intense workload during the pandemic, combined with the risk of infection, significantly heightens the likelihood of psychological distress. Additionally, concerns about transmitting COVID-19 to family members have been identified as a major trigger for generalized anxiety and stress [7, 8]. This psychological burden may not only affect job performance but can also increase the risk of workplace accidents and absenteeism due to fear of contracting the virus [9].

Given the ongoing strain on healthcare facilities and the increasing number of patients in Punjab, Pakistan, it is expected that generalized anxiety and psychological distress will rise among nursing and allied healthcare staff. This, in turn, can negatively impact job performance, increasing the risk of medical errors and compromising patient safety [10, 11]. Nurses play a vital role in ensuring quality patient care [12], yet in Pakistan, little attention has been given to the mental health challenges they face during the COVID-19 crisis. Therefore, this study aims to assess generalized anxiety disorders among nursing staff working in hospitals across Punjab province, Pakistan.

Materials and Methods

Study design, setting, and participants

This study employed an online, cross-sectional survey targeting nursing staff working in secondary and tertiary healthcare facilities across Punjab province. The study protocol underwent review and approval. Before participation, informed consent was obtained from all respondents.

Outcome assessment

A universal sampling approach was used, inviting all eligible nursing staff at the selected healthcare institutions to take part in the study. Data collection was carried out using an anonymous online questionnaire designed to assess anxiety levels among nurses during the COVID-19 pandemic.

To measure generalized anxiety, the GAD-7 scale was employed [13]. This tool consists of seven items, each rated on a scale from 0 (not at all) to 3 (nearly every day), yielding a total score between 0 and 21. Anxiety severity was categorized as mild (5–9), moderate (10–14), and severe (≥ 15). A cut-off score of ≥ 10 indicated clinically significant anxiety, with the GAD-7 demonstrating an 89% sensitivity and 82% specificity for detecting generalized anxiety disorder. Additionally, it has moderate accuracy in identifying other anxiety-related conditions, including panic disorder (74% sensitivity, 81% specificity), social anxiety disorder (72% sensitivity, 80% specificity), and post-traumatic stress disorder (66% sensitivity, 81% specificity).

Statistical analysis

Data were coded, cleaned, and analyzed using SPSS version 22. Non-parametric statistical tests were applied to compare differences between groups. A multiple regression model was implemented to evaluate the influence of covariates on GAD-7 scores, with standardized beta coefficients used to interpret regression results at a 95% confidence interval. Effect size estimation was conducted using proportional analysis in STATA version 14®, employing a random effects model. Additionally, the I^2 statistic was calculated to assess data heterogeneity. A P-value < 0.05 was considered statistically significant.

Results and Discussion

A total of 133 nursing professionals from 11 healthcare institutions took part in the survey. These facilities included District Headquarter (DHQ) Hospitals in Pakpattan, Okara, and Sahiwal, as well as Tehsil Headquarter (THQ) Hospitals in Arifwala, Chichawatni, and Wazirabad. Additionally, participants were drawn from the Punjab Institute of Cardiology, Faisalabad Institute of Cardiology, Jinnah Hospital, Children's Hospital, and Lahore General Hospital.

Data analysis showed that the majority of respondents were female (n = 120, 90.2%), with the highest representation from the 26–30 years age group (n = 59, 44.4%). Most participants had between 1 to 6 years of job experience, and a significant portion (n = 51, 38.3%) were assigned to emergency departments. Additionally, around 40% of the nurses had undergone COVID-19 training and were actively working in quarantine units, ICUs, or isolation wards dedicated to COVID-19 patients. A comprehensive breakdown of the findings is provided in **Table 1**.

Table 1. Demographic characteristics of respondents (n = 133)

Demographics	N (%)

Age (Mean = 28.24 ± 4.73 years)	
≤ 25 years	33 (24.8%)
26-30 years	59 (44.4%)
≥ 31 years	41 (30.8%)
Gender	
Male	13 (9.8%)
Female	120 (90.2%)
Job experience	
≤ 3 years	50 (37.6%)
4-6 years	49 (36.8%)
≥ 7 years	34 (25.6%)
Medical specialty	
Neurology	6 (4.5%)
Medicine	14 (10.5%)
Emergency	51 (38.3%)
Orthopedics	7 (5.3%)
Surgery	20 (15.0%)
Nephrology	5 (3.8%)
Gynecology	5 (3.8%)
Pediatrics	10 (7.5%)
Cardiology	11 (8.3%)
Others	4 (3.2%)
Placement	
Quarantine facility	7 (5.3%)
Isolation ward	32 (24.1%)
COVID ICU	10 (7.5%)
Other areas	84 (63.2%)
Received training for COVID	
Yes	54 (40.6%)
No	79 (59.4%)

The analysis of GAD-7 scores revealed that female nurses (7.38 ± 4.20, P = 0.032) and those aged 31 or older (7.68 ± 5.14) experienced higher anxiety levels. Job-related factors also influenced anxiety, with nurses having less than 3 years of experience (7.39 ± 3.32) showing elevated scores. Additionally, those working in high-pressure specialties, such as nephrology (9.50 ± 7.78), surgery (9.10 ± 4.67), and emergency (7.61 ± 3.98), reported higher anxiety. Nurses who received COVID-19 training had significantly lower anxiety scores (6.12 ± 4.09, P = 0.048) compared to those without training. These findings suggest that both demographic and job-related factors, along with training, play a key role in the anxiety levels of nursing staff during the pandemic. Detailed results are shown in **Table 2**.

Table 2. GAD-7 scores among nursing staff

Demographics	GAD-7 score (mean ± SD)	P-value
Gender		0.032*
Male	5.77 ± 4.85	

Female	7.38 ± 4.20	
Age		0.840
≤ 25 years	7.03 ± 3.57	
26-30 years	7.20 ± 4.70	
≥ 31 years	7.68 ± 5.14	
Job experience		0.445
≤ 3 years	7.39 ± 3.32	
4-6 years	6.39 ± 3.44	
≥ 7 years	6.44 ± 3.44	
Medical specialty		0.786
Neurology	5.83 ± 3.76	
Medicine	5.86 ± 4.38	
Emergency	7.61 ± 3.98	
Ortho	7.29 ± 4.23	
Surgery	9.10 ± 4.67	
Nephrology	9.50 ± 7.78	
Gynecology	6.60 ± 5.22	
Pediatrics	6.80 ± 4.83	
Cardiology	5.91 ± 3.51	
Others	6.01 ± 3.21	
Received training for COVID		0.048*
Yes	6.12 ± 4.09	
No	7.73 ± 4.74	
Placement		0.370
Quarantine facility	6.57 ± 6.30	
Isolation ward	7.53 ± 5.01	
COVID ICU	8.70 ± 3.23	
Other areas	6.99 ± 3.87	

Note: A P-value < 0.05 was considered statistically significant. Mann-Whitney and Kruskal-Wallis tests were used to assess differences among groups.

The analysis of the cut-off score for generalized anxiety among the respondents showed that 19.3% experienced moderate to severe anxiety, while 49.6% had mild anxiety **(Figure 1)**. To further understand the contributing factors, multiple regression analysis was conducted to examine the influence of various variables on generalized anxiety levels in nursing staff. The results indicated that younger age (≤ 25 years) reduced the likelihood of a higher GAD-7 score by 7%, while the medical specialty was associated with a 6.0% chance of impacting the GAD-7 score. Additionally, female nursing staff were 15% more likely to have higher GAD-7 scores, as indicated by the standardized beta value [0.148 (-0.450 – 4.697), P = 0.049]. Nurses with less job experience (≤ 3 years) had a 14% increased likelihood of higher GAD-7 scores. Although the availability of COVID-related facilities and medical specialties was not significantly associated with GAD-7 scores, those who received training on handling COVID-19 patients were 12% more likely to report lower anxiety levels. These findings are further summarized in **Table 3**.

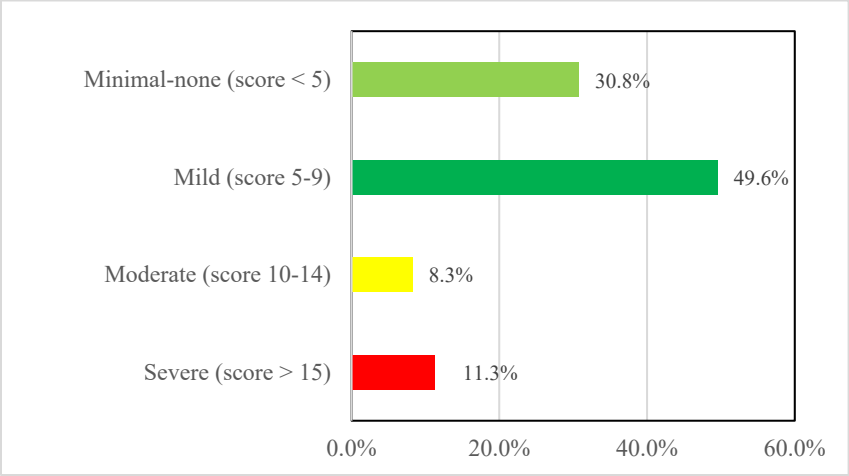

Figure 1. Cut-off score for GAD-7

Table 3. Effect of covariates on GAD-7 score

Covariates	β	Lower bound	Upper bound	P-value
Gender	0.148	0.001	0.985	0.049*
Job experience	0.142	-0.223	0.634	0.345
Age	-0.059	-0.396	0.265	0.696
Medical specialty	0.059	-0.120	0.238	0.515
Placement	-0.031	-0.873	0.606	0.721
Received training for COVID	0.115	-0.513	2.502	0.194

Multiple logistic regression was used, with the GAD-7 score as the dependent variable. A P-value of less than 0.05 was considered statistically significant, and β represents the standardized beta.

Additionally, participants were asked about the sources of stress they perceived. The primary concerns reported by the nurses involved the fear of contracting the infection themselves or transmitting it to their family members. Another significant worry was the potential for strained relationships with family and friends due to the impact of COVID-19. A detailed breakdown of these findings can be found in **Table 4**.

Table 4. Nurses' self-reported anxiety triggers

Statement	Yes (N (%))	No (N (%))	ES	95% CI	P-value / I^2
Concern about contracting COVID-19 at any moment	104 (78.2%)	29 (21.8%)	0.78	0.70 – 0.85	<0.001* / 0.0%
Worry about infecting family members with COVID-19	104 (78.2%)	29 (21.8%)	0.78	0.70 – 0.85	
Fear of going to the hospital due to a busy schedule and infection risk	55 (41.4%)	78 (58.6%)	0.41	0.33 – 0.50	
The belief that COVID-19 will persist in Pakistan for an extended period	114 (85.7%)	19 (14.3%)	0.86	0.79 – 0.91	
Perception that treating COVID-19 patients is highly challenging	78 (41.4%)	55 (41.4%)	0.59	0.50 – 0.67	
The belief that COVID-19 patients might face severe outcomes	108 (81.2%)	25 (18.8%)	0.81	0.74 – 0.87	
Concern over strained relationships with family and friends due to COVID-19	103 (77.4%)	30 (22.6%)	0.77	0.69 – 0.84	

Note: The effect size (ES) was derived from the analysis of proportions, and a random effect model was applied to estimate the proportion and confidence intervals (CI) for each anxiety trigger. Results with a P-value < 0.05 were deemed statistically significant.

Table 4 presents the self-reported causes of anxiety among nurses. The most commonly reported concerns included the fear of contracting COVID-19 (78.2%) and the worry that family members might become infected due to their work (78.2%). Additionally, 85.7% of the nurses expressed concern that COVID-19 would persist in Pakistan for an extended period. A significant proportion (77.4%) also reported anxiety about the impact of COVID-19 on their relationships with family and friends.

Other concerns included the challenging nature of treating COVID-19 patients (41.4%) and the potential serious consequences for these patients (81.2%). A smaller percentage (41.4%) felt afraid of going to work due to their hectic routines and the associated risk of infection.

The effect size was calculated using a proportional analysis, with the random effect model applied to estimate the proportions and confidence intervals for each stressor. Statistically significant results were considered for p-values less than 0.05.

The COVID-19 pandemic stands as one of the most catastrophic public health emergencies since the 1918 influenza outbreak [14]. As of May 22, 2021, there have been 165,772,430 global infections and 3,437,545 deaths attributed to the virus [15]. To the best of our knowledge, this study is the first to investigate not only the generalized anxiety experienced by nurses caring for COVID-19-positive patients but also to explore the factors that contribute to mental distress among nurses in Punjab, Pakistan. For the assessment of anxiety and depression, a GAD-7 score of ≥10 indicates a "yellow flag" (highlighting a potential clinical concern), while a score of ≥ 15 signals a "red flag" (suggesting the need for active treatment) [16]. In our study, approximately 20% of participants exhibited moderate to severe anxiety levels. Despite the additional stress induced by the ongoing COVID-19 crisis, which amplifies stress levels among healthcare workers, work-related stress remains a prevalent issue for nursing professionals worldwide [17-21]. In South Asia, particularly in countries like India and Pakistan, stress among nursing staff has been widely documented as a significant challenge within hospital settings, with reports indicating that between 35% and 85% of nurses experience high levels of stress [4, 22, 23]. Previous research has shown that about 35% of nursing staff in Karachi work under stressful conditions even in normal circumstances [23].

In this study, approximately 19.6% of the participants were found to experience a high level of generalized anxiety. These individuals should be referred for psychological evaluation and care to prevent the escalation of severe anxiety. The analysis revealed that both age and specialty had minimal impact on the GAD-7 scores. However, female nurses ($\beta = 0.148$, CI = 0.001-0.985, P = 0.049, GAD = 7.38 ± 4.20) with less than three years of job experience (GAD = 7.39 ± 3.32) and no prior training in COVID-19 management had higher anxiety levels. These findings align with other studies indicating that female nurses tend to experience higher levels of stress than their male counterparts [24]. Additionally, younger nurses with limited job experience are consistently identified as key factors contributing to stress, as seen in global research [25-27]. Policymakers should consider these factors alongside organizational and occupational influences [28], as gender and experience appear to be significantly linked to stress levels among nurses. Overall, the majority of respondents, 86% [0.86 (0.79-0.91)], reported stress due to concerns that COVID-19 would continue for an extended period in Pakistan, and that patients may experience serious complications as a result [0.81 (0.74-0.87)]. Furthermore, 78% [0.78 (0.70-0.85)] expressed worries about themselves or their family members contracting COVID-19, which could potentially damage relationships with loved ones [0.77 (0.69-0.84)].

Conclusion

The study found that 49.6% of nursing staff reported mild stress levels, with 19.6% meeting the GAD-7 criteria for generalized anxiety disorder (GAD-7 score ≥ 10). Female nurses exhibited significantly higher GAD-7 scores. Additionally, nurses with less job experience and no training in managing COVID-19 patients also had higher anxiety scores. Common stress factors included concerns about contracting COVID-19, spreading it to family members, and uncertainty regarding the long-term effects of COVID-19 in Pakistan.

Limitations

This study primarily focused on the impact of COVID-19 on generalized anxiety among nurses and did not

delve into stress related to work or occupation-specific factors. As a result, the researchers were unable to examine the role of work-related or occupational stressors among nursing staff in the Punjab province, Pakistan.

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