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| RESEARCH ARTICLE

Perceived Stress and Psychological Morbidity Among Healthcare Workers: Post-Pandemic Study from India

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| ABSTRACT
Healthcare workers often face tremendous stress, a situation made even more challenging by the COVID-19 pandemic. This stress puts them at higher risk for mental health issues and sleep problems. While there's a growing body of international research on this topic, there's still limited data on healthcare workers in tertiary care settings in India. The study aimed to understand how healthcare workers perceive stress, check for depressive and anxiety symptoms, and evaluate their sleep quality using established psychological assessment tools. The goal was also to explore the relationship between stress and these mental health outcomes. We have conducted a cross-sectional study in a tertiary care hospital in India, between October 2021 and June 2022. We gathered data from 225 healthcare workers, including doctors and nurses, through an anonymous online survey. We have recruited a total of 225 participants for the study, including doctors and nurses. We applied various statistical methods, including descriptive statistics and regression analyses, to interpret the data. The participants' mean age was approximately 26 years, with a majority (63.6%) being female. Most respondents were postgraduate doctors (54.22%). On average, participants have reported moderate levels of perceived stress, with a mean PSS-4 score of 7.86. About half of the participants had shown symptoms of depression and anxiety as per DASS-21. Additionally, the mean PSQI score was 6.92, indicating poor sleep quality. We have found a significant correlation between perceived stress and the severity of depressive ($p < 0.001$**) and anxiety symptoms ($p = 0.002$**). In a specific analysis of individuals with poor sleep (PSQI > 5), the overall model indicated significance ($R = 0.348$, $p = 0.001$**), but no individual predictors stood out. Our findings highlight that healthcare workers were experiencing significant levels of stress, mental health issues, and sleep disturbances in the aftermath of the pandemic. The clear link between perceived stress and the severity of depression and anxiety symptoms demonstrates an urgent need for focused mental health support systems for frontline healthcare workers.

| KEYWORDS

Perceived stress, healthcare workers, depression, anxiety, sleep quality, India

| ARTICLE INFORMATION

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1. Introduction

Healthcare workers, including doctors and nurses, often experience significant occupational stress due to heavy workloads, demanding clinical duties, and long hours (Giorgi et al., 2020). They served as critical frontliners during the pandemic, facing unique challenges distinct from those encountered in regular clinical practice. The COVID-19 pandemic was declared to be a public health emergency by the World Health Organisation (WHO) in 2020, leading to one of the most severe and prolonged crises in modern

healthcare history (WHO, 2020). In the aftermath of the pandemic, the existing challenges within healthcare systems have been exacerbated, resulting in ongoing pressure and stress that extends beyond the acute phases of the crisis (Shanafelt et al., 2020; Zhang et al., 2025). In addition to the pre-existing challenges of high patient loads, complex decision-making, and irregular shift patterns, the pandemic introduced a range of novel psychosocial stressors. These include the direct and sustained risk of infection, widespread patient mortality, moral distress, and social isolation (Shanafelt et al., 2020). Research has shown that healthcare workers experience significantly higher rates of mental health problems including anxiety and depression, compared to the general population, resulting in a considerable occupational mental health burden. (Giorgi et al., 2020; Sialakis et al., 2023). Extensive studies conducted across various international settings have shown that healthcare workers experienced higher rates of depression, anxiety, post-traumatic stress, and sleep disturbances during the pandemic compared to the general population. (Shi et al., 2022; Kang et al., 2020). This study addresses this gap in Indian literature by examining relationships among stress, mental health, and sleep quality among a cohort of medical and nursing staff at SVS Hospital, Mahabubnagar, using validated psychometric instruments during the 2021–2022 period, in the post-pandemic period.

2. Review of Literature

Perceived stress refers to how individuals interpret situations in their lives as stressful and overwhelming, connecting environmental experiences to mental health and psychological outcomes. (Cohen et al., 1983). Increased perceived stress over time may dysregulate the HPA (hypothalamic-pituitary-adrenal) axis and the cortisol response, disrupting neurobiological homeostasis and affecting cognitive, emotional, and physical domains. (Koolhaas et al., 2011). This could result in difficulties managing emotions, a lack of restorative sleep, and a higher risk of psychological disorders. Healthcare workers (HCWs) during the pandemic have experienced these issues led to moral injury, adding an extra layer of psychological trauma. (Hines et al., 2022). In an Egyptian study among healthcare workers, there was a very high prevalence of stress, along with elevated rates of anxiety and depressive symptoms as documented by the PSS and DASS-21 scales (Aly et al., 2021). A Hungarian study (Spányik et al., 2022) showed that factors related to work during COVID-19, such as feeling threatened, high workload, moral distress, and lack of support from the organisation, significantly increased stress, anxiety, and depression among healthcare workers. Multiple systematic reviews and meta-analyses have established consistently high rates of depression and anxiety among HCWs during the pandemic. A meta-analysis of 13 studies involving over 33,000 healthcare workers found that during the pandemic, 23.2% experienced anxiety, 22.8% depression, and 38.9% insomnia, with nurses showing higher rates of symptoms than physicians (Pappa et al., 2020). Shi et al (2022) found that over half of healthcare workers in China experienced varying levels of depression, and a majority reported anxiety, with stress from the COVID-19 pandemic being a major factor, though social support and resilience were linked to reduced stress. A recent study during the second wave of the pandemic showed a significant increase in depression, anxiety, and insomnia among hospital staff, particularly nurses, indicating that the impact of the pandemic has worsened over time (Uvais et al., 2023). A study found that anxiety among Greek healthcare workers rose from 12.7% in the first wave of the pandemic to 32.8% in the second wave, while depression increased from 15.8% to 37.7% (Pataka et al., 2022). This indicates that exposure to the pandemic waves and subsequent uncertainty leads to heightened mental health issues instead of allowing for adjustment. In a recent study, researchers analysed data from 35 studies on healthcare workers in India during the early stages of the COVID-19 pandemic. They found that rates of mental health issues were significantly higher than normal levels before the pandemic. (Sharma et al., 2023)

One common consequence of psychological distress is sleep disturbances. In a meta-analysis, insomnia and sleep deprivation were identified as the predominant issues faced by healthcare workers during the COVID-19 pandemic (Pataka et al., 2022). Sleep disturbances are a significant problem among healthcare workers and are closely linked to mental health disorders (Giorgi et al., 2020; Salari et al., 2022). Previous studies have indicated that doctors and nurses often experience poor sleep quality, insomnia, and non-restorative sleep. These issues are frequently linked to factors such as shift work, night shifts, and extended working hours (Zhang et al., 2025; Jahrami et al., 2022). Systematic reviews and meta-analyses reveal a strong connection between sleep disturbances in healthcare professionals and symptoms of depression, anxiety, and psychological distress. This suggests a bidirectional relationship between poor sleep and mental health (Baglioni et al., 2011; Salari et al., 2022; Deng et al., 2022). In the healthcare worker context, studies have shown that staff working during the COVID-19 pandemic experienced significantly worse sleep quality compared to before the pandemic. Additionally, research indicated that those who contracted COVID-19 experienced further declines in sleep quality during recovery, highlighting that the infections added to the stress of working during the pandemic. (Yigitoglu et al., 2021; Bozan et al., 2021)

There is increasing research on the mental health and sleep of healthcare workers, but there are still important gaps in the Indian context. Many studies have focused mainly on either psychiatric symptoms or sleep outcomes. However, they often do not assess perceived stress, mental health, and sleep quality together in the same group of people using standardised tools. Data from tertiary care settings in developing countries is limited, particularly where structural and organisational pressures may be long-standing and worsened by the pandemic. Understanding the relationship between perceived stress, psychiatric morbidity, and sleep quality in these settings is crucial for designing effective workplace interventions and shaping occupational health policies (Salari et al., 2022).

3. Aims and Methodology

The study aims to assess perceived stress, depressive and anxiety symptoms, and sleep quality among healthcare workers using the PSS-4, DASS-21, and PSQI tools. Additionally, we tried to explore the association between perceived stress and mental health indicators, including symptoms of depression, anxiety, and quality of sleep in this population.

3.1 Methods

This was a cross-sectional study conducted using an online questionnaire administered to healthcare professionals at SVS Hospital, a tertiary care centre. The study population consisted of medical and nursing staff employed at SVS Hospital during the study period. Eligible participants included doctors and nurses aged 18 years or older who were currently working in clinical departments and could read and understand the survey language. A convenience sampling strategy was employed, and all eligible healthcare professionals were invited to participate via an online questionnaire using a Google Forms link. A total of 225 healthcare professionals have completed the survey and included in the study. Data was collected using an anonymous, self-administered online survey between October 2021 and June 2022. The survey included sections on sociodemographic and occupational characteristics, as well as standardised instruments to assess perceived stress, depressive and anxiety symptoms, and sleep quality. Perceived stress was assessed using Perceived Stress Scale (PSS-4) (Warttig et al., 2013). The PSS-4 is a brief self-report measure that assesses the extent to which situations in an individual's life were considered stressful over the past month. It is particularly suitable for use in large surveys where brevity is essential (Cohen et al., 1983; Warttig et al., 2013). Each item is rated on a 5-point Likert scale ranging from 0 (“never”) to 4 (“very often”), with two items that are stated positively requiring reverse scoring. Symptoms of depression and anxiety were measured using the Depression Anxiety Stress Scales-21 (DASS-21) (Lovibond & Lovibond, 1995). The DASS-21 is a widely used self-report instrument consisting of three 7-item subscales that assess depression, anxiety, and stress over the past week (Lovibond & Lovibond, 1995; Antony et al., 1998). Items are rated on a 4-point scale from 0 (“did not apply to me at all”) to 3 (“applied to me very much or most of the time”). Subscale scores are derived by summing the relevant items and multiplying the total by two to align with the original 42-item version (Lovibond & Lovibond, 1995; Antony et al., 1998). Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI), a validated tool that assesses sleep quality over the past month (Buysse et al., 1989). The PSQI consists of 19 self-rated items organised into seven components: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction (Buysse et al., 1989). According to standard practice, a global PSQI score greater than 5 indicates poor sleep quality (Buysse et al., 1989).

3.2 Statistical analysis

Data was entered through survey forms and inputted onto statistical software package for social analysis (SPSS version 23). Continuous variables, such as PSS-4 and PSQI scores, were summarised using mean and standard deviations and frequency percentage. The association between perceived stress, psychiatric morbidity (depressive and anxiety symptoms), and sleep quality was examined using appropriate inferential statistics, including group comparisons (e.g., t-tests or ANOVA) for continuous scores and chi-square tests for categorical outcomes, as applicable. A p-value of less than 0.05 was considered to be statistically significant.

3.3 Ethical considerations

Participants have provided online informed consent before accessing the main questionnaire, and no personally identifiable information was collected. Staff members who were on long-term leave or who declined to provide consent were excluded. The study protocol was approved by the Institutional Ethics Committee prior to data collection. Participation was voluntary, and consent has been obtained prior to online survey. Data has been collected anonymously, and confidentiality was maintained.

4. Results

A total of 225 healthcare workers, including doctors at various levels and nursing staff, participated in the study. The mean age of the participants was 26.34 years, with a standard deviation of 3.49 years. Most participants were female (63.6%, n = 143). Postgraduate doctors constituted the largest subgroup (54.22%, n = 122), followed by MBBS interns (19.11%, n = 43), staff nurses (18.22%, n = 41), and faculty (8.44%, n = 19). Nearly half of the participants (47.6%) reported a decrease in working hours following the pandemic, while 36.0% reported an increase. About more than half of the participants (53.8%, n = 121) had previously worked in COVID wards. A history of psychiatric illness was reported by 8.4% of participants (n = 19), and 10.2% (n = 23) reported having a chronic medical condition. On dimensional measures, the mean PSS-4 score was 7.86 ± 2.04 (range 2–12), indicating overall

moderate levels of perceived stress in the sample. The mean PSQI global score was 6.92 ± 3.70 (range 1–18), with the mean above the conventional cut-off of 5, suggesting that poor sleep quality was common among participants (Table 1).

Perceived stress showed a clear gradient across depressive symptom severity categories. Participants with normal depressive scores had a mean PSS-4 of 7.27 (± 2.22), compared with 7.51 (± 1.22) in the mild group, 9.00 (± 1.82) in the moderate group, 8.81 (± 1.64) in the severe group, and 8.56 (SD 1.60) in the extremely severe group. One-way ANOVA has shown a statistically significant difference in PSS-4 scores across depression categories ($p < 0.001$**), indicating that higher depressive severity was associated with higher perceived stress (Table 2). A similar pattern was observed for anxiety. Mean PSS-4 scores increased from 7.34 (± 1.82) in those with normal anxiety levels to 7.68 (± 2.73) in the mild, 8.30 (± 2.44) in the moderate, 7.80 (± 1.23) in the severe, and 8.70 (± 1.56) in the extremely severe anxiety categories. The difference in PSS-4 scores across anxiety groups was statistically significant ($p = 0.002$**), indicating that higher anxiety severity was also associated with higher perceived stress (Table 3).

When sleep quality was examined categorically, participants with normal sleep (PSQI < 5) had a mean PSS-4 score of 7.57, while those with poor sleep (PSQI > 5) had a mean score of 8.09. Although perceived stress was numerically higher in the poor-sleep group, this difference did not reach statistical significance ($p = 0.060$). To further explore the interplay between perceived stress and psychiatric morbidity among those with disturbed sleep, a linear regression analysis was conducted in the subgroup with PSQI > 5 (n = 127). The regression analysis was statistically significant ($p = 0.001$**), with $R = 0.348$, indicating a positive correlation between perceived stress and poor sleep among participants. However, none of the individual predictors have statistical significance when entered simultaneously; DASS-stress ($B = 0.239$, $p = 0.242$), depressive symptoms ($B = 0.327$, $p = 0.088$), and anxiety symptoms ($B = -0.011$, $p = 0.943$). Together, these findings indicate that in this cohort of young healthcare professionals, perceived stress is significantly higher in those with greater depressive and anxiety symptom severity, while its association with poor sleep is present but not statistically robust when analysed categorically.

Table 2: Descriptive Statistics for PSS-4 and PSQI Scores

Scale	Mean	SD
PSS-4	7.86	2.04
PSQI	6.92	3.70

Table 3: PSS-4 Scores by Depressive Symptom Severity

Depressive Symptoms	Mean PSS-4	p-value
Normal	7.27+2.22	0.001*
Mild	7.51+1.22	
Moderate	9.00+1.82	
Severe	8.81+1.64	
Extremely Severe	8.56+1.60	

Table 4: PSS-4 Scores by Anxiety Symptom Severity

Anxiety Symptoms	Mean PSS-4	P-value
Normal	7.34+1.82	0.002**
Mild	7.68+2.73	
Moderate	8.30+2.44	
Severe	7.80+1.23	
Extremely Severe	8.70+1.56	

5. Discussion

In this cross-sectional study of 225 healthcare workers, the mean perceived stress score was in the moderate range. The cohort is young (mean age 26.34 years), predominantly female (63.6%), and heavily skewed towards postgraduate doctors (54.22%) and interns (19.11%), with a substantial proportion having worked in COVID wards (53.8%) and a minority reporting prior psychiatric

(8.4%) or chronic medical illness (10.2%). This profile suggests a group in a formative stage of their careers, exposed to high clinical demands and pandemic related pressures at a relatively early stage in their professional development. The heightened stress and symptom levels in this group raise concerns about long-term outcomes like poor mental health and job discontinuation.

More than two-fifths of participants had elevated perceived stress, and over half had reported depressive and anxiety symptoms. The mean PSQI score of greater than 5 (6.92) indicated overall poor sleep quality. The present study demonstrates that young healthcare workers, predominant in the sample working in a tertiary hospital setting, are experiencing moderate levels of perceived stress, with high burdens of depressive and anxiety symptoms and frequent sleep disturbances. These findings suggest a substantial burden of psychological distress and sleep problems in this workforce. These findings indicate that high perceived stress is common in the tertiary care setting and is comparable to that reported in earlier studies (Giorgi et al., 2020). The significant association between higher perceived stress and both psychiatric morbidity and poor sleep quality ($p < 0.05$) further underscores the close interconnection among stress appraisal, mental health, and sleep among healthcare professionals (Huang et al., 2024). The mean PSS-4 score in the moderate range, coupled with a mean PSQI above the conventional cut-off for poor sleep, indicates that psychological stress and impaired sleep quality are not isolated but are widespread across this cohort.

In the current study, over 50% of participants had reported symptoms of depression and anxiety, placing these figures in the upper range of previously reported estimates. Prevalence of depressive and anxiety symptoms in the study aligns closely with findings from previous research (Giorgi et al., 2020). A meta-analytic study also found that about one-third of healthcare workers experienced depression and more than one-third experienced anxiety during periods of high demand (Sialakis et al., 2023). Cross-sectional data from other tertiary settings in the post-pandemic era similarly report high rates of depressive and anxiety symptoms among healthcare professionals, underscoring that these issues can persist beyond the immediate crisis (Liang et al., 2023; Otai et al., 2025). This suggests that staff at this tertiary care hospital may be experiencing significantly high psychological stress, possibly due to sustained workloads and ongoing pressures that extend beyond the pandemic phase (Liang et al., 2023; Otai et al., 2025). The rates of depression and anxiety found in this study are similar to those in other studies from India (Uvais et al., 2023). The study by them has reported that 45.0% of hospital staff in Kerala experienced depression and 29.4% experienced anxiety during the second wave of COVID-19 (Uvais et al., 2023). The findings in this study match or are higher than these rates, likely due to the ongoing psychological stress from the second and third waves of COVID-19, particularly in a Tier-2 hospital with limited mental health support. Participants with normal depressive scores had the lowest PSS-4 means, while those with moderate to extremely severe depression had consistently higher perceived stress scores, and found to be statistically significant ($p < 0.001$**). It was observed similarly for anxiety symptoms, where PSS-4 scores increased across anxiety severity categories and were also statistically significant ($p = 0.002$**). These findings suggest that perceived stress is closely linked to both depressive and anxiety symptoms in healthcare workers, highlighting the role of stress as a central factor driving common mental disorders in high-demand occupational environments. Research has shown that perceived stress is a robust predictor of depression and anxiety in healthcare workers, with higher stress appraisals linked to greater symptom severity (Otai et al., 2025). The finding in our study that participants with higher PSS-4 scores were significantly more likely to report depressive and anxiety symptoms supports the notion that stress appraisal is an important and potentially modifiable target for intervention (Huang et al., 2024; Otai et al., 2025).

Our study shows that the mean Pittsburgh Sleep Quality Index (PSQI) score is above 5, indicating that many staff members experience significant sleep problems. We found a strong link between these sleep issues and perceived stress levels. This suggests that reducing stress might also help improve sleep. When we looked specifically at participants who reported poor sleep on a regression analysis, we found that symptoms of depression, anxiety, and stress explained a small but important part of how stressed they felt ($R^2 = 0.121$, $p = 0.001$**). This means that in people who sleep poorly, overall mental health is closely connected to their feelings of stress. The observed link between higher perceived stress and poor sleep quality, especially in regression models, also accords with a growing body of evidence (Jahrami et al., 2022). Huang et al. (2024) demonstrated in a large cross-sectional study that perceived stress was positively correlated with depression and anxiety, and that these psychiatric symptoms partially mediated the pathway from stress to poor sleep (Huang et al., 2024). Pan et al. (2024) found that uncertainty stress significantly predicted poor sleep quality among healthcare professionals, with those experiencing high uncertainty stress having markedly increased odds of poor sleep (Pan et al., 2024). A longitudinal study of healthcare workers by Jahrami et al. (2022) reported that, even when perceived stress improved over time, sleep quality continued to worsen, indicating that sleep disturbance can become a chronic consequence of prolonged occupational stress (Jahrami et al., 2022).

When looking at stress and mental health in relation to sleep quality, none of the individual factors were statistically significant when considered together. Depressive symptoms showed a trend ($B = 0.327$, $p = 0.088$) but anxiety had no effect ($B = -0.011$, $p = 0.943$). This suggests that depressive symptoms, anxiety, and stress scores are closely linked. They may overlap so much that it is hard to see how each one individually affects perceived stress, especially in a smaller group. This finding is important for understanding the stress that healthcare workers feel when they have sleep problems.

6. Strengths and Limitations

This study has several strengths. We have used brief but well-validated instruments to assess perceived stress (PSS-4), depressive and anxiety symptoms (DASS-21), and sleep quality (PSQI), thereby enhancing the reliability and comparability of the findings with other research. Second, including both medical and nursing staff from a tertiary care hospital provides a broader picture of psychological distress and sleep problems across key frontline professional groups. By simultaneously measuring perceived stress, psychiatric symptoms, and sleep quality within a single survey, the study examined relationships among these domains rather than treating them in isolation.

Several limitations should be acknowledged while interpreting these findings. The cross-sectional design precludes conclusions about causality or directionality. For example, it cannot be determined whether higher perceived stress led to psychiatric symptoms and poor sleep, whether pre-existing mental health caused sleep problems or whether these relationships are bidirectional. The study was conducted in a single tertiary-care hospital using convenience sampling and an online self-report survey, which may limit generalisability and introduce selection bias. Furthermore, although validated instruments were used, the study assessed symptoms rather than clinical diagnoses, and other potentially relevant factors, such as specific work schedules and department-level stressors, were not measured. Future research could build on these results by employing longitudinal, multicentre designs, including more detailed occupational and psychosocial variables among healthcare workers.

7. Conclusion

This study found a high burden of perceived stress, psychiatric morbidity and poor sleep quality among healthcare workers in a tertiary care hospital, with over half of participants reporting depressive and anxiety symptoms and mean sleep quality scores above the conventional threshold for poor sleep. Higher levels of perceived stress were significantly associated with both depressive and anxiety symptoms and poor sleep quality, highlighting the close interrelationship between stress appraisal, mental health and sleep in the health workforce. These findings underline the need for comprehensive, system-level strategies that reduce occupational stressors, promote psychological well-being and support healthy sleep among healthcare professionals, not only to improve staff health but also to safeguard patient safety and the functioning of health services.

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