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Associations of Stress and Anxiety Levels With Insomnia Among Nurses During the COVID-19 Pandemic: A Cross-Sectional Study

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ABSTRACT

Objective: *The increase in COVID-19 cases has resulted in stressful conditions for nurses. This condition can affect the level of stress and anxiety of nurses in handling patients. Stress can cause disruption of sleep patterns, such as insomnia. This study aimded to examine the association of stress and anxiety levels with insomnia among nurses at the South Tangerang City General Hospital during the COVID-19 pandemic.*

Methods: *A cross-sectional study was conducted in June 2022. Eighty-four nurses were selected from a population of 100 using simple random sampling. Stress, anxiety, and insomnia were assessed using the PSS-10, HARS, and KSPBJ-IRS, respectively.*

Results: *Thirty-eight nurses (45.2%) were aged 30–39 years, 62 (73.8%) were women, and 62 (73.8%) were classified as experiencing insomnia. Moderate stress was reported by 44 (52.4%) and moderate anxiety by 32 (38.1%). Stress level was associated with insomnia (Pearson $\chi^2(2) = 22.76$, $p < 0.001$); anxiety level was associated with insomnia (Fisher–Freeman–Halton exact $p = 0.039$).*

Conclusion: *Stress and anxiety levels were associated with insomnia in this sample.*

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INTRODUCTION

The COVID-19 pandemic placed additional demands on hospital services and the health professionals providing care. Nurses faced increased workloads, concern about infection, and changing work conditions. Studies and reviews conducted during the pandemic documented psychological distress, anxiety, stress, and sleep disturbance among health-care workers, although estimates varied across settings, populations, and measurement tools (Allan et al., 2020; Chew et al., 2020; De Kock et al., 2021; Gupta et al., 2021; Huang & Zhao, 2020). Reviews focused on nurses also reported substantial psychological and sleep symptoms and emphasized heterogeneity in the evidence (Al Maqbali et al., 2021; García-Vivar et al., 2023; Varghese et al., 2021; Xia et al., 2021). Insomnia among medical staff was further described in cross-sectional and pooled studies (Zhang et al., 2020). These demands may coincide with sleep problems, but a cross-sectional association does not establish that one condition causes the other.

Studies among nurses have linked stress and sleep problems, but they differ in population, setting, and outcome definition. During the pandemic, insomnia or poor sleep was reported among frontline and hospital nurses in China, Italy, Greece, and the United States, and associations with perceived stress or anxiety were described in several samples (Kandemir et al., 2022; Nie et al., 2020; Shen et al., 2021; Simonetti et al., 2021). Other studies addressed related outcomes such as stress and sleep quality or reported different patterns across measures and samples (Bilgiç et al., 2021; Purnamasari et al., 2021). Indonesian research has also documented psychological distress among health-care workers and nurses, including studies in referral hospitals and multi-province samples (Marthoenis et al., 2021; Muliantino et al., 2021; Ni'matuzahroh et al., 2021). Bessie et al. (2021) reported a significant association between stress and sleep quality among 44 nurses in Kupang, whereas Purnamasari et al. (2021) reported no significant association between anxiety and nurses' sleep quality during the pandemic. These studies differ in setting, sample, instruments, and sleep outcome; they therefore do not settle whether stress and anxiety are associated with insomnia in this hospital population. Local evidence from South Tangerang can add a setting-specific estimate, while the cross-sectional design permits an assessment of association only.

A preliminary interview conducted at the South Tangerang City General Hospital on 26 April 2022 included ten nurses; eight were reported to experience insomnia in the context of stress and anxiety. The present study therefore aimed to examine the association of stress and anxiety levels with insomnia among nurses at the South Tangerang City General Hospital during the COVID-19 pandemic.

RESEARCH METHOD

This quantitative analytical observational study used a cross-sectional design and was conducted at the South Tangerang City General Hospital in June 2022. The source population comprised 100 nurses working in the Emergency Department, pediatric inpatient ward, surgical inpatient ward, internal medicine inpatient ward, and COVID-19 isolation inpatient ward. A sample of 84 nurses was selected by simple random sampling from the hospital nurse roster.

Stress was measured using the 10-item Perceived Stress Scale (PSS-10; total score 0–40, with positively worded items reverse-scored); the Indonesian version has shown a two-factor structure and composite reliability of 0.93 among employee respondents, although measurement properties may differ by population (Hakim et al., 2024). Anxiety was assessed using the 14-item Indonesian Hamilton Anxiety Rating Scale (HAM-A/HARS; item scores 0–4; total score 0–56). In a sample of Indonesian

nurses, the translated HAM-A showed item–total correlations of 0.529–0.727 and Cronbach's alpha of 0.756 (Ramdan, 2019). Insomnia was assessed using the eight-item KSPBJ-IRS. Descriptive statistics were used to summarize respondent characteristics and the distributions of stress, anxiety, and insomnia. Associations between stress level and insomnia were assessed using Pearson's chi-square test. The association between anxiety level and insomnia was assessed using the two-sided Fisher–Freeman–Halton exact test.

RESULTS

Among the 84 respondents, 38 (45.2%) were aged 30–39 years, 62 (73.8%) were women, and 53 (63.1%) had a vocational education. Thirty-eight (45.2%) had worked for 3–5 years. Overall, 62 nurses (73.8%) were classified as experiencing insomnia. Moderate stress was reported by 44 (52.4%) respondents, and moderate anxiety by 32 (38.1%). Percentages in Table 1 are calculated using the full sample as the denominator.

Table 1. Respondent characteristics (n = 84)

Characteristics	f	%
Age		
20–29 years	36	42.9
30–39 years	38	45.2
40–49 years	6	7.1
50–59 years	4	4.8
Gender		
Male	22	26.2
Female	62	73.8
Education		
Vocational	53	63.1
Professional (Ners)	31	36.9
Length of service		
0–2 years	21	25.0
3–5 years	38	45.2
6–8 years	12	14.3
≥9 years	13	15.5
Insomnia		
Yes	62	73.8
No	22	26.2
Stress level		
Mild	22	26.2
Moderate	44	52.4
Severe	18	21.4
Anxiety level		
None	14	16.7
Mild	19	22.6
Moderate	32	38.1
Severe	19	22.6

Table 2 presents row percentages. Insomnia was reported by 8 of 22 nurses with mild stress (36.4%), 40 of 44 with moderate stress (90.9%), and 14 of 18 with severe stress (77.8%). The Pearson chi-square test indicated an association between stress level and insomnia, $\chi^2(2) = 22.76$, $p < 0.001$. The expected counts were 16.24 and 5.76 for mild stress, 32.48 and 11.52 for moderate stress, and 13.29 and 4.71 for severe stress; one of six expected counts was below 5 and none was below 1.

Table 2. Association between stress level and insomnia (n = 84)

Stress level	Insomnia, n (%)	No insomnia, n (%)	Total, n (%)	p-value
Mild	8 (36.4)	14 (63.6)	22 (100)	<0.001
Moderate	40 (90.9)	4 (9.1)	44 (100)	
Severe	14 (77.8)	4 (22.2)	18 (100)	
Total	62 (73.8)	22 (26.2)	84 (100)	

Table 3 presents row percentages. Insomnia was reported by 6 of 14 nurses with no anxiety (42.9%), 14 of 19 with mild anxiety (73.7%), 27 of 32 with moderate anxiety (84.4%), and 15 of 19 with severe anxiety (78.9%). Because expected cell counts were sparse, the association was evaluated using the two-sided Fisher–Freeman–Halton exact test with fixed margins; the exact p-value was 0.039.

Table 3. Association between anxiety level and insomnia (n = 84)

Anxiety level	Insomnia, n (%)	No insomnia, n (%)	Total, n (%)	p-value
None	6 (42.9)	8 (57.1)	14 (100)	0.039
Mild	14 (73.7)	5 (26.3)	19 (100)	
Moderate	27 (84.4)	5 (15.6)	32 (100)	
Severe	15 (78.9)	4 (21.1)	19 (100)	
Total	62 (73.8)	22 (26.2)	84 (100)	

DISCUSSION

The association between stress and insomnia in nurses

In this sample, insomnia was more frequently reported in the moderate- and severe-stress categories than in the mild-stress category. This pattern is consistent with studies reporting an association between perceived or occupational stress and sleep problems among nurses during the pandemic (Bessie et al., 2021; Tselebis et al., 2020; Zhan et al., 2020) and with the Indonesian emergency-nurse study by Setyabudi and Fitriani (2022). These studies used different samples and sleep measures, so the magnitude of their results should not be compared directly. Stress and insomnia were assessed at the same time in the present cross-sectional study.

The COVID-19 period involved changing service demands and concerns about infection among hospital staff (Kuo et al., 2020; Lai et al., 2020). Indonesian studies likewise documented psychological distress and mental-health concerns among nurses and other health-care workers during this period (Marthoenis et al., 2021; Muliantino et al., 2021; Ni'matuzahroh et al., 2021). These contextual factors may help explain why stress and sleep complaints co-occurred in this sample, but they were not measured as explanatory variables in this study. The present findings should therefore be interpreted as a statistical association rather than a causal effect.

The association between anxiety and insomnia in nurses

Anxiety level was also associated with insomnia in this sample. This finding is consistent with reports of co-occurring anxiety and sleep disturbance among nurses during the pandemic (D'emeh et al., 2021; Shen et al., 2021; Simonetti et al., 2021; Tu et al., 2020) who reported an association between anxiety and insomnia among emergency nurses. Purnamasari et al. (2021), however, reported no statistically significant association between anxiety and sleep quality among nurses. Differences in clinical setting, instrument, outcome definition, sample size, and statistical power may contribute to the different findings. In the current study, insomnia was dichotomized and anxiety was measured in categories; these choices may also affect how patterns are observed. The direction is unknown.

This study has several limitations. It was conducted in one hospital and included a sample drawn from five clinical areas, which limits generalizability to other hospitals and nurse populations. Its cross-sectional design does not establish temporality or causation. Because the analyses were bivariate, potential confounding factors were not controlled.

The results support attention to nurses' psychological well-being and sleep complaints during periods of high service demand. Hospitals may consider offering access to existing staff support and referral pathways, while future studies should use longitudinal or intervention designs to evaluate causes and the effect of support strategies.

CONCLUSION AND RECOMMENDATIONS

In this cross-sectional sample of 84 nurses at the South Tangerang City General Hospital, stress level and anxiety level were each associated with insomnia. The stress association was statistically significant by Pearson's chi-square test ($\chi^2(2) = 22.76$, $p < 0.001$), and the anxiety association was significant by the Fisher–Freeman–Halton exact test ($p = 0.039$). Future research should use longitudinal designs.

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