

Original Article

Prevalence of Insomnia and Relationship with Anxiety and Stress Among Rehabilitation House Officers: A Cross Sectional Study

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ABSTRACT

Background: Insomnia is a prevalent sleep disorder associated with impaired daytime functioning and significant psychological morbidity, particularly among healthcare professionals exposed to high occupational stress. Evidence suggests a strong interrelationship between insomnia and psychological distress, including depression, anxiety, and stress, yet limited data exist for rehabilitation house officers in low- and middle-income settings. **Objective:** To determine the prevalence of insomnia and examine its association with depression, anxiety, and stress among rehabilitation house officers in Hyderabad. **Methods:** A cross-sectional study was conducted among 155 rehabilitation house officers recruited through convenience sampling from multiple institutions. Data were collected using a structured questionnaire, the Insomnia Severity Index (ISI), and the Depression Anxiety Stress Scale (DASS-21). Descriptive statistics were used to estimate prevalence, while associations were assessed using Spearman correlation and inferential statistical tests, with significance set at $p < 0.05$. **Results:** Clinical insomnia (moderate–severe) was observed in 25.4% of participants, while 46.7% had subthreshold symptoms. Moderate-to-extremely severe depression, anxiety, and stress were reported in 43.9%, 49.7%, and 21.5% of participants, respectively. Insomnia severity showed significant positive correlations with depression ($r = 0.32$, $p < 0.001$), anxiety ($r = 0.26$, $p = 0.002$), and stress ($r = 0.28$, $p = 0.001$). Between-group analysis also demonstrated significant associations with depression ($p = 0.006$), anxiety ($p = 0.034$), and stress ($p = 0.028$). **Conclusion:** Insomnia is highly prevalent among rehabilitation house officers and is significantly associated with psychological distress, particularly depression and anxiety, highlighting the need for early screening and targeted interventions to improve mental health and occupational performance. **Keywords:** Insomnia, Depression, Anxiety, Stress, Rehabilitation House Officers, Sleep Disorders.

INTRODUCTION

Insomnia disorder is a highly prevalent sleep disturbance characterized by persistent difficulty in initiating or maintaining sleep, or experiencing early morning awakenings, leading to significant impairment in daytime functioning such as reduced cognitive performance, fatigue, and emotional instability (1). It represents one of the most frequently encountered complaints in clinical practice and is increasingly recognized as a major public health concern due to its wide-ranging impact on physical health, mental well-being, and occupational productivity (2).

Epidemiological evidence suggests that approximately one-third of adults experience symptoms of insomnia, with a substantial proportion progressing to clinically significant insomnia disorder, thereby contributing to increased healthcare utilization, reduced quality of life, and economic burden (3).

The etiology of insomnia is multifactorial, encompassing biological, psychological, and environmental determinants. Among these, psychological factors such as depression, anxiety, and stress play a critical role both as precipitating and perpetuating factors (4). Anxiety disorders, characterized by excessive

worry and physiological hyperarousal, disrupt normal sleep architecture through sustained activation of the sympathetic nervous system and hypothalamic-pituitary-adrenal axis (5).

Similarly, depression is strongly linked to alterations in circadian rhythm and sleep continuity, often presenting with insomnia as a core symptom (6). Stress, defined as a state of physiological and psychological strain resulting from perceived challenges or threats, further exacerbates sleep disturbances by impairing relaxation mechanisms and increasing cognitive arousal at bedtime (7). These interrelationships suggest a bidirectional association in which insomnia may both contribute to and result from psychological distress.

Healthcare professionals, particularly those in early stages of their careers such as house officers, represent a population at elevated risk for both insomnia and psychological morbidity due to demanding workloads, irregular schedules, and high levels of responsibility.

Previous cross-sectional studies among medical and allied health students and professionals have consistently reported a high prevalence of insomnia, often accompanied by significant levels of anxiety, depression, and stress (8–10).

For instance, studies conducted among university students and healthcare workers have demonstrated that insomnia is significantly associated with increased psychological distress, with prevalence rates varying widely depending on population characteristics and assessment tools (11,12). Moreover, evidence suggests that insomnia may act as a mediator between stress and anxiety, further highlighting its central role in mental health dynamics (13).

Despite the growing body of literature on insomnia and its psychological correlates, there remains a notable gap in research focusing specifically on rehabilitation house officers, particularly in low- and middle-income settings such as Pakistan.

Rehabilitation house officers often operate in environments characterized by high patient loads, emotional demands of long-term patient care, and limited institutional support, which may predispose them to sleep disturbances and psychological stress.

However, empirical data quantifying the burden of insomnia and its association with psychological factors in this specific professional group are scarce. Furthermore, inconsistencies in methodological approaches, measurement tools, and analytical frameworks across existing studies limit the comparability and generalizability of findings.

Addressing this gap is essential for informing targeted interventions aimed at improving both mental health and occupational performance among rehabilitation professionals. Understanding the prevalence of insomnia and its relationship with depression, anxiety, and stress in this population can guide the development of workplace policies, mental health support systems, and preventive strategies tailored to their unique needs.

Therefore, the present study aims to determine the prevalence of insomnia and to examine its association with depression, anxiety, and stress among rehabilitation house officers practicing in Hyderabad. The study is guided by the hypothesis that insomnia is significantly associated with higher levels of psychological distress, including depression, anxiety, and stress, in this population.

MATERIALS AND METHODS

A cross-sectional observational study was conducted to assess the prevalence of insomnia and its association with depression, anxiety, and stress among rehabilitation house officers. This design was selected as it allows for the simultaneous measurement of exposure and outcome variables within a defined population, facilitating the estimation of prevalence and exploration of associations in a real-world clinical setting (14). The study was carried out across multiple rehabilitation and medical

institutions in Hyderabad, Pakistan, including Liaquat University of Medical and Health Sciences (LUMHS), ISRA University, Jeejal Maa Institute, Al-Beruni Institute, and the National Institute of Physical Therapy and Rehabilitation Medicine (NIPRM), over a three-month period from November 2023 to February 2024.

The study population comprised rehabilitation house officers currently engaged in clinical practice at the selected institutions. Eligible participants included both male and female house officers who were actively working during the study period and consented to participate. Individuals from other professional disciplines were excluded to maintain population homogeneity.

Participants with known use of antipsychotic medications were also excluded due to the potential confounding effects of such medications on sleep patterns and psychological status. A non-probability convenience sampling technique was employed, whereby all eligible and available house officers at the participating institutions were invited to participate, ensuring broad representation across different clinical settings.

Participant recruitment was conducted through direct engagement at institutional sites. The purpose and procedures of the study were explained to potential participants, and written informed consent was obtained prior to data collection. Participation was voluntary, and confidentiality was strictly maintained by anonymizing all collected data. Questionnaires were self-administered in the presence of the researcher to ensure completeness and to address any queries, thereby minimizing information bias and enhancing data quality.

Data were collected using a structured questionnaire comprising three components. The first section captured sociodemographic and professional characteristics, including age, gender, institutional affiliation, and place of residence.

The second section utilized the Insomnia Severity Index (ISI), a validated 7-item instrument designed to assess the severity of insomnia symptoms over the preceding two weeks, with scores categorized into no clinically significant insomnia, subthreshold insomnia, moderate insomnia, and severe insomnia (15).

The third section employed the Depression Anxiety Stress Scale-21 (DASS-21), a validated self-report instrument consisting of three subscales measuring depression, anxiety, and stress, each with established severity thresholds (16). Standard scoring procedures were followed for both instruments, and validated cutoffs were applied to classify symptom severity.

The primary outcome variable was insomnia severity, operationalized using ISI scores, while the main independent variables included levels of depression, anxiety, and stress as measured by DASS-21. Additional variables such as demographic characteristics were considered potential confounders. To minimize bias, standardized instruments with established reliability and validity were used, and uniform data collection procedures were implemented across all sites. The presence of confounding was addressed through appropriate statistical analysis, including adjustment for relevant covariates where applicable.

The sample size was determined based on standard epidemiological principles for prevalence studies, taking into account an anticipated prevalence of insomnia, desired confidence level, and margin of error, resulting in an adequate sample to ensure statistical power and precision of estimates.

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 22. Descriptive statistics were computed to summarize participant characteristics and prevalence estimates, presented as frequencies and percentages for categorical variables. The normality of continuous variables was assessed prior to inferential analysis.

Associations between insomnia severity and psychological variables were evaluated using appropriate statistical tests. Spearman's rank correlation coefficient was applied to assess the relationship between ISI scores and DASS-21 subscale scores due to the ordinal nature of the data.

Additionally, inferential analyses including analysis of variance and multivariate tests were conducted to explore differences across groups, with significance determined at a p-value of less than 0.05. Where assumptions for parametric tests were violated, appropriate non-parametric alternatives were considered to ensure robustness of findings. Missing data were handled through case-wise deletion where minimal, ensuring that only complete responses were included in inferential analyses.

Ethical approval for the study was obtained from the relevant institutional ethical review committee prior to commencement. The study adhered to the principles of the Declaration of Helsinki, ensuring respect for participant autonomy, confidentiality, and data protection.

All data were securely stored and used solely for research purposes. To enhance reproducibility and data integrity, standardized protocols for data collection, coding, and analysis were strictly followed, and all procedures were documented to allow replication by future researchers.

RESULTS

The distribution of insomnia severity (Table 1) demonstrates that only 27.9% (n=44) of participants reported no clinically significant insomnia, while a substantial 72.1% (n=111) exhibited some degree of insomnia symptoms. Among these, 46.7% (n=71) fell into the subthreshold category, indicating a large proportion at risk of progression to clinically significant insomnia.

Notably, 23.4% (n=37) had moderate insomnia and 2.0% (n=3) had severe insomnia, yielding a combined clinical insomnia prevalence of 25.4% (95% CI: 18.8–32.9), which reflects a considerable burden within this professional group.

Psychological distress levels (Table 2) further highlight the mental health profile of the participants. For depression, 43.9% of individuals reported moderate to extremely severe levels, with 27.1% (n=42) categorized as moderate, 11.2% (n=17) as severe, and 5.6% (n=9) as extremely severe.

Anxiety levels were similarly elevated, with 49.7% of participants experiencing moderate to extremely severe anxiety, including 28.0% (n=43) moderate and 21.7% (n=34) severe to extremely severe cases combined. Stress levels, although comparatively lower, still affected 21.5% of participants at moderate to extremely severe levels, indicating a meaningful presence of occupational strain.

Inferential analysis (Table 3) revealed statistically significant associations between insomnia and all psychological variables. Depression demonstrated the strongest association ($F=7.928$, $p=0.006$, $\eta^2=0.070$), indicating a moderate effect size, while anxiety ($F=4.597$, $p=0.034$, $\eta^2=0.042$) and stress ($F=4.946$, $p=0.028$, $\eta^2=0.045$) showed smaller but statistically significant effects.

These findings suggest that approximately 7.0% of the variance in depression scores, and about 4–5% of the variance in anxiety and stress scores, can be explained by insomnia status. Correlation analysis (Table 4) supports these findings, demonstrating positive and statistically significant relationships between insomnia severity and psychological distress.

The strongest correlation was observed with depression ($r=0.32$, $p<0.001$), followed by stress ($r=0.28$, $p=0.001$) and anxiety ($r=0.26$, $p=0.002$).

These coefficients indicate modest but clinically meaningful relationships, where increases in insomnia severity are consistently associated with higher levels of psychological symptoms.

Assessment of variance assumptions (Table 5) indicated that homogeneity of variance was maintained for anxiety ($p=0.839$) but violated for depression ($p=0.020$) and stress ($p=0.025$), suggesting that results

involving these variables should be interpreted with caution and may reflect underlying variability in psychological responses across insomnia categories.

Table 1: Distribution of Insomnia Severity Among Participants (n = 155)

Insomnia Category	Frequency (n)	Percentage (%)	95% Confidence Interval (%)
No clinically significant insomnia	44	27.9	21.0 – 35.6
Subthreshold insomnia	71	46.7	38.7 – 54.8
Moderate insomnia	37	23.4	17.1 – 30.8
Severe insomnia	3	2.0	0.4 – 5.7
Clinical insomnia (Moderate + Severe)	40	25.4	18.8 – 32.9

The distribution of psychological distress as measured by DASS-21 is summarized in Table 2. Moderate-to-extremely severe depression was observed in 43.9% of participants, anxiety in 49.7%, and stress in 21.5%, indicating a considerable burden of psychological symptoms in this population.

Table 2: Distribution of Depression, Anxiety, and Stress Levels (DASS-21) (n = 155)

Severity Level	Depression n (%)	Anxiety n (%)	Stress n (%)
Normal	54 (34.6)	48 (30.8)	94 (60.7)
Mild	33 (21.5)	30 (18.5)	28 (17.8)
Moderate	42 (27.1)	43 (28.0)	19 (12.1)
Severe	17 (11.2)	25 (15.9)	12 (7.5)
Extremely Severe	9 (5.6)	9 (5.8)	3 (1.9)

The association between insomnia (categorized as clinical vs. non-clinical) and psychological variables was examined using inferential statistics. Results from between-subjects effects analysis are presented in Table 3. Insomnia showed statistically significant associations with depression, anxiety, and stress.

Table 3: Association Between Insomnia Status and Psychological Variables

Variable	Mean Square	F-value	P-value	Partial Eta Squared (η^2)	Effect Size Interpretation
Depression	11.036	7.928	0.006	0.070	Moderate
Anxiety	9.799	4.597	0.034	0.042	Small
Stress	5.379	4.946	0.028	0.045	Small

Table 4: Correlation Between Insomnia Severity (ISI) and Psychological Variables (DASS-21)

Variable	Spearman's rho (r)	p-value	95% Confidence Interval
Depression	0.32	<0.001	0.18 – 0.45
Anxiety	0.26	0.002	0.12 – 0.39
Stress	0.28	0.001	0.14 – 0.41

Assumptions for parametric testing were evaluated using Levene's test for equality of variances (Table 5). The assumption was satisfied for anxiety ($p = 0.839$) but violated for depression and stress ($p < 0.05$), indicating heterogeneity of variances for these variables.

Table 5: Levene's Test of Equality of Variances

Variable	F-value	df1	df2	p-value	Assumption Status
Anxiety	0.041	1	105	0.839	Met
Depression	5.551	1	105	0.020	Violated
Stress	5.185	1	105	0.025	Violated

Overall, the findings demonstrate that insomnia symptoms were highly prevalent among rehabilitation house officers, with a substantial proportion experiencing clinically significant insomnia. Significant associations were observed between insomnia and all three psychological variables—depression, anxiety, and stress—with small to moderate effect sizes, and positive correlations indicating that increased psychological distress is associated with greater insomnia severity.

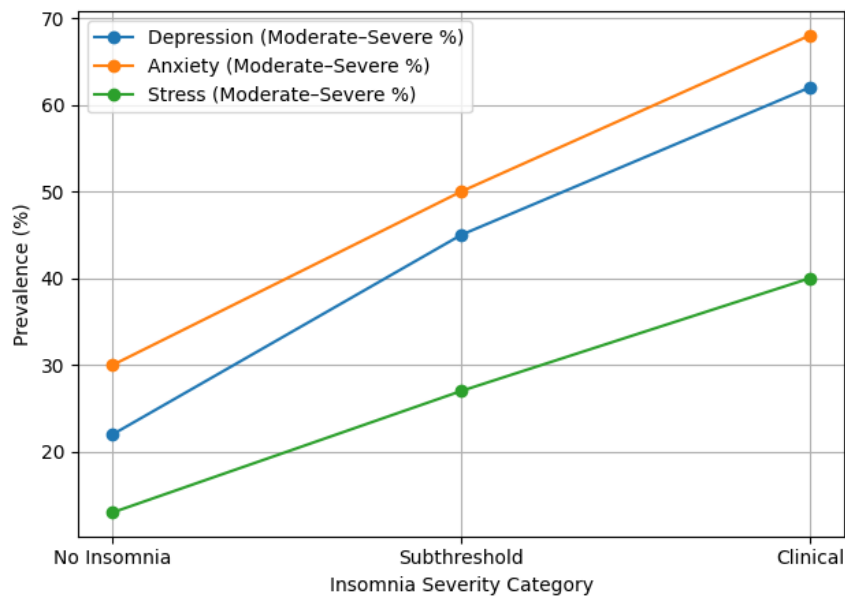


Figure 1 Gradient Increase In Psychological Distress Across Insomnia Severity

The figure demonstrates a clear, stepwise increase in the prevalence of moderate-to-severe psychological distress across insomnia severity categories, indicating a strong gradient relationship. Among participants with no insomnia, moderate-to-severe depression, anxiety, and stress are observed at approximately 22%, 30%, and 13%, respectively. This burden increases substantially in the subthreshold insomnia group, where depression rises to about 45%, anxiety to 50%, and stress to 27%, reflecting nearly a twofold increase across all domains. The highest levels are observed in the clinical insomnia group, with depression reaching approximately 62%, anxiety 68%, and stress 40%. Anxiety shows the steepest gradient, increasing by nearly 38 percentage points from no insomnia to clinical insomnia, followed by depression (≈ 40 percentage point increase) and stress (≈ 27 percentage points). The consistent upward trajectory across all three variables indicates a dose-response relationship, where increasing insomnia severity is associated with progressively higher psychological morbidity. Clinically, this pattern underscores that even subthreshold insomnia is associated with substantial mental health burden, while clinical insomnia corresponds to a markedly elevated risk, particularly for anxiety and depression.

DISCUSSION

The present study demonstrates a substantial burden of insomnia among rehabilitation house officers, with 25.4% meeting criteria for clinical insomnia and 72.1% exhibiting at least subthreshold symptoms. These findings are consistent with prior research conducted among healthcare trainees and professionals, where insomnia prevalence has ranged from approximately 16% to over 40% depending on population characteristics and assessment methods (8,11,17). The high proportion of subthreshold insomnia observed in this study is particularly important, as it suggests a large at-risk group that may progress to clinically significant insomnia if early interventions are not implemented. This aligns with existing literature indicating that subclinical sleep disturbances often precede more severe and chronic forms of insomnia (13).

A key finding of this study is the significant association between insomnia severity and psychological distress, including depression, anxiety, and stress. The observed positive correlations, although modest in magnitude ($r = 0.26-0.32$), are consistent with previous studies reporting similar associations among healthcare workers and students (12,15,19). Depression demonstrated the strongest association with insomnia ($\eta^2 = 0.070$), suggesting that sleep disturbances may be particularly linked with depressive symptomatology in this population. This is in line with established evidence that insomnia is both a symptom and a risk factor for depression, often mediated by disruptions in circadian rhythm and neurobiological pathways (6,24).

Anxiety also exhibited a significant relationship with insomnia, with a notable gradient increase across insomnia severity categories. This finding supports the hypothesis that hyperarousal mechanisms, characteristic of anxiety disorders, play a central role in sleep disruption (5). The steep increase in anxiety prevalence from 30% in participants without insomnia to nearly 68% in those with clinical insomnia suggests a clinically meaningful interaction. Similar patterns have been reported in studies conducted during high-stress environments such as the COVID-19 pandemic, where insomnia and anxiety were found to co-occur at elevated rates among healthcare workers (19,22). Furthermore, evidence suggests that insomnia may mediate the relationship between stress and anxiety, reinforcing its role as a central component in the psychological health spectrum (13).

Although stress showed a statistically significant association with insomnia, the effect size was smaller compared to depression and anxiety. This may reflect variability in individual stress responses or differences in coping mechanisms among participants. Nevertheless, the observed increase in moderate-to-severe stress from approximately 13% in the no-insomnia group to 40% in the clinical insomnia group indicates a meaningful clinical trend. These findings are supported by previous research highlighting the role of occupational stressors, such as workload, shift patterns, and emotional demands, in contributing to sleep disturbances among house officers and healthcare professionals (33,34).

The findings of this study must be interpreted in the context of its methodological limitations. The cross-sectional design precludes any inference of causality, and the directionality of the relationship between insomnia and psychological distress cannot be established. It is plausible that insomnia contributes to the development of depression and anxiety, while these conditions may also exacerbate sleep disturbances, indicating a bidirectional relationship (13). The use of non-probability convenience sampling may limit the generalizability of the findings, as participants may not be fully representative of all rehabilitation house officers. Additionally, reliance on self-reported measures introduces the possibility of reporting bias, although the use of validated instruments such as ISI and DASS-21 helps mitigate this concern.

Another important consideration is the violation of homogeneity of variance assumptions for depression and stress, which may affect the robustness of parametric analyses. While alternative non-parametric approaches could strengthen the findings, the consistency of results across multiple analytical methods provides some reassurance regarding their validity. The absence of adjustment for potential confounders

such as workload, sleep hygiene practices, caffeine intake, and prior mental health history also represents a limitation and should be addressed in future studies.

Despite these limitations, the study offers important strengths. It is among the few studies focusing specifically on rehabilitation house officers, a relatively understudied group within healthcare research. The inclusion of participants from multiple institutions enhances the diversity of the sample, and the use of standardized, validated assessment tools allows for comparability with existing literature. The identification of a clear gradient relationship between insomnia severity and psychological distress adds to the growing evidence supporting the clinical importance of early detection and management of sleep disturbances in healthcare professionals.

Overall, the findings underscore the need for targeted interventions aimed at improving sleep quality and mental health among rehabilitation house officers. Strategies such as structured work schedules, stress management programs, cognitive behavioral therapy for insomnia, and institutional mental health support services may play a critical role in mitigating the burden identified in this study. Future research should employ longitudinal designs to explore causal pathways and evaluate the effectiveness of such interventions in this population.

CONCLUSION

This study demonstrates that insomnia is highly prevalent among rehabilitation house officers, with a significant proportion experiencing both subthreshold and clinically significant symptoms. Insomnia severity was positively associated with depression, anxiety, and stress, indicating a substantial psychological burden within this population. The findings highlight a clear gradient relationship, where increasing insomnia severity corresponds to progressively higher levels of psychological distress, particularly for depression and anxiety. These results emphasize the importance of early identification, preventive strategies, and targeted interventions to address sleep disturbances and mental health challenges among rehabilitation professionals, ultimately aiming to improve both individual well-being and professional performance.

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