Association Between Sleep-related Cognitions, Sleep-related Behaviors, and Insomnia in Patients with Anxiety and Depression: A Cross-sectional Study

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ABSTRACT

Background: The cognitive model of insomnia states that worry about sleep contributes to poor sleep quality. Besides worry, beliefs about sleep and maladaptive safety behaviors also affect sleep quality. We aimed to find the association among the presence of insomnia, sleep-related cognitions, and behaviors among patients diagnosed with anxiety or depression.

Methodology: The present cross-sectional comparison study included patients with anxiety spectrum or depressive disorders as per the Diagnostic and Statistical Manual for Mental Disorders—fifth edition and healthy controls. Mood status, insomnia severity, sleep quality, dysfunctional beliefs about sleep, maladaptive safety behaviors, and pre-sleep arousal were evaluated using Hamilton Anxiety Scale (HAM-A), Montgomery Åsberg Depression Rating Scale (MADRS), Insomnia Severity Index, Pittsburgh Sleep Quality Index, Dysfunctional Beliefs and Attitudes Sleep Scale (DBAS), Sleep-related Behavior Questionnaire (SRBQ), and Pre-sleep Arousal Scale (PSAS), respectively. A p

value ≤.05 was considered statistically significant.

Results: Both patients ($n = 80$) and controls ($n = 80$) were similar in sociodemographic profile, though the sample was predominantly female. Comparison between patients with insomnia ($n = 60$), patients without insomnia ($n = 20$), and healthy controls ($n = 80$) showed that HAM-A and MADRS, DBAS, SRBQ, and PSAS scores were higher in patients with insomnia compared to their counterparts. DBAS and SRBQ scores positively correlated with increasing severity of insomnia. Dysfunctional beliefs regarding sleep (OR: 1.05; 95% CI = 1.00–1.09) and maladaptive behaviors related to sleep (OR: 1.02; 95% CI = 1.00–1.05) predicted insomnia in patients with depression or anxiety.

Conclusion: Insomnia in anxiety or depression is associated with illness severity, dysfunctional beliefs regarding sleep, and sleep-related maladaptive behaviors. Maladaptive cognitions and behaviors can independently influence sleep quality.

Key Message: Sleep-related cognitions and behaviors significantly influence sleep quality and severity of insomnia.

Patients with insomnia exhibited greater dysfunctional beliefs and maladaptive coping behaviors when compared to patients without insomnia and controls.

Dysfunctional beliefs and sleep-related maladaptive behaviors independently predict severity of insomnia.

Insomnia is conventionally defined as "the subjective report of difficulty initiating sleep, difficulty maintaining sleep, waking up too early, or sleep that is chronically nonrestorative, or poor in quality of sleep that persists despite adequate opportunity for sleep, and that results in daytime impairment."[1] Insomnia is observed in 25%–30% of the general population, and the prevalence can exceed 50% in people with health conditions.[2] Around 40% of people with insomnia suffer from at least one psychiatric disorder, of whom major depression (23%), anxiety

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(24%), alcohol abuse (7%), and drug abuse (4%) are common causes.[3]

Besides being a diagnostic criterion, insomnia plays multiple crucial roles in the course and outcome of anxiety and depressive disorders.[4–6] Insomnia acts as a predisposing or precipitating factor for depressive episodes,[7] causes frequent recurrences,[8–10] and causes early mortality.[11] Sleep deprivation induces or worsens anxiety and depression by disrupting the circadian rhythm and altering body homeostasis, stress response mechanisms, and downstream neurotransmission.[11,12] Conversely, anxiety and depression are often accompanied by preoccupation and worries about falling asleep, perpetuating a negative cycle involving insomnia and anxiety/depression. This leads to a fragmentation of sleep, affecting both quantity and quality of sleep.[11,13] The cognitive model of insomnia suggests that a relationship exists among worry, the examination of threat cues, beliefs about sleep, and counterproductive safety behaviors that maintain and reinforce insomnia.[14]

Recent studies reveal that sleep-related dysfunctional beliefs, safety behaviors, and pre-sleep cognitions tend to negatively impact the quantity, quality, and depth of sleep among patients with psychiatric disorders.[15–18] Dysfunctional beliefs about sleep lead to excessive and negative cognitive experiences about getting adequate sleep and the immediate impact of disturbed sleep on health and/or daytime functioning.[19] Sleep-related safety behaviors are the set of maladaptive strategies individuals use to avoid feared consequences, such as evading commitments and reducing daytime activities.[15] Pre-sleep arousal refers to a heightened state involving both physiological arousal (tachycardia, tachypnea, etc.) and cognitive anxiety (ruminations, worry, etc.), which can influence the onset and maintenance of sleep.[20,21]

Compared to the global literature, there is a shortage of literature regarding subjective sleep concerns among psychiatric patients from developing countries like India. One Indian study revealed that most patients disregarded worries about insomnia and its consequences on their health, relationships, and work.[22] The concerns about physical health and family issues dominated their pre-sleep cognitions. There exists a lacuna in the Indian literature regarding the relationship among clinical factors, insomnia, and their association with sleep-related cognitions. The present study aimed to explore the association between subjective reports of insomnia, sleep-related cognitions, and behaviors among patients diagnosed with syndromal anxiety or depression.

Materials and Methods

Setting, Design, and Duration

The study was conducted in the outpatient services of psychiatry in a tertiary care hospital in southern India. The hospital caters medical services to a population from low socioeconomic strata. This cross-sectional study was conducted between January 2021 and June 2022.

Participants

Patients aged 18–60, diagnosed with anxiety disorder or depressive disorder as per the Diagnostic and Statistical Manual for Mental Disorders (DSM-5), and those who provided informed consent for participation, were included. The primary investigator (KM) made the diagnosis through clinical history taking after a detailed discussion with the treating team (AS and KS).

Patients were divided into two groups: those with insomnia (Group A) and those without insomnia (Group B). To eliminate the effect of confounding by sociodemographic characteristics, age-matched relatives of patients without a history of psychiatric illness or insomnia were included as healthy controls (Group C). Screening questions (a) Do you have a lifetime history of psychiatric illness? (b) Have you been suffering from insomnia in the past three months were administered to the control group before inclusion into the study. The screening, diagnosis, and clinical categorization were performed by KM and validated by AS and KS. Based on the available literature on the epidemiology of insomnia among anxious/depressed patients,[2] and using the formula $n \geq [Z^2_{1-\alpha/2} \times p(1-p)]/d^2$, a sample size of 150 was arrived for both cases and controls. However, since the study was conducted during the COVID-19 pandemic and lockdown restrictions, the sample size was relaxed to 80 in each group after due approval from the biostatistician and the Institute Ethics Committee.

Patients with comorbid psychotic symptoms in the current episode or active use of alcohol, nicotine, sedative-hypnotics, or other substances within the past three months were excluded. Patients with primary sleep disorders, insomnia due to general medical conditions, neurological disorders, or intellectual disabilities were also excluded.

Scales Used

Semi-structured Proforma

Sociodemographic data, age of onset, duration of illness, and number of episodes were collected using a specially designed semi-structured proforma.

Hamilton Anxiety Scale (HAM-A)

The HAM-A scale has 14 items measuring both psychic anxiety and somatic anxiety. Every item is scored on a scale of 0 (not present) to 4 (severe). The total score ranges between 0 and 56, with mild (<17), mild to moderate (18–24), and severe (25–30) grades of severity. The scale has a strong internal consistency, with Cronbach's alpha of 0.893 for the English version.[23]

Montgomery Åsberg Depression Rating Scale (MADRS)

The MADRS is a 10-item questionnaire that measures the severity of depression with scores of each item ranging between 0 and 6. Based on the scores, patients can be categorized into having no depression (0–6), mild depression (7–19), moderate depression (20–34), severe depression (≥35), and very severe depression (≥60).[24] The scale has better psychometric properties and internal consistency, with a Cronbach's alpha of 0.8 and over for the English version.[25]

Insomnia Severity Index (ISI)

The ISI is a self-rated instrument with seven items that assess insomnia's nature, severity, and impact, rated on a 5-point [0 (no problem)–4 (very severe problem)]. Insomnia is graded as absent (0–7), mild (8–14), moderate (15–21), and severe (22–28). The scale has good psychometric properties and high internal consistency, with a Cronbach's alpha of 0.91 for the English version.[26]

Pittsburgh Sleep Quality Index (PSQI)

The PSQI is a self-report inventory assessing sleep duration, latency, and overall sleep quality. The total score ranges between 0 and 21 and provides a measure of sleep quality and sleep disturbances. PSQI has excellent psychometric properties and is often used in insomnia-related studies. The scale had shown high internal consistency, with a Cronbach's alpha of 0.70–0.83 for the English version.[27]

Dysfunctional Beliefs and Attitude about Sleep Scale (DBAS)

The DBAS-16 is a self-rated questionnaire that examines sleep-related cognitions including beliefs, attitudes, and attributions about sleep and insomnia. The scores are given on a Likert scale that ranged from 0 (strongly disagree) through 5 (neutral) to 10 (strongly agree). A higher DBAS total score indicates a stronger endorsement of dysfunctional beliefs. The scale has good psychometric properties and strong internal consistency, with a Cronbach's alpha of 0.69–0.88 for the English version.[28]

Sleep-related Behavior Questionnaire (SRBQ)

The SRBQ is a 32-item self-report questionnaire reflecting behavioral strategies used to cope with insomnia during the day and at night. Total scores range between 0 and 128, with higher scores indicating more frequent engagement in sleep-related safety behaviors. The SRBQ has demonstrated strong reliability and has been shown to differentiate normal and poor sleepers reliably. The English version of the scale has a Cronbach's alpha of 0.83–0.92.[29]

Pre-sleep Arousal Scale (PSAS)

The PSAS contains 16 items describes arousal symptoms at bedtime. The items are rated on a 5-point Likert scale. It distinguishes good sleepers from people with insomnia. It is particularly useful with sleep-onset difficulties. Higher scores indicate higher pre-sleep arousal. This scale is related to measures of anxiety, depression, somatic anxiety symptoms, and cognitive anxiety symptoms. The scale has better psychometric properties, with a Cronbach's alpha of 0.67–0.88 for the English version.[30]

All the scales were translated into a regional language (Tamil) by a linguistic expert and were back-translated to English by two other independent native Tamil speakers. The back-translated versions were checked for content validity by two independent faculty, and after achieving mutual consensus, the finalized forms were used for the present study.

Study Procedure

Participants fulfilling the selection criteria were included after obtaining written informed consent. Based on ISI total scores, patients were divided into two groups: Group A (patients with insomnia; ISI score ≥8), Group B (patients without insomnia; ISI score ≤7), and their sociodemographic and outcome characteristics were compared with Group C (age-matched healthy controls; ISI score ≤7). The Institute Human Ethics Committee approved the study. The Strengthening the Reporting of Observational Studies in Epidemiology guidelines were used to ensure optimal reporting.[31]

Statistical Analyses

Data was analyzed using Microsoft Excel software and the Statistical Package for Social Sciences (SPSS for Windows, Version 17.0. Chicago, SPSS Inc). The Kolmogorov–Smirnov test assessed the normality of data. For continuous variables, means and standard deviations or the median with an interquartile range were computed depending on the distribution. Categorical variables are reported as frequencies and percentages. Continuous variables between two groups (patients and controls) were compared using an independent sample t-test, and one-way ANOVA was used to compare between three (A, B, and C) groups. The Kruskal–Wallis test was used when there was non-normal distribution between the three groups and Dunn's post hoc tests were done to explore within-group differences. The chi-square test was used to compare the proportions of categorical variables. The Fisher Exact test was used wherever the cell values were less than five. Continuous variables between two groups with non-normal distribution were compared with the Mann–Whitney U test. The Spearman Rho correlation

test was used for correlation analyses between two continuous variables following non-normal distribution. Binary logistic regression analysis, with gender, mood severity, DBAS, SRBQ, and PSAS scores as independent variables, was conducted to identify the predictors for the dependent variable (insomnia severity) among the patients.

Results

Sociodemographic Profile—Cases Versus Controls

One hundred and two patients with anxiety or depression were screened for eligibility. After excluding ineligible patients, 80 patients diagnosed with anxiety or depression ($n = 80$) and age-matched controls ($n = 80$) participated in the study. There were no missing data. Both the groups were comparable in their sociodemographic profile, except that the proportion of females was higher among the cases than among the healthy controls. There were no differences between the two groups based on medical comorbidities (**Table 1**).

Illness Morbidity among Patients (Groups A and B)

The majority of patients had a diagnosis of major depressive disorder, belonged to age group of 29–38 years, had their illness for less than a year, with a single episode and with no previous hospitalization (**Table 2**), and was the most common diagnosis, followed by generalized anxiety disorder. The other psychiatric diagnoses were adjustment disorders, illness anxiety disorder, panic disorder, and anxiety unspecified. Most patients had their onset of illness at 28–38 years. Most patients had their illness for less than one year, with a single episode, and with no previous hospitalization (**Table 2**).

Sociodemographic Profile and Mood Severity—Comparison between Groups A, B, and C

To explore the association among the sociodemographic factors, clinical factors, and the severity of insomnia in patients

TABLE 1.

Comparison of Socio-demographic Characteristics Between Cases and Controls.

Variable	Cases (n = 80) Mean ± SD or Frequency (%)	Controls (n = 80) Mean ± SD or Frequency (%)	Test Characteristic (p Value)
Gender			
Male	30 (37.5%)	46 (57.5%)	χ^2 = 6.416 (.011)*
Female	50 (62.5%)	34 (42.5%)	
Marital status			
Unmarried	22 (27.5%)	22 (27.5%)	(.900)
Married	57 (71.2%)	57 (71.2%)	
Divorced	0 (0.0%)	1 (1.3%)	
Widowed	1 (1.3%)	0 (0.0%)	
Educational status			
Graduate	21 (26.3%)	35 (43.8%)	(.070)
Diploma	6 (7.5%)	6 (7.5%)	
High school	35 (43.6%)	21 (26.2%)	
Middle school	7 (8.8%)	2 (2.4%)	
Primary	6 (7.5%)	10 (12.5%)	
Literate	1 (1.3%)	1 (1.3%)	
Illiterate	4 (5.0%)	5 (6.3%)	
Occupational status			
Professional	13 (16.2%)	23 (28.7%)	(.263)
Skilled	15 (18.8%)	16 (20.0%)	
Semiskilled	5 (6.2%)	8 (10.0%)	
Unskilled	4 (5.0%)	1 (1.3%)	
Unemployed	1 (1.3%)	2 (2.5%)	
Homemaker	34 (42.5%)	24 (30.0%)	
Student	8 (10.0%)	6 (7.5%)	
Area of domicile			
Rural	45 (56.2%)	43 (53.8%)	χ^2 = 0.101 (.874)
Urban	35 (43.8%)	37 (46.2%)	
Socio-economic status			
Upper middle	32 (40.0%)	34 (42.5%)	(.749)
Lower middle	48 (60.0%)	45 (56.2%)	
Lower	0 (0.0%)	1 (1.3%)	
Physical comorbidity			
Diabetes mellitus	4 (5.0%)	6 (7.5%)	(.744)
Hypertension	9 (11.3%)	8 (10.0%)	
Dyslipidemia	2 (2.5%)	4 (5.0%)	
Any other comorbidities	0 (0.0%)	1 (1.3%)	
None	65 (81.2%)	61 (76.2%)	
Severity of insomnia and quality of sleep			
ISI	11.19 ± 6.67	0.98 ± 1.38	U = 396.5 (<.001)*
PSQI	9.74 ± 3.46	1.81 ± 1.24	U = 105.5 (<.001)*

ISI: Insomnia Severity Index, PSQI: Pittsburgh Sleep Quality Index.
*p < .05, statistically significant.

with anxiety and depression, the cases (n = 80) were divided into two sub-groups based on the ISI score, as mentioned above: patients with insomnia (Group A; n = 60), and patients without insomnia (Group B; n = 20). Key clinical indices such as the type of primary psychiatric diagnosis (p = .311), age at onset of anxiety or depression (p = .675), duration of illness (p = .362), number of episodes (p = .609), and number of previous hospitalizations (p = .900) did not differ between groups A and B.

TABLE 2.

Distribution of Clinical Characteristics Among the Patients.

Variable	Cases (*n* = 80) Mean ± *SD* or Frequency (%)
Psychiatric diagnosis	
Generalized anxiety disorder	23 (28.7%)
Depression	42 (52.4%)
Insomnia	2 (2.5%)
Mixed anxiety and depression	3 (3.8%)
Illness anxiety disorder	3 (3.8%)
Panic disorder	4 (5.0%)
Anxiety unspecified	3 (3.8%)
Age at onset of psychiatric illness (in years)	
18–28	18 (22.5%)
29–38	29 (36.2%)
39–48	20 (25.0%)
49–60	13 (16.3%)
Duration of illness (in years)	
<1	41 (51.2%)
1–5	29 (36.3%)
>5	10 (12.5%)
Number of episodes	
1	39 (48.8%)
2	8 (10.0%)
>2	33 (41.2%)
Number of previous hospitalizations	
Nil	74 (92.5%)
1	4 (5.0%)
>2	2 (2.5%)

SD: Standard deviation.

Both patient subgroups A and B were compared against healthy controls (Group C; *n* = 80) based on sociodemographic, sleep-related cognitions, maladaptive behaviors, and sleep quality. There was a statistically significant difference based on sex among the three groups, with insomnia more prevalent in males than female patients. The three groups did not differ based on other sociodemographic characteristics. Patients in Group A had poorer sleep quality when compared to the other groups (**Table 3**).

Sleep-related Cognitions and Maladaptive Behaviors—Comparison between Groups A, B, and C

The DBAS, PSAS, and SRBQ scores were significantly higher among patients with insomnia when compared with the other two groups (**Table 4**).

Relationship between Sleep-related Cognitions, Maladaptive Behaviors, Mood Severity, and Insomnia

Correlational analyses revealed that among patients with insomnia (Group A), greater severity of insomnia was associated with higher dysfunctional beliefs about sleep (*p* = .049) and more frequent sleep-related maladaptive behaviors (*p* = .016). Similarly, harboring higher pre-sleep arousal thoughts (*p* = .023) and higher sleep-related maladaptive behaviors (*p* = .042) were associated with greater severity of insomnia when compared with the other two groups (**Table 4**).

anxiety but not depression (**Table 5**). In addition, an increasing trend in the scores of PSAS was associated with increased occurrences of sleep-related maladaptive behaviors (Spearman's $\rho = 0.41, p < .001$).

Predictors of Insomnia in Patients (Group A) with Anxiety or Depression Using Logistic Regression

Logistic regression analyses were performed to identify the possible predictors (sex, sleep-adjusted HAM-A and MADRS scores, DBAS, SRBQ, and PSAS scores) of the dependent variable (insomnia severity). Results showed that dysfunctional beliefs and attitudes about sleep (OR = 1.03 95%CI: 1.00–1.05) and the practice of maladaptive sleep-related behaviors (OR = 1.05 95%CI: 1.00–1.09) independently predicted the severity of insomnia. About 27% of the variability in the outcome measure could be explained by DBAS, and 49%, by sleep-related behaviors (**Table 6**).

Discussion

We found that a greater frequency of dysfunctional beliefs and maladaptive coping behaviors are associated with insomnia severity among patients with anxiety or depression who reported insomnia.

Sociodemographic Characteristics, Sleep-related Cognitions and Behaviors

Most of our patients belonged to the fourth decade of life, with an average age of around 37 years.[32] We did not find any association between age and the presence of insomnia in the current study. Though supporting literature exists,[33–35] contrasting literature reveals that older age groups are more prone for insomnia and early morning awakening.[36]

In the present study, most patients were females who presented with anxiety or depression. However, the prevalence of insomnia was slightly higher among males with insomnia than their female counterparts. This contrasts previous

TABLE 3.

Comparison of Sociodemographic, Clinical Characteristics Between Two Subgroups of Patients and Healthy Controls.

Variable	Group A Patients with Insomnia ($n = 60$) Mean ± *SD*	Group B Patients Without Insomnia ($n = 20$) Mean ± *SD*	Group C Controls ($n = 80$) Mean ± *SD*	Test Characteristic *p* Value
Age (in years)	36.55 ± 10.86	38.60 ± 12.82	38.17 ± 11.78	$F = 0.420$ $p = .658$
Gender				
Male	23 (38.3%)	7 (35%)	46 (57.5%)	$\chi^2 = 6.483$ (.041)*
Female	37 (61.7%)	13 (65%)	34 (42.5%)	
Marital status				
Unmarried	16 (26.6%)	6 (30%)	22 (27.4%)	(.921)**
Married	43 (71.7%)	14 (70%)	57 (71.3%)	
Divorced	0 (0%)	0 (0%)	1 (1.3%)	
Widowed	1 (1.7%)	0 (0%)	0 (0%)	
Educational status				
Graduate	14 (23.3%)	7 (35%)	35 (43.7%)	(.142)**
Diploma	4 (6.7%)	2 (10%)	6 (7.5%)	
High school	29 (48.4%)	6 (30%)	21 (26.2%)	
Middle school	5 (8.3%)	2 (10%)	2 (2.5%)	
Primary	5 (8.3%)	1 (5%)	10 (12.5%)	
Literate	1 (1.7%)	0 (0%)	1 (1.3%)	
Illiterate	2 (3.3%)	2 (10%)	5 (6.3%)	
Occupational status				
Profession	8 (13.3%)	5 (25%)	23 (28.7%)	(.268)**
Skilled	11 (18.2%)	4 (20%)	16 (20%)	
Semiskilled	4 (6.7%)	1 (5%)	8 (10%)	
Unskilled	4 (6.7%)	0 (0%)	1 (1.3%)	
Unemployed	1 (1.7%)	0 (0%)	2 (2.5%)	
Homemaker	28 (46.7%)	6 (30%)	24 (30%)	
Student	4 (6.7%)	4 (20%)	6 (7.5%)	
Area of domicile				
Rural	36 (60%)	9 (45%)	43 (53.8%)	$\chi^2 = 1.465$ (.496)
Urban	24 (40%)	11 (55%)	37 (46.2%)	
Socio-economic status				
Upper middle	22 (36.7%)	10 (50%)	34 (42.5%)	(.670)**
Lower middle	38 (63.3%)	10 (50%)	45 (56.2%)	
Lower	0 (0%)	0 (0%)	1 (1.3%)	
Physical comorbidity				
Diabetes Mellitus	1 (1.7%)	3 (15%)	7 (8.8%)	(.265)**
Hypertension	7 (11.6%)	2 (10%)	8 (10%)	
Dyslipidemia	1 (1.7%)	1 (5%)	4 (5%)	
None	51 (85%)	14 (70%)	61 (76.2%)	
Sleep quality				
PSQI global score	10.42 ± 3.34	7.70 ± 3.08	1.81 ± 1.24	$F = 214.71$ ($p < .001$)* Within groups post-hoc results: {A > B, A > C, B > C}

KW: Kruskal Willis test, SA-HAM-A: Sleep-adjusted Hamilton Anxiety Scale total score, SA-MADRS: Sleep-adjusted Montgomery Åsberg Depression Rating Scale total score.
*$p < .05$, statistically significant.
**Fisher's Exact test was used.

TABLE 4.

Comparison of Sleep-related Cognitions and Behavior Between Patients with Insomnia, Patients Without Insomnia and Controls.

Variable	Group A Patients with Insomnia (n = 60) Mean ± SD	Group B Patients Without Insomnia (n = 20) Mean ± SD	Group C Controls (n = 80) Mean ± SD	Test Characteristic p Value	Post-hoc Analyses**
DBAS score	66.42 ± 30.83	44.75 ± 30.50	37.64 ± 21.74	KW = 33.286 (p < .001)*	Group A > Group C, Group A > Group B
PSAS score	32.23 ± 9.02	26.20 ± 9.36	17.44 ± 5.53	KW = 98.895 (p < .001)*	Group A > Group C, Group B > Group C
SRBQ score	53.40 ± 19.36	31.80 ± 20.20	11.19 ± 7.44	KW = 96.971 (p < .001)*	Group A > Group B, Group A > Group C, Group B > Group C

DBAS: Dysfunctional Beliefs and Attitudes Sleep Scale, PSAS: Pre-sleep Arousal Scale, SRBQ: Sleep-related Behavior Questionnaire, KW—Kruskal–Wallis.
*p < .05, statistically significant.
**Dunn's post-hoc analyses.

TABLE 5.

Correlation Analyses.

Variables	Patients with Insomnia (n = 60)		
	ISI Scores	Sleep-adjusted MADRS	Sleep-adjusted HAM-A
	Pearson's r or Spearman's Rho (p Value)		
HAM-A	0.20 (0.124)	–	–
MADRS	−0.02 (0.855)	–	–
DBAS	0.25 (0.049)*	0.10 (0.438)	−0.11 (0.382)
SRBQ	0.31 (0.016)*	0.24 (0.060)	0.26 (0.042)*
PSAS	0.22 (0.083)	0.08 (0.525)	0.29 (0.023)*

MADRS: Montgomery Åsberg Depression Rating Scale total score, HAM-A: Hamilton Anxiety Scale total score.
*p < .05, statistically significant.

TABLE 6.

Predictors of Insomnia Among Patients with Anxiety or Depression Using Logistic Regression Analyses.

Dependent Variable: Insomnia Severity							95% C.I for Exp (B)	
Independent Variable	B	SE	Wald	df	Sig(p)	Exp (B)	Lower	Upper
Gender	0.016	0.679	0.001	1	0.981	1.017	0.269	3.846
SA_ HAM A	0.27	0.041	0.444	1	0.505	1.028	0.948	1.114
SA_MADRS	0.034	0.036	0.921	1	0.337	1.035	0.965	1.110
DBAS_T	0.027	0.012	5.346	1	0.021*	1.028	1.004	1.051
SRBQ_T	0.049	0.022	5.089	1	0.024*	1.050	1.006	1.095
PSAS_T	−0.19	0.044	0.186	1	0.666	0.981	0.900	1.070
Constant	−2.829	1.299	4.739	1	0.029	0.059		

*p < .05, statistically significant.

studies revealing that insomnia is greater among females than males.[37,38] The difference could be because of variations in medication intake between males and females, which was not explored in the present study.

Most participants were married, and marital status was not associated with insomnia. The literature on the effects of marital status on insomnia is inconsistent, with both married and unmarried statuses linked to insomnia.[2,34,39]

Though studies have found increased subjective reports of insomnia among patients who were unemployed or belonging to lower socioeconomic status,[36] our study did not replicate such findings. This could be because most of our sample were

homemakers and not included under the "unemployed" group for analyses.

Insomnia, Sleep-related Maladaptive Cognitions, and Behaviors

In line with previous studies,[10,40,41] we found that insomnia, the associated dysfunctional beliefs, pre-sleep arousal, and sleep-related maladaptive behaviors were more frequently found in patients with anxiety or depression than the healthy controls. Studies support the idea that with higher levels of anxiety and worry, an individual's subjective perception of control over sleep and the effects of poor sleep could be affected, further leading to a stronger endorsement of distorted sleep beliefs.[17,42] Improvement in such dysfunctional beliefs about sleep and pre-sleep arousal was associated with improvement in sleep duration.[16,43]

Insomnia and Illness-related Factors

In addition, other clinical characteristics, such as the duration of illness and the presence of psychiatric and medical comorbidities, did not influence the severity of insomnia. In contrast to the current findings, a few studies have found the role of these clinical characteristics in worsening insomnia severity.[44,45] The discordance of our findings indicates that the severity of insomnia can be governed by factors unrelated to illness course and morbidity.

Interplay Between Mood Status, Sleep-related Cognitions and Behaviors, and Insomnia

The present study found various associations that indicate that insomnia, mood status, and sleep-related maladaptive cognitions and behaviors can have mutually influential relationships in anxious or depressed patients reporting subjective insomnia. This is described as follows.

Sleep-related Cognitions, Behaviors, and Mood Status

Increasing severity of anxiety was associated with higher pre-sleep arousal thoughts and greater engagement in sleep-related maladaptive behaviors. This could be because elevated anxiety and worry could affect an individual's perception of one's control over sleep and the effects of poor sleep, leading to reflective thinking and eventually worsening insomnia.[17]

We did not find any association between the severity of depression and pre-sleep arousal and behaviors. Though supporting literature is available from India,[22] this is in sharp contrast to global literature, which reveals that participants with depression used significantly more safety behaviors and had more frequent dysfunctional beliefs about sleep than participants without depression.[18] The reason could be that patients with anxiety can harbor defective cognitive schema and excessive cognitive worry about insomnia more than patients with depression.

Sleep-related Cognitions, Behaviors, and Insomnia

The present study found that psychological factors such as sleep-related maladaptive cognitions and behaviors can significantly impact the overall sleep quality and the severity of insomnia.

When compared to patients without subjective insomnia, the patients with insomnia reported harboring more frequent negative beliefs about the causes and consequences of insomnia, experiencing greater worry with somatic arousal symptoms at bedtime, and performing various maladaptive behaviors in improving sleep or coping with tiredness resulting from insomnia.

We found that increasing insomnia severity was associated with harboring more dysfunctional beliefs about sleep and greater engagement in sleep-related maladaptive behaviors. Further, we noted that greater engagement of sleep-related maladaptive behaviors was associated with greater severity of pre-sleep arousal. Such findings underscore the complex interplay between higher levels of dysfunctional beliefs, pre-sleep arousal, and engagement in maladaptive coping behaviors, culminating in greater insomnia severity. Previous studies support that comorbid psychiatric disorders are associated with more behavioral symptoms and psychological inflexibility, leading to increased concerns about sleep and mal-adaptive behaviors, culminating in poor sleep quality.[17,46] Our findings concur with studies that revealed that pre-sleep arousal and sleep-related safety behaviors were linked with poor subjective sleep quality.[15,47,48]

Predictors of Insomnia Among Patients with Anxiety or Depression

Regression analyses indicated that two independent factors could significantly predict the severity of insomnia: (a) dysfunctional beliefs and attitudes about sleep and (b) the practice of sleep-related maladaptive behaviors. The observations reiterate that the effects of maladaptive attitudes and behaviors toward sleep are independent of the severity of anxiety or depression. The findings are similar to those reported in the literature that sleep-related safety behaviors are adopted as coping mechanisms for insomnia, and dysfunctional beliefs can act as predictors of sleep-related behaviors in insomnia.[18,49,50] However, some studies did not find similar associations.[15,22,51] One study had suggested that sleep-related behaviors are more significant contributors to insomnia than dysfunctional beliefs.[15]

Observing that sleep-related cognitions and behaviors contribute to poor sleep above and beyond the severity of affective symptoms can explain how sleep disturbance persists as a common residual symptom even after successful treatment of anxiety and depression.

Strengths

This study adds to the limited evidence from this region concerning the effects of sleep-related cognitions and maladaptive behaviors on sleep quality among patients with anxiety or depression. It builds on the previous study from India[22] by emphasizing the predictive nature of sleep-related cognitions and maladaptive behaviors on the severity of insomnia.

Limitations

The observations of the present study are limited by its cross-sectional design; a prospective design would have identified the direction of association (cause-and-effect relationship) among various maladaptive

attitudes, behaviors, and insomnia. Additional limitations include the lack of an objective assessment of sleep parameters, using unvalidated translated versions of rating scales, and including patients in a hospital setting who might represent the more severe fraction of the patient population. The validity of the inferential analyses of mood severity scores using sleep-adjusted scores of HAM-A and MADRS should be cautiously interpreted since the total raw scores were modified by eliminating sleep-related items.

Conclusions

Sleep-related cognitions and behaviors significantly influence sleep quality and insomnia severity. Patients with insomnia exhibited greater dysfunctional beliefs and maladaptive coping behaviors compared to patients without insomnia among the subjects with anxiety or depression. Both dysfunctional beliefs and sleep-related maladaptive behaviors were independent predictors of insomnia severity. Greater engagement of sleep-related maladaptive behaviors was associated with greater severity of pre-sleep arousal. Future studies must explore the therapeutic efficacy of cognitive behavioral interventions for insomnia in such patients.

Declaration of Conflicting Interests

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