

# Sleep Disturbances Among Adult Patients with Mood Disorders: A Saudi Cross-Sectional Study

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**Background:** Mood disorders (MDs) rank among the most common psychiatric illnesses and frequently co-occur with sleep disturbances that worsen prognosis, impair functioning, and reduce quality of life. This study examines sleep disturbances in patients with MDs at a tertiary hospital in Saudi Arabia (King Khalid University Hospital) and aims to identify the factors correlated with sleep disturbances.

**Methods:** Researchers conducted a cross-sectional study using convenience sampling with 306 participants. The assessment tool included a questionnaire developed by the research team to capture sociodemographic, psychiatric, medical, and sleep-related information, as well as the Arabic versions of the Sleep Hygiene Index (SHI) and the Glasgow Sleep Effort Scale (GSES).

**Results:** Nearly one-third (31.1%) of the participants reported a diagnosed sleep disorder, with insomnia being the most common (80.0%). Univariate analysis revealed that higher SHI scores were significantly associated with younger age ( $P = 0.024$ ), single marital status ( $P = 0.002$ ), and smoking ( $P = 0.006$ ). In the multivariable model, only smoking remained significantly associated with higher SHI scores. Regarding the GSES, unemployment and chronic diseases were linked to higher scores in univariate analysis ( $P = 0.048$  and  $P = 0.001$ , respectively). The multivariate analysis indicated that younger age and chronic diseases were significantly associated with higher GSES scores ( $P = 0.021$  and  $P < 0.001$ , respectively).

**Conclusion:** Sleep disturbances occur at high rates among patients with MDs and are associated with behavioral, psychosocial, and medical factors. Targeted interventions addressing smoking, chronic-disease management, and age-specific vulnerabilities may improve sleep quality and overall outcomes.

**Keywords:** bipolar disorder, major depressive disorder, mood disorders, quality of life, sleep

## Introduction

Sleep plays a crucial role in maintaining physical and mental health,<sup>1</sup> however, sleep difficulties continue to increase globally.<sup>2</sup> Approximately 45% of the world's population experiences sleep problems, with insomnia being the most prevalent, affecting about 30% of adults.<sup>3</sup> Global studies have revealed that poor sleep quality elevates the risk of chronic diseases, including cardiovascular disorders.<sup>4</sup> Furthermore, the prevalence of sleep disorders is especially concerning, as inadequate sleep is linked to higher rates of obesity and diabetes—conditions already widespread in many countries.<sup>4</sup> In Saudi Arabia, a cross-sectional study of over 2000 adults found that one-third reported short sleep duration (< 7 hours/night).<sup>5</sup> Those findings underscore the need for public health initiatives to raise awareness of, and address the causes of, poor sleep in the Saudi population.<sup>5</sup>

Mood disorders (MDs) encompass mental health conditions characterized by significant mood fluctuations and related symptoms,<sup>6</sup> with the two main types of MDs being depressive and bipolar disorders. Depressive disorders involve prolonged periods of low mood, anhedonia, appetite and sleep changes, and feelings of worthlessness or guilt, among other symptoms.<sup>6</sup> Bipolar disorders involve alternating episodes of depression, hypomania, and mania, varying by subtype.<sup>7</sup> These disorders affect millions worldwide.<sup>8</sup> The World Health Organization estimates that approximately

5.7% of adults globally experience depression,<sup>9</sup> while bipolar disorder (BD) affects about 0.5% of the global population.<sup>10</sup> Nationally, the Saudi National Mental Health Survey (SNMHS)—the first nationally representative psychiatric epidemiological study in Saudi Arabia—reported a lifetime prevalence of approximately 6% for major depressive disorder (MDD).<sup>11</sup> Similarly, national estimates suggest that the prevalence of BD in Saudi Arabia is around 3% of the population.<sup>11,12</sup>

Sleep disturbances are highly prevalent among patients with MDs and play a crucial role in contributing to the onset, progression, and severity of these conditions.<sup>13,14</sup> MDD and BD are often associated with disrupted sleep patterns, including insomnia, hypersomnia, and poor sleep quality.<sup>13,14</sup> Sleep problems can function as both symptoms and contributions to mood dysregulation.<sup>14</sup> For instance, chronic sleep disturbances can exacerbate mood symptoms, impair cognitive function, and increase the risk of relapse in individuals with MDs.<sup>13,14</sup> Additionally, mood disturbances can disrupt circadian rhythm regulation, leading to irregular sleep–wake cycles that negatively impact treatment and recovery in patients with BD and depression.<sup>15</sup> Nonetheless, evidence has confirmed a strong bidirectional association between sleep disturbances and MDs.<sup>16,17</sup>

Although global research has widely explored sleep disturbances among individuals with MDs,<sup>13–17</sup> research in Saudi Arabia remains scarce. Further, existing Saudi studies on sleep disturbances have primarily targeted non-clinical populations,<sup>18,19</sup> leaving a notable gap in knowledge regarding sleep disturbances among individuals with MDs. Moreover, relatively few studies have simultaneously examined a broad spectrum of MDs while incorporating sleep hygiene behaviors and cognitive-emotional sleep factors, such as sleep effort, in clinical settings.<sup>20</sup> Addressing these research gaps could provide additional insight into the interplay between sleep and MDs, which can lead to improving care and outcomes for affected individuals. Accordingly, this study examines the prevalence and characteristics of sleep disturbances among adult patients with MDs at a tertiary care hospital in Saudi Arabia and identifies associated sociodemographic, clinical, and behavioral factors. The findings may inform clinical practice and policy in Saudi Arabia, resulting in supporting the implementation of routine screening for sleep disturbances and targeted interventions—particularly those addressing modifiable sleep-related factors. Such measures could ultimately improve outcomes for patients with MDs in Saudi Arabia.

## Method

### Study Design, Setting, and Participants

Researchers conducted this cross-sectional study among patients attending psychiatric clinics at King Khalid University Hospital (KKUH), Riyadh, Saudi Arabia, with data collection occurring between May and July 2025. The targeted population included adult psychiatric patients aged 18–65 years diagnosed with mood and mood-related disorders. Specifically, diagnoses included MDD, persistent depressive disorder, other specified and unspecified depressive disorders, bipolar I and II disorders, cyclothymic disorder, and other specified and unspecified bipolar and related disorders. The exclusion criteria included patients younger than 18 or older than 65, those with communication barriers, and individuals with primary psychotic disorders (eg, schizophrenia or schizoaffective disorder), those with substance use disorders, and those with secondary MDs (eg, secondary to substance use and secondary to medical conditions).

The estimated target population size, after applying inclusion and exclusion criteria, was 624, based on the data from KKUH's IT department. To account for non-respondent and non-completed responses, investigators added a 25% buffer and calculated the required sample size using Raosoft.com with a 5% margin of error and a 95% confidence level. The calculated sample size was 299; however, the final sample included 306 participants.

Participants were recruited via convenience sampling from a list of file numbers from the hospital's IT department, identifying patients diagnosed with mood and mood-related disorders. To enhance the representativeness of the results, investigators reviewed the patients' medical charts—particularly the psychiatric notes—to ensure the patient's overall stability of the mood disorder condition. Stability was defined as follows in the 12 months preceding data collection: (1) no major depressive, hypomanic, or manic episodes documented; (2) no major medication changes were made due to instability; and (3) no psychiatric ward admissions. Patients who did not meet these stability criteria were not invited to participate.

## Study Instrument

The study tool comprised a questionnaire developed by the research team to collect sociodemographic, medical, psychiatric, and sleep-related information. In addition, the tool included the Sleep Hygiene Index (SHI) and the Glasgow Sleep Effort Scale (GSES). All data were self-reported by the participants.

The questionnaire included four sections. The first section addressed sociodemographic information (age, gender, marital status, and employment status). The second section covered psychiatric-related information, including family history of psychiatric illnesses, caffeine consumption, smoking, and illegal substance use. The third section gathered medical-related information, such as weight, height, and chronic medical conditions. The fourth section addressed sleep-related information, including sleep disorders, snoring, and nightmares during sleep, nighttime awakenings, usual bedtime, duration to fall asleep, and nocturnal sleep hours.

The SHI was developed to measure sleep hygiene practices;<sup>21</sup> it consists of 13 items.<sup>21</sup> The scoring system considers that 26 or below indicates good sleep hygiene, 27–34 indicates average sleep hygiene, and 35 and above indicates poor sleep hygiene.<sup>21</sup> The scale's internal consistency has been previously evaluated. The original English version has a Cronbach's alpha of 0.66.<sup>21</sup> However, the Arabic version used in this study yielded a Cronbach's alpha of 0.589.<sup>22</sup>

The GSES was developed to assess sleep effort, a factor that is often elevated among insomnia patients.<sup>23</sup> The GSES consists of seven items,<sup>23</sup> with responses including 0 ("not at all"), 1 ("to some extent"), and 2 ("very much").<sup>23</sup> Total scores range from 0 to 14, with higher scores indicating a higher effort needed for an individual to sleep.<sup>23</sup> The original English version displayed good reliability among patients with insomnia (Cronbach's alpha of 0.77).<sup>23</sup> The Arabic version used here exhibited a Cronbach's alpha of 0.87.<sup>24</sup> After obtaining permissions from the authors, investigators used the Arabic versions of both the SHI and the GSES in this study,<sup>22,24</sup> (permissions were also obtained for the original English versions).<sup>21,23</sup>

## Ethical Considerations

The Institutional Review Board of the College of Medicine at King Saud University, Riyadh, Saudi Arabia, approved this study (Research Project No. E-24-9408). Investigators obtained electronically informed consent from the participants prior to data collection. The participants received assurances of anonymity, confidentiality, and the voluntary nature of their involvement. This study adhered to the principles of the Declaration of Helsinki.

## Statistical Analysis

Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS) Version 28 (IBM Co., Armonk, NY, USA). Numerical data were presented as the mean and standard deviation (SD) and analyzed between each two groups using an independent *t*-test, whereas a one-way analysis of variance (ANOVA) was employed across more than two groups. Categorical data were presented as the frequency and percentage and analyzed using a Chi-square test or an exact test. Linear regression analyses were performed to assess the factors associated with the SHI and GSES scores. Univariate linear regression analyses were first conducted to examine the association between each independent variable and the SHI and GSES scores separately. Variables with a P-value <0.20 in univariate analyses, as well as variables deemed clinically relevant a priori, were entered into multivariable linear regression models. Multivariable models were specified using forced entry (enter method). Assumptions of linear regression were evaluated, including linearity, normality of residuals, homoscedasticity, and absence of multicollinearity. Variance inflation factors (VIFs) were examined, and all values were <1.3. Model fit was assessed using residual plots and overall model significance. A two-tailed P-value < 0.05 was considered statistically significant.

## Results

As presented in Table 1, 306 participants with MDs (84 males, 222 females) completed the study instruments. The largest age group was 46–55 (28.76%), followed by 56–65 years (22.55%). The mean body mass index (BMI) was 29.83 ± 6.61 kg/m<sup>2</sup>. Most patients were married (53.92%) and unemployed (55.56%). Notably, among the 104 employed participants, 7.69% worked night shifts. Furthermore, 133 patients reported a first-degree family member (parent, sibling,

**Table 1** Sociodemographic, Medical, and Psychiatric Data of the Participants

Item	Total Participants (n = 306)
Age (years)	
18–25	40 (13.07%)
26–35	43 (14.05%)
36–45	66 (21.57%)
46–55	88 (28.76%)
56–65	69 (22.55%)
BMI (kg/m <sup>2</sup> )	29.83 ± 6.61
Gender	
Male	84 (27.45%)
Female	222 (72.55%)
Marital status	
Single	84 (27.45%)
Married	165 (53.92%)
Divorced/Separated	41 (13.4%)
Widowed	16 (5.23%)
Employment status	
Unemployed	170 (55.56%)
Employed	104 (33.99%)
Retired	32 (10.46%)
Having night shifts in the job	(n=104)
No	96 (92.31%)
Yes	8 (7.69%)
Having first-degree family members (parents, siblings, children) with any psychiatric disorders	133 (43.46%)
Type of psychiatric disorders among first-degree family members*	(n = 133)
Mood disorders (depression or bipolar)	92 (69.17%)
Anxiety disorders	71 (53.38%)
Psychotic disorders	21 (15.79%)
Other	10 (7.52%)
Drinking coffee, tea, or soft drinks	288 (94.12%)
Type of drink*	(n = 288)
Coffee	265 (92.01%)
Tea	205 (71.18%)
Soft drinks	104 (36.11%)
Number of cups/cans a day	(n = 288)
1	135 (46.88%)
2	88 (30.56%)
3	44 (15.28%)
>3	21 (7.29%)
Drinking energy drinks	22 (7.19%)
Number of cans	(n=22)
1–2 weekly	16 (72.73%)
3–4 weekly	4 (18.18%)
Almost daily	2 (9.09%)
Smoking cigarettes	32 (10.46%)
Number of packs a day	(n = 32)
Less than half a pack	11 (34.38%)
Half to one pack	13 (40.63%)
More than one pack	8 (25%)
Using drugs or illegal substances (marijuana, alcohol, steroids, etc.)	10 (3.27%)
Having chronic diseases	208 (67.97%)

(Continued)

**Table 1** (Continued).

Item	Total Participants (n = 306)
Type of chronic diseases*	(n = 208)
HTN	60 (28.85%)
DM	77 (37.02%)
Lipid problems (such as high cholesterol)	117 (56.25%)
Thyroid problems (such as hypothyroidism or hyperthyroidism)	69 (33.17%)
Irritable bowel syndrome	76 (36.54%)
Chronic physical pain (such as fibromyalgia)	15 (7.21%)
Asthma	33 (15.87%)
Other	33 (15.87%)

**Notes:** Numerical data are presented as mean  $\pm$  SD, and Categorical data are presented as frequency (%). \*More than one answer was allowed.

**Abbreviations:** BMI, Body mass index; HTN, Hypertension; DM, Diabetes Mellitus.

or child) with a psychiatric disorder; of these, 69.17% had MDs (depression or bipolar), and 53.38% had anxiety disorders. Moreover, nearly all patients (288) consumed caffeinated beverages (coffee 92.01%, tea 71.18%, and soft drinks 36.11%), with 46.88% reporting one cup/can a day and 30.56% reporting two a day. Twenty-two patients consumed energy drinks, 72.73% of whom reported one to two cans weekly. Thirty-two patients smoked cigarettes, 40.63% of whom smoked half to one pack a day. Only 3.27% reported illegal substance use. Two hundred and eight patients had a history of chronic diseases, with high lipid problems predominating (56.25%), followed by diabetes mellitus (DM; 37.02%), irritable bowel syndrome (IBS; 36.54%), and thyroid problems (hypo or hyperthyroidism; 33.17%).

As **Table 2** illustrates, 95 participants (31.05%) reported a diagnosed sleep disorder, with insomnia being the most common (80%); 83 participants suffered from snoring (12.05% rarely, 37.35% sometimes, and 50.6% frequently); 126 suffered from nightmares (32.54% rarely, 45.24% sometimes, and 22.22% frequently); 202 awoke at night to use the bathroom (20.3% rarely, 29.7% sometimes, and 50% frequently), with 74.75% waking once or twice per night and

**Table 2** Sleep-Related Data of the Participants

Item	Total Participants (n = 306)
Have you ever been diagnosed with any sleep disorders?	
No	211 (68.95%)
Yes	95 (31.05%)
Type of sleep disorder*	(n = 95)
Insomnia	76 (80%)
Sleep apnea	24 (25.26%)
Restless legs syndrome	13 (13.68%)
Narcolepsy	6 (6.32%)
Abnormal sleep behaviors (such as night terrors, sleepwalking, and nightmares)	16 (16.84%)
Other	2 (2.11%)
Do you suffer from snoring while sleeping?	
No	141 (46.08%)
Yes	83 (27.12%)
Not sure	82 (26.8%)
Frequency of snoring	(n = 83)
Rarely (once or twice a month)	10 (12.05%)
Sometimes (once or twice a week)	31 (37.35%)
Frequently (almost every day)	42 (50.6%)
Do you suffer from nightmares while sleeping?	126 (41.18%)

(Continued)

**Table 2** (Continued).

Item	Total Participants (n = 306)
Frequency of nightmares	(n = 126)
Rarely (once or twice a month)	41 (32.54%)
Sometimes (once or twice a week)	57 (45.24%)
Frequently (almost every day)	28 (22.22%)
Do you wake up at night to go to the bathroom?	202 (66.01%)
Frequency of waking up during sleep per night	(n = 202)
Once or twice	151 (74.75%)
More than twice	51 (25.25%)
Frequency of waking up occurrence	(n = 202)
Rarely (once or twice a month)	41 (20.3%)
Sometimes (once or twice a week)	60 (29.7%)
Frequently (almost every day)	101 (50%)
When do you usually go to sleep?	
8:00 pm to 10:00 pm	16 (5.23%)
10:00 pm to 12:00 am	88 (28.76%)
12:00 am to 2:00 am	113 (36.93%)
After 2:00 am	89 (29.08%)
How long does it take you to fall asleep?	
<30 min	100 (32.68%)
30 min to 1 hr	112 (36.6%)
1 hr to 2 hrs	60 (19.61%)
>2 hrs	34 (11.11%)
How many hours do you sleep each night?	
<4	22 (7.19%)
4–6	100 (32.68%)
6–8	108 (35.29%)
>8	76 (24.84%)

**Notes:** Numerical data are presented as mean ± SD, and Categorical data are presented as frequency (%). \*More than one answer was allowed.

25.25% waking more than twice. More than one-third of the patients (36.93%) reported going to sleep usually between 12:00 and 2:00 am, with 32.68% taking less than 30 minutes and 36.6% taking 30 minutes to 1 hour to fall asleep. Moreover, 32.68% and 35.29% reported having 4–6 and 6–8 hours of nocturnal sleep, respectively.

Table 3 presents the SHI results. The highest mean scores were for the following statements: “I get out of bed at different times from day to day” (2.24 ± 1.27), “I do something that may wake me up before bedtime” (2.24 ± 1.5), “I go to bed at different times from day to day” (2.15 ± 1.24), and “I think, plan, or worry when I am in bed” (2.08 ± 1.35). Most patients (85.29%) exhibited good sleep hygiene, 12.42% average, and 2.29% poor, with an overall mean score of 19.19 ± 6.98 (see Figures 1 and 2).

According to the GSES, mean item scores were as follows: putting too much effort into sleeping when it should occur naturally (0.84 ± 0.76), feeling one should be able to control sleep (1.08 ± 0.76), postponing bedtime for fear of being unable to sleep (0.55 ± 0.72), worrying about not sleeping when unable to sleep (0.87 ± 0.81), perceiving oneself as being not good at sleeping (0.78 ± 0.76), becoming anxious about sleeping before bedtime (0.6 ± 0.72), and worrying about the consequences of not sleeping (0.96 ± 0.81). The overall mean GSES score was 5.68 ± 4.08. (Table 4 and Figure 3)

The investigation found a statistically significant relationship between participant age and the SHI scores (P = 0.004), with the 36–45-year and 46–55-year age groups exhibiting significantly lower scores than the 26–35-year group. Furthermore, SHI scores differed significantly according to marital status (P = 0.007), as married participants demonstrated significantly lower scores than single participants. Participants working night shifts had significantly higher SHI scores than those without night shifts (P = 0.009). A significant relationship emerged between the number of caffeinated

**Table 3** Sleep Hygiene Index (SHI) of the Participants

Item	Never (0)	Rarely (1)	Sometimes (2)	Frequently (3)	Always (4)	Score
I take daytime naps lasting two or more hours	96 (31.37%)	64 (20.92%)	78 (25.49%)	35 (11.44%)	33 (10.78%)	1.49 ± 1.33
I go to bed at different times from day to day	35 (11.44%)	54 (17.65%)	103 (33.66%)	57 (18.63%)	57 (18.63%)	2.15 ± 1.24
I get out of bed at different times from day to day	35 (11.44%)	47 (15.36%)	101 (33.01%)	57 (18.63%)	66 (21.57%)	2.24 ± 1.27
I exercise to the point of sweating within 1 hour of going to bed	220 (71.9%)	45 (14.71%)	28 (9.15%)	10 (3.27%)	3 (0.98%)	0.47 ± 0.86
I stay in bed longer than I should two or three times a week	61 (19.93%)	66 (21.57%)	81 (26.47%)	46 (15.03%)	52 (16.99%)	1.88 ± 1.35
I use alcohol, tobacco, or caffeine within 4 hours of going to bed or after going to bed	127 (41.5%)	46 (15.03%)	62 (20.26%)	32 (10.46%)	39 (12.75%)	1.38 ± 1.43
I do something that may wake me up before bedtime (for example: play video games, use the internet, or clean)	65 (21.24%)	30 (9.8%)	65 (21.24%)	58 (18.95%)	88 (28.76%)	2.24 ± 1.5
I go to bed feeling stressed, angry, upset, or nervous	93 (30.39%)	77 (25.16%)	95 (31.05%)	17 (5.56%)	24 (7.84%)	1.35 ± 1.19
I use my bed for things other than sleeping or sex (for example: watch television, read, eat, or study)	110 (35.95%)	40 (13.07%)	65 (21.24%)	35 (11.44%)	56 (18.3%)	1.63 ± 1.51
I sleep on an uncomfortable bed (for example: poor mattress or pillow, too many or not enough blankets)	209 (68.3%)	40 (13.07%)	34 (11.11%)	8 (2.61%)	15 (4.9%)	0.63 ± 1.1
I sleep in an uncomfortable bedroom (for example: too bright, too stuffy, too hot, too cold, or too noisy)	227 (74.18%)	33 (10.78%)	22 (7.19%)	7 (2.29%)	17 (5.56%)	0.54 ± 1.1
I do important work before bedtime (for example: pay bills, schedule, or study)	138 (45.1%)	56 (18.3%)	68 (22.22%)	27 (8.82%)	17 (5.56%)	1.11 ± 1.23
I think, plan, or worry when I am in bed	51 (16.67%)	46 (15.03%)	104 (33.99%)	38 (12.42%)	67 (21.9%)	2.08 ± 1.35
Total score						19.19 ± 6.98
Good sleep hygiene						261 (85.29%)
Average sleep hygiene						38 (12.42%)
Poor sleep hygiene						7 (2.29%)

**Note:** Numerical data are presented as mean ± SD, and Categorical data are presented as frequency (%).

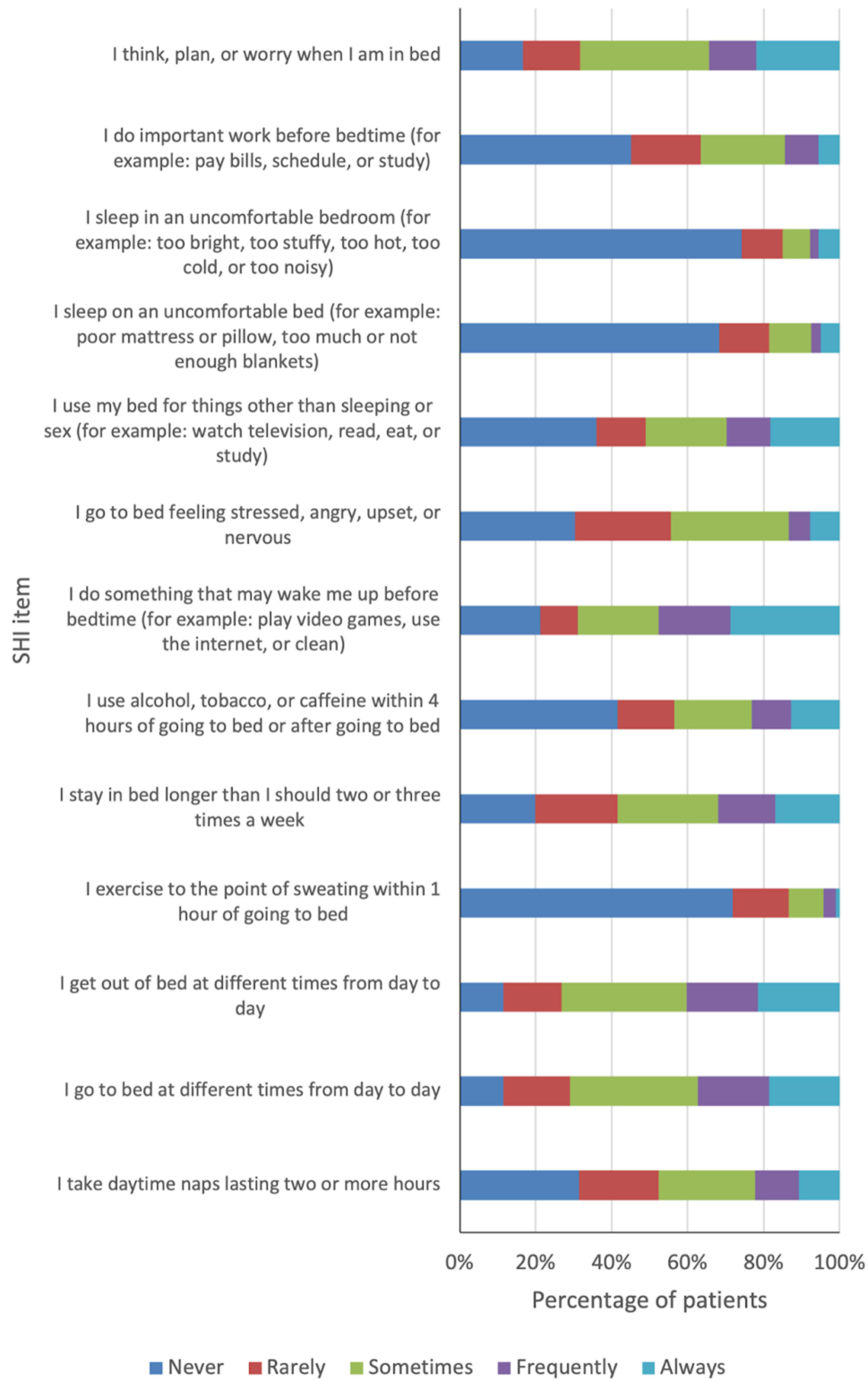
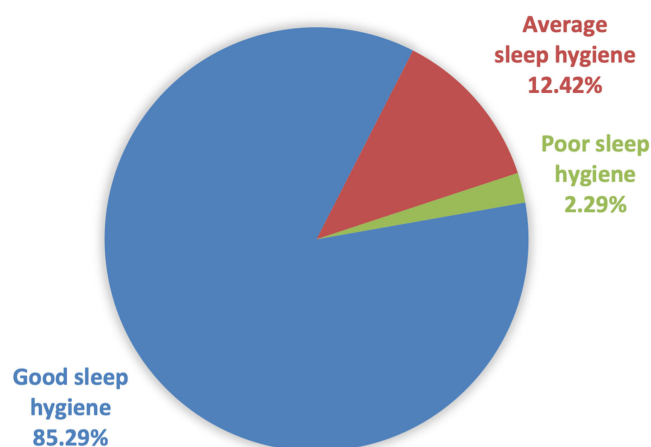


Figure 1 The SHI assessment of the participants.



**Figure 2** Distribution of participants' sleep hygiene.

drinks (coffee, tea, or soft drinks) consumed and SHI scores ( $P < 0.001$ ), with participants consuming three or more cups/cans a day exhibiting significantly higher scores than those consuming one or two cups/cans a day. Furthermore, patients who consumed energy drinks and those who smoked cigarettes had significantly higher SHI scores than non-consumers and non-smokers, respectively ( $P = 0.021$  and  $0.006$ ). Participants with IBS exhibited significantly higher SHI scores than those without IBS ( $P = 0.004$ ). Table 5 illustrates the associations between SHI scores and socio-demographic, medical, and psychiatric characteristics of the participants.

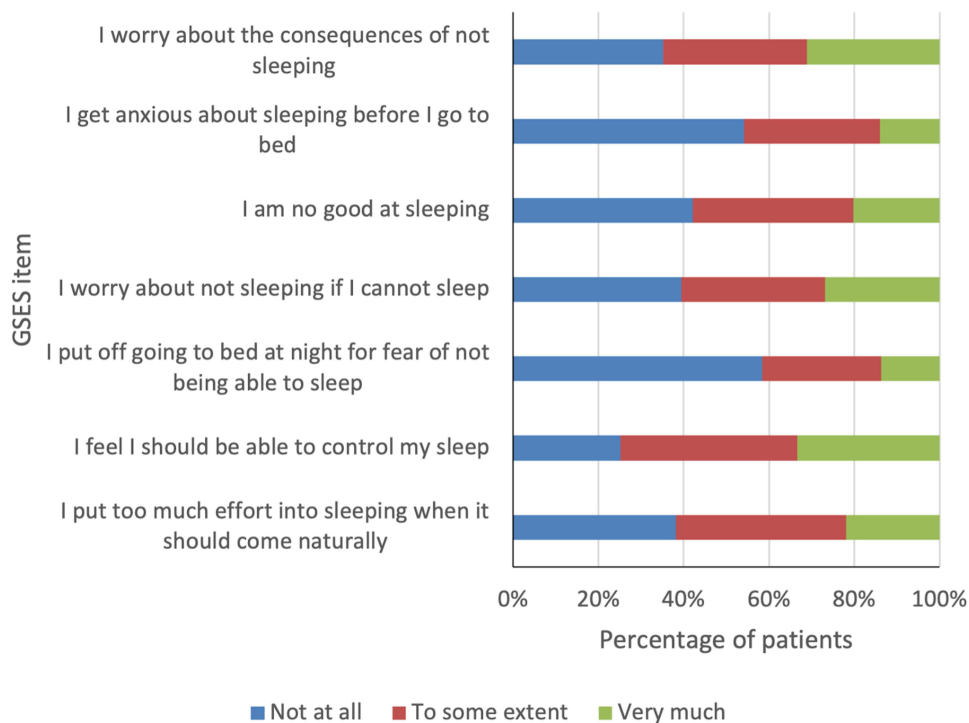
As presented in Table 6, participants working night shifts had significantly higher GSES scores than those without night shifts ( $P = 0.003$ ). Patients with first-degree family members who had anxiety disorders had significantly higher GSES scores than those without such family history ( $P = 0.045$ ). Weekly energy drink consumption was significantly associated with GSES scores ( $P = 0.035$ ), with patients consuming 3–4 cans per week demonstrating significantly higher scores than those consuming 1–2 cans per week. Patients with a history of chronic diseases had significantly higher GSES scores than those without ( $P = 0.001$ ). Participants with IBS also exhibited significantly higher GSES scores ( $P = 0.002$ ).

The univariate linear regression analysis identified age, marital status, energy drink consumption, drinks, and cigarette smoking as significantly associated with SHI scores. Specifically, participants aged 46–55 years had significantly lower SHI scores than those aged 18–25 years (coefficient =  $-2.98$ , 95% CI [ $-5.55, -0.4$ ],  $P = 0.024$ ). Married participants had significantly lower scores than single participants (coefficient =  $-2.95$ , 95% CI [ $-4.76, -1.13$ ],  $P = 0.002$ ). Participants who consumed energy drinks and those who smoked cigarettes had significantly higher SHI scores than non-consumers (coefficient =  $3.56$ , 95% CI [ $0.54, 6.58$ ],  $P = 0.021$ ) and non-smokers (coefficient =  $3.59$ , 95% CI [ $1.05, 6.13$ ],  $P = 0.006$ ), respectively. In the multivariable model, cigarette smoking was the only factor significantly associated with SHI scores,

**Table 4** Glasgow Sleep Effort Scale (GSES) Results of the Participants

Item	Not at All (0)	To Some Extent (1)	Very Much (2)	Score
I put too much effort into sleeping when it should come naturally	117 (38.24%)	122 (39.87%)	67 (21.9%)	$0.84 \pm 0.76$
I feel I should be able to control my sleep	77 (25.16%)	127 (41.5%)	102 (33.33%)	$1.08 \pm 0.76$
I put off going to bed at night for fear of not being able to sleep	179 (58.5%)	85 (27.78%)	42 (13.73%)	$0.55 \pm 0.72$
I worry about not sleeping if I cannot sleep	121 (39.54%)	103 (33.66%)	82 (26.8%)	$0.87 \pm 0.81$
I am no good at sleeping	129 (42.16%)	115 (37.58%)	62 (20.26%)	$0.78 \pm 0.76$
I get anxious about sleeping before I go to bed	166 (54.25%)	97 (31.7%)	43 (14.05%)	$0.6 \pm 0.72$
I worry about the consequences of not sleeping	108 (35.29%)	103 (33.66%)	95 (31.05%)	$0.96 \pm 0.81$
Total score	$5.68 \pm 4.08$			

**Note:** Numerical data are presented as mean  $\pm$  SD, and Categorical data are presented as frequency (%).



**Figure 3** The GSES assessment of the participants.

as smokers had higher scores than non-smokers (coefficient = 3.12, 95% CI [0.26, 5.98], P = 0.033). Table 7 presents the linear regression analysis for factors associated with SHI scores.

The univariate linear regression analysis revealed that employment status and chronic diseases were significantly associated with GSES scores. Employed participants had significantly lower GSES scores than unemployed participants (coefficient = -1.00, 95% CI [-2, -0.01], P = 0.048), whereas participants with a history of chronic diseases had significantly higher GSES scores than those without (coefficient = 1.68, 95% CI [0.71, 2.64], P = 0.001). In the

**Table 5** Relationship Between the SHI and the Sociodemographic, Medical, and Psychiatric Data of the Participants

Item	SHI Score	P-value
Age (years)		
18–25	20.73 ± 5.5 <sup>ab</sup>	0.004
26–35	22.28 ± 5.5 <sup>a</sup>	
36–45	18.44 ± 6.5 <sup>b</sup>	
46–55	17.75 ± 7.01 <sup>b</sup>	
56–65	18.94 ± 8.28 <sup>ab</sup>	
Gender		
Male	20.05 ± 7.49	0.188
Female	18.87 ± 6.77	
Marital status		
Single	20.92 ± 5.97 <sup>a</sup>	0.007
Married	17.97 ± 7.14 <sup>b</sup>	
Divorced/Separated	20.61 ± 7.81 <sup>ab</sup>	
Widowed	19.13 ± 5.99 <sup>ab</sup>	

(Continued)

**Table 5** (Continued).

Item	SHI Score	P-value
Employment status		
Unemployed	19.05 ± 6.87	0.787
Employed	19.56 ± 6.93	
Retired	18.75 ± 7.85	
Having night shifts in the job		
No	19.22 ± 7.05	0.009
Yes	23.63 ± 3.5	
Having first-degree family members with any psychiatric disorders		
No	18.54 ± 7.23	0.061
Yes	20.05 ± 6.57	
Type of psychiatric disorders		
Mood disorders		
No	19.95 ± 6.45	0.913
Yes	20.09 ± 6.66	
Anxiety disorders		
No	19.05 ± 6.43	0.102
Yes	20.92 ± 6.61	
Psychotic disorders		
No	20.08 ± 6.47	0.887
Yes	19.86 ± 7.25	
Drinking (coffee, tea, or soft drinks)		
No	17.11 ± 7.66	0.193
Yes	19.32 ± 6.93	
Type of drink		
Coffee		
No	18.74 ± 6.78	0.674
Yes	19.37 ± 6.95	
Tea		
No	18.76 ± 7.13	0.381
Yes	19.55 ± 6.85	
Soft drinks		
No	18.87 ± 7.07	0.140
Yes	20.13 ± 6.63	
Number of cups/cans a day		
1	17.99 ± 6.9 <sup>a</sup>	<0.001
2	18.94 ± 6.75 <sup>ab</sup>	
3	21.77 ± 5.75 <sup>bc</sup>	
>3	24.38 ± 6.95 <sup>c</sup>	
Drinking energy drinks		
No	18.94 ± 7.04	0.021
Yes	22.5 ± 5.33	
Number of cans		
1–2 weekly	22.31 ± 4.59	0.268
3–4 weekly	25.5 ± 5	
Daily	18 ± 11.31	
Smoking cigarettes		
No	18.82 ± 6.8	0.006
Yes	22.41 ± 7.79	

(Continued)

**Table 5** (Continued).

Item	SHI Score	P-value
Number of packs a day		
Less than half a pack	19.45 ± 8.42	0.140
Half to one pack	22.31 ± 7.3	
More than one pack	26.63 ± 6.5	
Using drugs or illegal substances (marijuana, alcohol, steroids, etc.)		
No	19.13 ± 7.01	0.381
Yes	21.1 ± 6.12	
Having chronic diseases		
No	18.59 ± 6.85	0.302
Yes	19.48 ± 7.04	
HTN		
No	19.57 ± 6.86	0.752
Yes	19.23 ± 7.53	
DM		
No	19.5 ± 6.18	0.960
Yes	19.44 ± 8.34	
Lipid problems (such as high cholesterol)		
No	19.51 ± 6.28	0.958
Yes	19.45 ± 7.6	
Thyroid problems (such as hypothyroidism or hyperthyroidism)		
No	19.92 ± 6.87	0.197
Yes	18.58 ± 7.34	
Irritable bowel syndrome		
No	18.42 ± 7.31	0.004
Yes	21.3 ± 6.18	
Chronic physical pain (such as fibromyalgia)		
No	19.36 ± 7.15	0.407
Yes	20.93 ± 5.43	
Asthma		
No	19.66 ± 6.99	0.379
Yes	18.48 ± 7.34	

**Notes:** Data are presented as mean ± standard deviation (SD). Comparisons between two groups were performed using the independent-samples t-test, and comparisons between more than two groups were conducted using one-way ANOVA followed by Bonferroni post hoc test where applicable. Groups with different lowercase letters indicate significant differences in post hoc pairwise comparisons. Statistical significance was set at P < 0.05.

**Table 6** Relationship Between the GSES Score and the Sociodemographic, Medical, and Psychiatric Data of the Participants

Item	GSES Score	P-value
Age (years)		
18–25	6.33 ± 4.08	0.148
26–35	5.28 ± 3.67	
36–45	5.3 ± 4.16	
46–55	5.16 ± 3.99	
56–65	6.58 ± 4.28	
Gender		
Male	5.39 ± 3.75	0.450
Female	5.79 ± 4.2	

(Continued)

**Table 6** (Continued).

Item	GSES Score	P-value
Marital status		
Single	5.44 ± 3.99	0.570
Married	5.58 ± 4.1	
Divorced/Separated	6.15 ± 4.11	
Widowed	6.75 ± 4.42	
Employment status		
Unemployed	5.96 ± 4.21	0.069
Employed	4.96 ± 3.66	
Retired	6.5 ± 4.44	
Having night shifts in the job		
No	4.66 ± 3.45	0.003
Yes	8.63 ± 4.37	
Having first-degree family members with any psychiatric disorders		
No	5.73 ± 4.17	0.791
Yes	5.61 ± 3.98	
Type of psychiatric disorders		
Mood disorders		
No	6.56 ± 4.72	0.100
Yes	5.18 ± 3.55	
Anxiety disorders		
No	4.87 ± 3.72	0.045
Yes	6.25 ± 4.12	
Psychotic disorders		
No	5.61 ± 4.06	0.990
Yes	5.62 ± 3.61	
Drinking (coffee, tea, or soft drinks)		
No	6.67 ± 4.84	0.291
Yes	5.62 ± 4.03	
Type of drink		
Coffee		
No	6 ± 3.83	0.636
Yes	5.58 ± 4.05	
Tea		
No	6.05 ± 4.34	0.250
Yes	5.44 ± 3.89	
Soft drinks		
No	5.49 ± 4.19	0.471
Yes	5.85 ± 3.74	
Number of cups/cans a day		
1	5.61 ± 3.94	0.216
2	5.66 ± 3.98	
3	4.84 ± 4.38	
>3	7.1 ± 3.9	
Drinking energy drinks		
No	5.61 ± 4.04	0.254
Yes	6.64 ± 4.54	
Number of cans		
1–2 weekly	5.56 ± 3.95 <sup>a</sup>	0.035
3–4 weekly	11.75 ± 2.63 <sup>b</sup>	
Daily	5 ± 7.07 <sup>ab</sup>	

(Continued)

**Table 6** (Continued).

Item	GSES Score	P-value
Smoking cigarettes		
No	5.57 ± 4.07	0.181
Yes	6.59 ± 4.12	
Number of packs a day		
Less than half a pack	7.64 ± 4.41	0.580
Half to one pack	6.23 ± 4.25	
More than one pack	5.75 ± 3.69	
Using drugs or illegal substances (marijuana, alcohol, steroids, etc.)		
No	5.63 ± 4.03	0.264
Yes	7.1 ± 5.34	
Having chronic diseases		
No	4.54 ± 4.06	0.001
Yes	6.22 ± 3.99	
HTN		
No	6.35 ± 3.92	0.445
Yes	5.88 ± 4.16	
DM		
No	5.98 ± 3.86	0.260
Yes	6.62 ± 4.2	
Lipid problems (such as high cholesterol)		
No	6.03 ± 4.14	0.560
Yes	6.36 ± 3.89	
Thyroid problems (such as hypothyroidism or hyperthyroidism)		
No	6.29 ± 3.86	0.724
Yes	6.07 ± 4.27	
Irritable bowel syndrome		
No	5.57 ± 3.94	0.002
Yes	7.34 ± 3.85	
Chronic physical pain (such as fibromyalgia)		
No	6.15 ± 3.98	0.393
Yes	7.07 ± 4.2	
Asthma		
No	6.31 ± 4	0.444
Yes	5.73 ± 3.98	

**Notes:** Data are presented as mean ± standard deviation (SD). Comparisons between two groups were performed using the independent-samples *t*-test, and comparisons between more than two groups were conducted using one-way ANOVA followed by Bonferroni post hoc test where applicable. Groups with different lowercase letters indicate significant differences in post hoc pairwise comparisons. Statistical significance was set at  $P < 0.05$ .

**Table 7** Linear Regression Analysis for Factors Associated with the SHI Score

Item	Univariate Analysis			Multivariable Analysis		
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value
Age (years)						
18–25	Ref			Ref		
26–35	1.55	–1.41 to 4.52	0.303	0.87	–2.26 to 3.99	0.586
36–45	–2.29	–4.99 to 0.42	0.097	–2.86	–6.5 to 0.78	0.123
46–55	–2.98	–5.55 to –0.4	0.024	–3.51	–7.18 to 0.17	0.061
56–65	–1.78	–4.46 to 0.9	0.191	–2.13	–6.16 to 1.9	0.299

(Continued)

**Table 7** (Continued).

Item	Univariate Analysis			Multivariable Analysis		
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value
BMI (kg/m <sup>2</sup> )	0.01	-0.11 to 0.13	0.866	0.05	-0.07 to 0.17	0.441
Gender						
Male	Ref			Ref		
Female	-1.18	-2.94 to 0.58	0.188	-1.19	-3.16 to 0.79	0.238
Marital status						
Single	Ref			Ref		
Married	-2.95	-4.76 to -1.13	0.002	-0.52	-3.41 to 2.37	0.724
Divorced/Separated	-0.31	-2.89 to 2.27	0.815	1.93	-1.35 to 5.22	0.248
Widowed	-1.79	-5.48 to 1.9	0.34	0.58	-3.79 to 4.96	0.793
Employment status						
Unemployed	Ref			Ref		
Employed	0.5	-1.21 to 2.22	0.563	-0.27	-2.2 to 1.66	0.786
Retired	-0.3	-2.96 to 2.35	0.822	-0.15	-3.05 to 2.75	0.921
Having first-degree family members (parents, siblings, children) with any psychiatric disorders						
No	Ref			Ref		
Yes	1.51	-0.07 to 3.09	0.061	1.38	-0.23 to 2.98	0.092
Drinking coffee, tea, or soft drinks						
No	Ref			Ref		
Yes	2.21	-1.12 to 5.55	0.193	1.79	-1.55 to 5.13	0.293
Drinking energy drinks						
No	Ref			Ref		
Yes	3.56	0.54 to 6.58	0.021	2.34	-0.78 to 5.47	0.141
Smoking cigarettes						
No	Ref			Ref		
Yes	3.59	1.05 to 6.13	0.006	3.12	0.26 to 5.98	0.033
Using drugs or illegal substances (marijuana, alcohol, steroids, etc.)						
No	Ref			Ref		
Yes	1.97	-2.45 to 6.39	0.381	-0.95	-5.64 to 3.74	0.689
Having chronic diseases						
No	Ref			Ref		
Yes	0.88	-0.8 to 2.57	0.302	1.47	-0.34 to 3.27	0.111

**Notes:** A higher score indicates worse sleep hygiene. Statistical significance at P-value<0.05.

**Abbreviations:** CI, Confidence interval; Ref, Reference category.

multivariable model, after adjusting for the included factors, patients aged 46–55 years had significantly lower GSES scores than those aged 18–25 years (coefficient = -2.57, 95% CI [-4.74, -0.4], P = 0.021), and participants with a history of chronic diseases had significantly higher GSES scores than those without (coefficient = 1.91, 95% CI [0.84, 2.98], P < 0.001). [Table 8](#) presents the linear regression results for factors associated with GSES scores.

**Table 8** Linear Regression Analysis for Factors Associated with the GSES Score

Item	Univariate Analysis			Multivariable Analysis		
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value
Age (years)						
18–25	Ref			Ref		
26–35	-1.05	-2.8 to 0.71	0.242	-1.36	-3.21 to 0.48	0.147
36–45	-1.02	-2.62 to 0.58	0.21	-1.94	-4.09 to 0.21	0.077
46–55	-1.17	-2.69 to 0.36	0.133	-2.57	-4.74 to -0.4	0.021
56–65	0.25	-1.33 to 1.84	0.753	-1.66	-4.04 to 0.73	0.172

(Continued)

**Table 8** (Continued).

Item	Univariate Analysis			Multivariable Analysis		
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value
BMI (kg/m <sup>2</sup> )	0.02	-0.05 to 0.09	0.63	0.01	-0.06 to 0.09	0.687
Gender						
Male	Ref			Ref		
Female	0.4	-0.63 to 1.42	0.45	0.09	-1.08 to 1.25	0.884
Marital status						
Single	Ref			Ref		
Married	0.14	-0.94 to 1.22	0.797	0.93	-0.78 to 2.64	0.284
Divorced/Separated	0.71	-0.83 to 2.24	0.365	1.33	-0.61 to 3.27	0.18
Widowed	1.31	-0.88 to 3.5	0.241	1.63	-0.96 to 4.22	0.216
Employment status						
Unemployed	Ref			Ref		
Employed	-1	-2 to -0.01	0.048	-0.97	-2.11 to 0.17	0.095
Retired	0.54	-1 to 2.07	0.494	0.26	-1.46 to 1.97	0.77
Having first-degree family members (parents, siblings, children) with any psychiatric disorders						
No	Ref			Ref		
Yes	-0.13	-1.05 to 0.8	0.791	-0.48	-1.42 to 0.47	0.324
Drinking coffee, tea, or soft drinks						
No	Ref			Ref		
Yes	-1.05	-3 to 0.9	0.291	-0.94	-2.91 to 1.04	0.352
Drinking energy drinks						
No	Ref			Ref		
Yes	1.03	-0.75 to 2.81	0.254	1.35	-0.5 to 3.2	0.152
Smoking cigarettes						
No	Ref			Ref		
Yes	1.02	-0.48 to 2.52	0.181	1.29	-0.4 to 2.99	0.133
Using drugs or illegal substances (marijuana, alcohol, steroids, etc.)						
No	Ref			Ref		
Yes	1.47	-1.11 to 4.05	0.264	0.85	-1.92 to 3.62	0.546
Having chronic diseases						
No	Ref			Ref		
Yes	1.68	0.71 to 2.64	0.001	1.91	0.84 to 2.98	<0.001

**Notes:** A higher score indicates more effort is needed for an individual to sleep. Statistical significance at P-value<0.05.

**Abbreviations:** CI, Confidence interval; Ref, Reference category.

## Discussion

This study explored sleep disturbances among patients with MDs and examined the contributing factors. The findings can help healthcare professionals offer improved patient care and thereby improve the quality of life for this population.

Approximately one-third of the participants (31.05%) reported a diagnosed sleep disorder, with insomnia accounting for 80% of these cases. Comparable prevalence rates have appeared in other populations with MDs. For instance, one study reported that 34.9% of patients with BD and 15% with recurrent depression met the criteria for insomnia.<sup>25</sup> Similarly, in a cohort of 180 euthymic BD patients, 41.1% reported poor sleep quality.<sup>26</sup> By contrast, a study of Saudi adults without psychiatric diagnoses indicated that 33.8% experienced less than seven hours of sleep per night.<sup>5</sup> As a result, the high prevalence of insomnia in the present study may reflect a combination of disease-related circadian dysregulation and behavioral factors. Thus, a plausible hypothesis is that irregular sleep schedules and nighttime arousal could indicate a limited awareness of sleep hygiene practices. Although no studies have directly examined sleep hygiene awareness among individuals with psychiatric disorders in Saudi Arabia, the lack of awareness is common and has been noted even among parents of children in Saudi Arabia.<sup>5,27</sup> The present findings concerning insomnia in this sample suggest that clinicians should consider integrating evidence-based interventions, such as cognitive-behavioral therapy for insomnia (CBT-I), which has demonstrated long-term efficacy.<sup>28</sup>

Approximately one-third of the participants (27.12%) reported snoring, with half experiencing it frequently. Although often dismissed as benign, snoring can indicate serious conditions such as obstructive sleep apnea (OSA) and has been

independently associated with coronary artery disease.<sup>29,30</sup> The high prevalence of snoring therefore raises a significant concern for individuals with MDs, a population in which up to 50% have been found to meet the criteria for OSA.<sup>31</sup> These findings emphasize the value of routine screening for sleep-disordered breathing in this population.

More than one-third of this study's sample (41.18%) reported nightmares, consistent with prior research on MDs. Studies of individuals with MDD, for instance, have documented prevalence as high as 56%.<sup>32</sup> Nightmares are clinically significant, as they have been associated with suicide attempts and may predict suicidal behavior.<sup>33,34</sup> Moreover, frequent nightmares can signal underlying psychological trauma, given that dream content often reflects waking stressors and past traumatic experiences.<sup>35</sup> Therefore, it is crucial for clinicians to address nightmares when caring for patients suffering from MDs. Interventions such as imagery rehearsal therapy (IRT) have been highly effective in reducing nightmares and distress.<sup>36</sup> At the same time, selective serotonin reuptake inhibitors (SSRIs) and serotonin and norepinephrine reuptake inhibitors (SNRIs) can induce or worsen nightmares.<sup>37</sup> Thus, a careful clinical evaluation that explores potential trauma history and considers targeted treatments, such as IRT, is highly valuable.

Nearly two-thirds of the participants reported nocturia, consistent with reviews linking this symptom to depression.<sup>38</sup> In a Swedish study, men with nocturia displayed an odds ratio of 6.5 for MDD, while women exhibited an odds ratio of 2.8.<sup>39</sup> The effective management of nocturia requires a multidisciplinary approach to exclude organic causes.<sup>40</sup> Specifically, undiagnosed DM warrants consideration, given the metabolic risks associated with psychotropic medications, particularly second-generation antipsychotics.<sup>41</sup>

Although more than two-thirds (85.29%) of the participants demonstrated good sleep hygiene, as indicated by low SHI scores, certain problematic behaviors occurred at high rates. The item with the highest score concerned getting out of bed at different times each day, suggesting circadian rhythm disturbances among patients with MDs. This interpretation aligns with a UK cross-sectional study that found circadian disruption to be strongly associated with poor mental health and well-being, particularly in MDD and BD.<sup>42</sup> In addition, high scores also emerged for engaging in activities that increase arousal before bedtime, as well as lying awake thinking, planning, or worrying in bed. These patterns may reflect undiagnosed insomnia and reinforce the need for targeted interventions such as CBT-I and interpersonal and social rhythm therapy (IPSRT), especially among patients with BD.<sup>43</sup>

In the present study, univariate analyses associated higher SHI scores with energy drink consumption and smoking, but only smoking remained significant after adjustment. While caffeine is a well-established sleep disruptor,<sup>44,45</sup> the results highlight smoking as a more robust predictor, consistent with large-scale analyses linking nicotine intake to sleep fragmentation.<sup>46</sup> The sustained association with smoking as an independent predictor may reflect the rapid stimulant effects of nicotine, particularly when inhaled.<sup>47</sup> Clinically, this finding emphasizes the importance of integrating smoking-cessation counseling into sleep-focused interventions for patients with MDs.

The univariate analysis revealed that married participants exhibited significantly better sleep hygiene than single participants, aligning with general population trends found in several studies.<sup>48,49</sup> However, this association did not persist in the multivariable model, implying that clinical variables—such as disease severity or comorbidities—may override the protective effects of marriage in this patient group. Future studies should explore whether relationship quality, rather than marital status alone, is a more accurate determinant of sleep health.

Regarding the GSES scores, chronic medical diseases emerged as a robust association with higher sleep effort. This finding aligns with evidence linking conditions such as chronic pain and diabetes to sleep disruption via physical discomfort and psychological distress.<sup>50,51</sup> Such findings hold significant relevance in the Saudi context, as the Saudi National Mental Health Survey reported that 34% of individuals with MDs had comorbid medical conditions, and 80% suffered from chronic pain.<sup>11</sup> Collectively, these results advocate for a holistic care model that integrates both physical and mental health.

The multivariate analysis revealed that younger adults (18–25) experienced significantly greater sleep effort than the 46–55 age group. Although this pattern diverges from general population trends that associate insomnia with advancing age,<sup>52</sup> it may reflect lifestyle factors prevalent in younger demographics, such as irregular routines and electronic media use.<sup>53</sup> As a result, clinicians should remain attentive to sleep vulnerabilities in younger patients with MDs and consider evidence-based interventions such as CBT-I, which specifically targets maladaptive sleep-related thoughts and behaviors.<sup>28</sup>

Notably, the univariate analysis linked unemployment and night-shift work to higher sleep effort, consistent with literature linking these factors to stress and circadian disruption.<sup>54,55</sup> However, these associations attenuated after adjustment, suggesting their effects may be mediated by more direct factors such as chronic medical conditions, which are often more prevalent in unemployed populations.<sup>56</sup> Regarding night-shift work, the lack of significance in the adjusted model likely reflects the small sample size of this subgroup, which limited statistical power. Although neither unemployment nor shift work qualified as an independent predictor in the final model, their initial associations remain clinically meaningful. These factors should be considered when evaluating sleep difficulties in patients with MDs, as they may still contribute to the overall burden of sleep disturbance.

The study also identified a significant association between IBS and sleep difficulties. Participants with MDs and comorbid IBS demonstrated both poorer sleep hygiene and greater sleep effort than those without IBS. This finding aligns with a growing body of literature emphasizing the bidirectional relationship between gastrointestinal health and sleep, mediated by the gut–brain axis.<sup>57</sup> Poor sleep can exacerbate IBS symptoms, such as abdominal pain and bloating, while the visceral discomfort and psychological distress of IBS can disrupt sleep continuity and quality.<sup>58</sup> In patients with MDs, this interplay can create a particularly burdensome cycle, further complicated by many psychotropic medications—particularly serotonergic agents such as SSRIs—that frequently cause gastrointestinal side effects that may mimic or exacerbate IBS symptoms.<sup>59</sup> Therefore, clinicians managing patients with MDs, especially depression, should routinely screen for gastrointestinal comorbidities such as IBS, given that individuals with depression face approximately 2.4 times higher risk of having IBS than those without depression.<sup>60</sup> Moreover, to interrupt this cycle of symptoms, a collaborative care approach incorporating gastroenterologists may be optimal, in addition to offering evidence-based psychological interventions, such as cognitive-behavioral therapy specifically tailored for IBS (CBT-IBS), which can help patients effectively manage their psychological distress and gastrointestinal symptoms.<sup>61</sup>

## Strengths and Limitations

This study has several strengths. A primary strength lies in the rigorous definition of clinical stability detailed in the Methods section, which minimizes the confounding effects of acute mood episodes or relapses, thereby capturing enduring sleep traits rather than state-dependent symptoms. The relatively large sample size also provided sufficient statistical power to detect significant associations. Furthermore, the use of validated Arabic versions of the SHI and the GSES enhanced measurement reliability in the local context. Additionally, the study integrated behavioral, psychosocial, and medical-related factors in its examination of sleep disturbances. To our knowledge, this study represents the first in Saudi Arabia to specifically investigate a clinical sample of individuals with MDs for sleep hygiene and sleep effort.

Despite these strengths, several limitations must be acknowledged. First, the cross-sectional design precludes causal inferences regarding the relationships between the assessed variables and sleep outcomes. Future longitudinal studies are needed to establish temporality and causality. Second, convenience sampling from a single tertiary hospital restricts the generalizability of the findings. Multicenter studies employing stratified sampling are therefore needed to confirm the generalizability of these results. Third, reliance on self-reported data introduces risks of recall bias and social desirability bias. Moreover, the study did not systematically exclude primary sleep disorders, such as OSA or restless legs syndrome (RLS). Although this naturalistic approach allowed for a naturalistic assessment of sleep burden on individuals with MDs, it limited the ability to differentiate sleep disturbances intrinsic to MDs from those arising from comorbid primary sleep pathology. Accordingly, future Saudi research should aim to exclude primary sleep disorders to attribute sleep disturbances to MDs more accurately. In addition, future studies should incorporate objective sleep measures, such as actigraphy, where feasible, to corroborate the self-reported findings. Furthermore, although the study assessed multiple variables, other potential significant factors remained unmeasured, including psychotropic medication-related characteristics. Therefore, subsequent studies should account for psychotropic medications' type, dosage, and timing to clarify their effect on sleep disturbances in patients with MDs, especially given the well-documented effects of many psychotropic medications on sleep.<sup>59,62</sup> Similarly, the present study did not examine the effect of the psychiatric illness duration or employ standardized symptom severity scales, as it targeted clinically stable patients (as detailed in the Methods section). Thus, future Saudi studies could address these gaps by incorporating structured diagnostic interviews and standardized mood-severity measures to better characterize clinical heterogeneity.

## Conclusion

This study sought to characterize the prevalence and correlates of sleep disturbances among clinically stable adults with MDs in a tertiary care hospital in Riyadh, Saudi Arabia. Despite clinical stability, participants with MDs exhibited a significant burden of sleep disturbances, most predominantly insomnia, nightmares, and nocturia. Regarding poor sleep hygiene, cigarette smoking emerged as a primary modifiable factor, whereas increased sleep effort was robustly associated with younger age and chronic medical comorbidities. These findings indicate that sleep pathology in this population arises from multiple behavioral, physiological, and other determinants. Therefore, a comprehensive multi-disciplinary multifaceted management approach is needed. This should include the prevention of modifiable contributing factors, routine screening for sleep disturbances using validated tools, early detection of sleep disturbances, managing physical and psychological comorbidities, and using targeted behavioral interventions.

## Abbreviations

MDs, Mood disorders; MDD, Major depressive disorder; BD, Bipolar disorder; KKHU, King Khalid University Hospital; SHI, Sleep Hygiene Index; GSES, Glasgow Sleep Effort Scale; SD, Standard deviation; ANOVA, Analysis of variance; VIFs, Variance inflation factors; BMI, Body mass index; DM, Diabetes mellitus; IBS, Irritable bowel syndrome; CBT-I, Cognitive-behavioral therapy for insomnia; OSA, Obstructive sleep apnea; IRT, Imagery Rehearsal Therapy; SSRIs, Selective serotonin reuptake inhibitors; SNRIs, Serotonin and norepinephrine reuptake inhibitors; IPSRT, Interpersonal and Social Rhythm Therapy; CBT-IBS, Cognitive-behavioral therapy for IBS; RLS, Restless legs syndrome.

## Data Sharing Statement

The data collected in this study will be made available upon reasonable request directed to the corresponding author.

## Ethical Considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the institutional review board at the College of Medicine at King Saud University, Riyadh, Saudi Arabia (Research Project No. E-24-9408).

## Author Contributions

AHA (Ahmad H. Almadani) — Conceptualization; Methodology; Formal analysis; Data curation; Writing – original draft; Writing – review & editing. AHAL (Ayedh H. Alghamdi) — Conceptualization; Methodology; Formal analysis; Data curation; Writing – review & editing. FSA — Conceptualization; Methodology; Investigation (data collection); Writing – original draft. AJA — Data curation; Writing – original draft. RTH — Conceptualization; Methodology; Investigation (data collection); Writing – original draft. AIB — Conceptualization; Methodology; Formal analysis; Data curation; Writing – original draft. AAA — Conceptualization; Methodology; Investigation; Writing – original draft. RMA — Conceptualization; Methodology; Investigation; Writing – original draft. LAA — Conceptualization; Methodology; Investigation; Writing – original draft. AKM — Methodology; Writing – original draft. MMA — Investigation; Writing – original draft. MAA — Conceptualization; Methodology; Writing – review & editing. All authors gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Disclosure

The authors have no conflict of interest to declare.

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