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Original Article

Insomnia and the use of sleep medications among nurses in northwest Iran: A web-based survey of prevalence and correlates

Atefeh Asadpour Asl[1], Elnaz Asghari[2], Farnaz Rahmani[2], Leili Zailame[3], Parvin Sarbakhsh[4], Amir Saberi Kojabadi[1]*

[1]Department of Medical Surgical Nursing, Nursing and Midwifery Faculty, Tabriz University of Medical Sciences, Tabriz, Iran
[2]Research Center of Psychiatric and Behavioral Sciences, Razi Hospital, Tabriz University of Medical Sciences, Tabriz, Iran
[3]Department of Nursing Management, Deputy of Treatment, Tabriz University of Medical Sciences, Tabriz, Iran
[4]Health and Environment Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

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Corresponding Author:
Amir Saberi Kojabadi, Health and Environment Research Center, South Shariati St. School of Nursing & Midwifery, Tabriz, Iran.
E-mail: a.saberi@tbzmed.ac.ir

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ABSTRACT

Background & Aim: There is a growing global reliance on sleep medications among healthcare professionals, raising concerns about dependency and health outcomes. This study aimed to assess the prevalence of insomnia, sleep medication usage, and their correlates among nurses.
Methods & Materials: This cross-sectional study employed a web-based survey to recruit 1,213 nurses from university hospitals in East Azerbaijan Province, Iran, via institutional portals. Participants completed the Insomnia Severity Index and a profile of insomnia medication usage. The data were analyzed using descriptive statistics, analytical tests, and multiple linear regression in SPSS 21 ($p < 0.05$).
Results: Among 1,213 participants (84.3% female, mean age 36.9 ± 8.5 years), the majority had subclinical (52.6%) or moderate (38.3%) insomnia. While 41.2% reported using non-drug methods for insomnia, 73.5% did not use any sleep medication. Among medication users, benzodiazepines (10.5%) and herbal remedies (9.5%) were most common. Nurses working rotating shifts ($t = -5.93$, $p< 0.001$) and those with >3-night shifts per week ($F=19.41$, $p< 0.001$) had higher insomnia severity scores. Multiple linear regression revealed that female gender ($\beta= 1.780$, $p= 0.009$), married status ($\beta= 0.740$, $p= 0.009$), non-use of benzodiazepines ($\beta=-1.284$, $p = 0.004$), and use of non-drug methods ($\beta = -1.789$, $p< 0.001$) were significantly associated with higher ISI score.
Conclusion: Nurses exhibit high insomnia rates and medication dependence, necessitating urgent integration of non-drug approaches like optimized shifts and sleep hygiene programs to reduce severity and improve well-being.

Introduction

Sleep hygiene includes practices that promote optimal sleep quality. These practices involve maintaining a consistent sleep schedule, creating a comfortable sleep environment, and avoiding stimulants at bedtime (1). Proper sleep practices are vital for managing stress, enhancing cognitive function, and reducing the risk of burnout (2).

Sleep hygiene is particularly critical for nurses, who often work long and irregular hours (1). Their shift-based work usually results in insomnia and sleep disorders, which can compromise their well-being and patient safety (3). Also, adequate sleep hygiene may support emotional resilience, enabling nurses to provide better patient care and cope more effectively with the challenges of their professional demands (4).

Inadequate sleep hygiene can lead to insomnia, characterized by difficulty initiating or maintaining sleep, or experiencing non-restorative sleep, despite having adequate opportunities to rest (1). It represents a significant concern among healthcare professionals, particularly nurses (5). The global prevalence of insomnia among nurses is alarmingly high, with estimates ranging from 30% to 65% (6). Shift work, especially night shifts, exacerbates sleep disturbances by disrupting the body's natural circadian rhythms (2).

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A cross-sectional study conducted in Italy also found that 65.4% of ICU nurses exhibited clinically significant insomnia, which was associated with irregular shift patterns and insufficient recovery time between shifts (5). A recent study conducted in Iran revealed that 19.4% of nurses reported getting less than 5 hours of sleep per night, and 79.9% of them experienced insomnia to varying degrees (7). Another study's findings indicated that 86% of Iranian nurses experienced undesirable conditions, as measured by the Sleep Quality Index, which led to symptoms of insomnia during their regular duties (2).

Insomnia in nurses can lead to several negative consequences, including decreased job performance, elevated absenteeism rates, and negative impacts on mental health (8). Also, insomnia has been identified as a predictor of needlestick injuries, medication errors, and diminished clinical performance, highlighting the occupational hazards associated with insomnia (9).

There are several methods to improve sleep hygiene, like behavioral practices, cognitive and psychological strategies, and sleep medication (1). However, the use of sleep medications has become a common yet contentious management strategy for nurses (10). Sayehmiri et al. reported in their meta-analysis that the rate of sleep medication consumption among nurses was 28% (11). Existing evidence indicates that nurses may be more likely to self-diagnose, self-treat, and may not seek help from specialists, potentially leading to problematic substance use. Furthermore, cultural factors, such as a reluctance to seek medical or psychological help, may significantly influence sleep management strategies among nurses in Iran (12).

Using sleep medication for insomnia can provide short-term relief; however, its long-term use is associated with tolerance, dependency, and impaired neurocognitive function (13). This has serious negative consequences for the physical and mental health of nurses, as well as for their job quality (1). A study conducted in Thailand found that nurses who sleep fewer than seven hours per night are more likely to self-medicate; however, this practice does not reduce the incidence of medical errors (14). Additionally, the use of psychotropic drugs has been independently linked to a fourfold increase in needlestick injuries, suggesting that sleep medication may inadvertently elevate workplace risks (14).

In conclusion, while insomnia and reliance on sleep medications pose significant global challenges for nurses, regional variations in work culture, healthcare access, and cultural attitudes have a critical influence on these patterns. Despite documented high levels of insomnia and medication use among Iranian nurses, a crucial gap persists in understanding the specific prevalence, severity, and correlates of these issues within the Northwest Iran context. This knowledge gap impedes the development of effective interventions to mitigate associated occupational risks, such as medical errors and burnout. Our study, therefore, aims to provide a detailed assessment of insomnia prevalence, sleep medication usage, and their key correlates among nurses in Northwest Iran. The findings are crucial in informing the design of evidence-based, culturally responsive strategies that promote safer and more sustainable sleep management practices for this vital healthcare workforce.

Methods

Study design

The study adopted a cross-sectional survey design. To ensure the quality of the research, the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline for cross-sectional studies was used (22).

Setting & participants

The target population for the study consisted of 4,000 nurses working in 35 public teaching hospitals in East Azerbaijan province, affiliated with Tabriz University of Medical Sciences. Inclusion required direct patient care; exclusion applied if <10% of the survey items were incomplete. Sampling took place in October 2024.

Data collection

Data collection involved a structured online survey. This approach facilitated broad outreach to participants while ensuring their privacy and convenience. The survey was administered via a Porsline-provided data collection link. Administrative support was initially secured from nursing departments within participating medical centers. Subsequently, clinical supervisors were requested to disseminate the survey link through hospital nursing office-managed specialized social media platforms, including WhatsApp and Eitaa (a national social platform). The purpose of the survey was explicitly outlined on the introductory page of the questionnaire. Participation was voluntary among nursing staff respondents. After two weeks, supervisors were sent a reminder. Due to no further responses, the survey link was closed four weeks after it was initially distributed. Porsline provided a unique code to each participating nurse's cellphone to prevent duplicate responses from any single participant.

Instruments

The anonymous, self-reported, structured electronic questionnaires included background characteristics questions developed by the researchers, a medication usage survey, and the Insomnia Severity Index (ISI). The background characteristics questionnaire, created by the researchers based on a literature review and expert evaluations, collects participants' information regarding age, gender, marital status, type of place, employment status, type of disease, self-medication, work years' experience, type of work shift, healthcare setting, and night shift frequency. A profile of medication use for insomnia was assessed, including the type of sleep medications used (e.g., melatonin, benzodiazepines, antihistamines, SSRIs, herbal remedies, and non-benzodiazepine hypnotics), self-medication practices, and the use of non-pharmacological methods to manage insomnia.

The ISI is a brief instrument designed to assess the severity of both nighttime and daytime components of insomnia (15). The seven-item questionnaire prompts participants to evaluate their sleep issues and symptoms using a Likert scale. The questions focus on the respondent's perceptions of their sleep, encompassing the intensity of symptoms, the individual's satisfaction with their sleep habits, the extent to which insomnia affects daily activities, how noticeable the respondent believes their insomnia is to others, and the overall distress caused by the sleep issue. A 5-point Likert scale rates each item (0=no issue to 4= extremely severe issue), resulting in a total score ranging from 0 to 28. The total score is interpreted as no insomnia (0–7), mild insomnia (8–14), moderate insomnia (15–21), and severe insomnia (22–28). In Iran, its psychometric characteristics were assessed in the Sadeghniiat-Haghighi study, and its Cronbach's alpha was reported as 0.86 (7). In the present study, face validity was assessed using five nurses and five faculty members, and Cronbach's alpha coefficient for the ISI was calculated to be 0.94.

Data analysis

Data analysis was conducted in IBM SPSS Statistics V21.0. Descriptive statistics were used to summarize the data. To assess the normality of the ISI score, skewness and kurtosis values were examined, along with graphical methods such as histograms and Q-Q plots. Given the normal distribution of this variable, t-tests and ANOVA were utilized to explore the relationship between ISI score and background characteristics. Subsequently, variables with $p < 0.2$ (35) were incorporated into a multiple linear regression analysis to identify predictors of ISI scores. A significance level of $p<0.05$ was established for all statistical tests.

Ethical considerations

The Vice-Chancellor approved the research project for Tabriz University of Medical Sciences (code IR.TBZMED.REC.1403.387). The study adhered to the ethical guidelines outlined in the Declaration of Helsinki, and the university granted permission for the sampling. Data were provided in an anonymized form to protect participant identities. At the beginning of the

questionnaire, after explaining the objectives, participants provided informed consent, acknowledging their voluntary participation in the study and the confidentiality of their responses. The research goals, anonymity, and voluntary participation were explained at the start of the study, and no identifiable personal information was collected to ensure privacy.

Results

Of the about 4,000 eligible nurses, 1.213 participated in the study, resulting in a response rate of 30.32%. According to web-based survey studies, the acceptable response rate typically falls between 20% and 30% (25).

Background characteristics of participants

Of the 1,213 participants, 84.3% (n=1.022) were women, with a mean age of 36.9±8.5 years (range, 22 -60 years). Most of them (75.9%) worked rotating shifts. Table 1 presents background characteristics of the sample.

Table 1. Distribution of background sociodemographic characteristics (n = 1,213)

Nurses' characteristics	Category		N (%)
Age	≤30		361 (29.8)
	31-40		395 (32.6)
	>41		457 (37.6)
Gender	Male		191 (15.7)
	Female		1022 (84.3)
Marital status	Divorced, widowed		35 (2.8)
	Married		900 (74.2)
	Single		279 (23.0)
	Missing		9 (3.0)
Employment status	Contractual		78 (6.4)
	Official		750 (61.8)
	Corporation		80 (6.6)
	Mandatory		198 (16.3)
	Fixed-Term		107 (8.8)
Health care setting	General medicine ward		132 (10.9)
	Surgical		145 (12.0)
	Accident and emergency		160 (13.1)
	Operating Room		85 (7.0)
	Outpatient		18 (1.5)
	Psychiatric		307 (25.3)
	Special		366 (30.2)
Type of place	City (Tabriz)		813 (67.0)
	County		400 (33.0)
Type of shift	Fixed		292 (24.1)
	Rotating		921 (75.9)
Night shifts per week	0		295 (24.3)
	1		202 (16.7)
	2		25 (2.0)
	3		455 (37.5)
	> 3		236 (19.5)
Having a chronic disease	Yes	Mental illness	74 (6.1)
		Skeletal	197 (16.2)
		Endocrine	120 (9.9)
		Digestive	155 (12.8)
		Urinary	30 (2.5)
	No		637 (52.5)
Using medication for a chronic disease	Yes	Neuropsychiatric	96 (7.8)
		Diabetes	37 (3.1)
		Hypertension	103 (8.5)
		Digestive	121 (10.0)
	No		856 (70.6)

The ISI demonstrated a normal distribution, as indicated by skewness (-0.09) and kurtosis (-0.11). The mean ±SD of the nurses' ISI scores was 13.3 ± 3.9, with scores from 2 to 24. The distribution of ISI score among the participants was as follows: no insomnia (7.2%, n=87), subclinical insomnia (52.6%, n=638), moderate insomnia (38.3%, n=464), and severe insomnia (2.0%, n=24). The highest severity on the ISI was associated with the statement "interference of sleep problems with daily functioning"; the lowest severity was linked to the statement "problems waking up early" (Table 2). Although 41.2% (n=500) said they use non-drug methods for insomnia, 73.5% (n=891) reported not using any sleep medications. Moreover, among those who used medications for insomnia, benzodiazepines (n=127, 10.5%) and herbals (n=115, 9.5%) were the most frequently utilized (Table 3).

Table 2. Means and standard deviations of Insomnia Severity Index (n = 1.213)

Item	Mean ± SD
Difficulty falling asleep (Initial insomnia) [Range: 0–4]	1.7 ± 1.1
Difficulty maintaining sleep (Sleep maintenance difficulty) [Range: 0–4]	1.58 ± 1.2
Early morning awakening (Terminal insomnia) [Range: 0–4]	1.53 ± 1.2
Satisfaction with recent sleep patterns [Range: 0–4]	1.60 ± 1.1
Sleep disturbance interferes with daily functioning [Range: 0–4]	2.85 ± 1.0
Noticeability of sleep quality impairment to others [Range: 0–4]	1.81 ± 1.2
Concern/distress about recent sleep problems [Range: 0–4]	2.22 ± 1.3
Total ISI [Range: 0–28]	13.36 ± 3.9

Table 3. Profile Distribution of Medication Usage (n = 1.213)

Medication usage		N (%)
Using sleep medications	Yes	322 (26.5)
	No	891 (73.5)
Self-medication for insomnia	Yes	265 (21.8)
	No	948 (78.2)
Melatonin	Yes	67 (5.5)
	No	1146 (94.5)
Benzodiazepines	Yes	127 (10.5)
	No	1086 (89.5)
Non-benzodiazepines	Yes	19 (1.6)
	No	1194 (98.4)
Antihistamines	Yes	33 (2.7)
	No	1180 (97.3)
Herbal	Yes	115 (9.5)
	No	1098 (90.5)
SSRI	Yes	54 (4.5)
	No	1159 (95.5)
Non-drug methods for insomnia	Yes	500 (41.2)
	No	713 (58.8)

Nurses who worked rotating shifts (t=5.93, p <0.001) and those with more than three-night shifts per week (F=19.41, p< 0.001) were more likely to experience insomnia. Additionally, nurses with chronic illnesses (F=8.935, p<0.001) and those taking medications for their chronic conditions (t= 6.2, p<0.001) were also more likely to experience insomnia. Participants who did not use sleep medications (t= 9.60, p<0.001) and who used non-drug methods (t=-12.10, p< 0.001) had higher ISI scores. All of those using sleep medication had significantly higher ISI scores (p< 0.001) than their counterparts (Table 4).

In the multiple linear regression model, in which the effect of all variables was controlled together, it was found that being female (β= 1.7, p=0.009), married status (β=0.7, p=0.009), not using benzodiazepines (β=-1.2, p=0.004), and using non-drug methods for insomnia (β=-1.7, p<0.001) were independently and significantly associated with higher ISI score. The specifics of this model are presented in Table 5.

Table 4. Mean insomnia severity index scores according to background characteristics and profile of medication usage (n=1,213)

Variable			Mean ± SD	t/f	P-value
Age	≤30		13.61 ± 3.99	F = 2.109	0.122
	31-40		13.5 ± 3.8		
	>41		13.1 ± 3.9		
Gender	Male		12.9 ± 4.1	t = -1.575	0.116
	Female		13.4 ± 3.9		
Marital status	Divorced, widowed		14.1 ± 3.4	F = 2.501	0.082
	Married		13.5 ± 3.8		
	Single		12.9 ± 4.3		
Type of shift	Fixed		12.2 ± 3.8	t = -5.93	< 0.001
	Rotating		13.7 ± 3.9		
Employment status	Contractual		14.1 ± 3.6	F =1.81	0.124
	Official		13.3 ± 3.7		
	Corporation		14.2 ± 3.7		
	Mandatory		13.2 ± 4.2		
	Fixed-Term		13.1 ± 3.9		
Type of place	City (Tabriz)		13.5 ± 4.0	t = 1.26	0.208
	County		13.2 ± 3.7		
Healthcare setting	Operating room		12.9 ± 3.9	F = 1.695	0.219
	Emergency		13.4 ± 4.0		
	Surgical		13.6 ± 4.1		
	Internal		13.7 ± 3.7		
	Other		12.9 ± 3.9		
	Outpatient		12.9 ± 3.7		
	Special		13.7 ± 3.8		
Night Shift per week	0		12.1 ± 3.7	F = 19.41	<0.001
	1		12.9 ± 3.9		
	2		13.8 ± 3.9		
	3		12.1 ± 3.9		
	>3		14.4 ± 3.7		
Having a chronic disease	Yes	Mental illness	14.9 ± 3.7	F = 8.935	<0.001
		Skeletal	14.1 ± 3.6		
		Endocrine	13.4 ± 3.8		
		Digestive	14.3 ± 3.7		
		Urinary	13.6 ± 4.0		
	No		12.7 ± 4.0		
Using medication for a chronic disease	Yes	Neuropsychiatric	14.6 ± 4.1	F = 6.20	<0.001
		Diabetes	13.9 ± 3.6		
		Hypertension	13.7 ± 4.0		
		Digestive	14.3 ± 3.5		
	No		13.0 ± 3.9		
Use of sleep medication	Yes		12.7 ± 3.3	t = 9.60	<0.001
	No		15.1 ± 3.9		
Self-medication for insomnia	Yes		15.3 ± 3.5	t = 4.17	<0.001
	No		13.1 ± 3.9		
Use of melatonin	Yes		15.2 ± 3.9	t = -3.97	<0.001
	No		13.2 ± 3.9		
Use of benzodiazepines	Yes		15.4 ± 3.9	t =-6.48	<0.001
	No		13.1 ± 3.3		
Use of non-benzodiazepines	Yes		16.2 ± 3.9	t = 13.32	<0.001
	No		13.3 ± 3.0		
Use of antihistamines	Yes		15.6 ± 3.9	t =-3.31	<0.001
	No		13.3 ± 3.6		
Use of herbal	Yes		15.1 ± 3.9	t = -5.12	<0.001
	No		13.2 ± 3.6		
Use of SSRI	Yes		15.6 ± 3.9	t =-4.31	<0.001
	No		13.3 ± 3.2		
Use of non-drug methods for insomnia	Yes		14.9 ± 3.9	t = -12.10	<0.001
	No		12.3 ± 3.4		

Table 5. Predictors of nurses' insomnia in the multiple linear regression analysis (n= 1.213)

Parameter	Unstandardized Coefficients (β)	Std. Error	t	P-value	95% Confidence Interval	
					Lower bound	Upper bound
Intercept	17.7	1.9	9.0	.000	13.9	21.6
Gender (Reference: Male)						
Female	1.7	0.2	-2.6	.009	-1.3	-0.1
Marital status (Reference: Divorced, widowed)						
Single	0.9	0.6	1.4	.148	-0.3	2.3
Married	0.7	0.2	2.6	.009	0.1	1.2
Type of shift (Reference: Fixed)						
Rotating	-0.4	0.3	-1.3	0.180	-1.0	0.1
Employment status (Reference: Fixed-Term)						
Official	0.9	0.5	1.7	0.076	-0.1	2.0
Contractual-Permanent	0.5	0.3	1.3	0.189	-0.2	1.2
Mandatory	0.9	0.5	1.7	0.085	-0.1	1.9
Corporation	0.1	0.4	.3	0.722	-0.7	1.1
Type of place (Reference: County)						
Tabriz	0.3	0.2	1.4	0.137	-0.1	0.7
Having a chronic disease (Reference: No)						
Mental illness	0.8	0.7	1.1	0.266	-0.6	2.4
Skeletal	1.1	0.7	1.5	0.115	-0.2	2.5
Endocrine	0.3	0.7	0.5	0.608	-1.0	1.8
Digestive	1.0	0.7	1.4	0.140	-.3	2.4
Urinary	0.0	0.6	0.0	0.930	-1.2	1.3
Use of melatonin (Reference: No)						
Melatonin (Yes)	-.4	0.5	-0.9	0.332	-1.4	0.5
Use of benzodiazepines (Reference: No)						
Benzodiazepines (Yes)	-1.2	0.4	-2.9	0.004	-2.1	-0.4
Use of Non-benzodiazepines (Reference: No)						
Non-benzodiazepines (Yes)	-1.0	0.8	-1.2	0.201	-2.7	0.5
Use of antihistamines (Reference: No)						
Antihistamines (Yes)	-0.8	0.6	-1.2	0.207	-2.1	0.4
Use of herbal (Reference: No)						
Herbal (Yes)	-0.6	0.4	-1.5	0.122	-1.5	0.1
Use of SSRI (Reference: No)						
SSRI (Yes)	-0.6	0.5	-1.0	0.273	-1.6	0.4
Use of prescribed medication (Reference: No)						
Prescribed medication (Yes)	-0.3	0.4	-.8	0.396	-1.2	0.4
Use of non-drug methods (Reference: No)						
Non-drug (Yes)	-1.7	0.2	-6.1	0.000	-2.3	-1.2
Self-medication for insomnia (Reference: No)						
Self-medication (Yes)						
Age	0-.0	0.0	-1.4	0.160	-0.0	0.0
Night shift frequency	2.5	0.1	4.5	0.000	0.3	0.8
R Squared= .186 (Adjusted R Squared = .164)						

Discussion

The study found that 40.3% of participants had moderate-to-severe insomnia. A study conducted with 194 nurses working in intensive care units across five hospitals in Istanbul, Turkey, found that 39.7% of the participants suffered from moderate to severe insomnia (16). More recent studies have reported higher rates. For instance, in China, Qi et al. found that 51.7% of frontline healthcare workers experienced insomnia in 2020 (17), and Zhan et al. reported a similar prevalence of 52.8% 2020 (18). Azoulay et al. observed a slightly lower rate of approximately 40% (3). These findings align with the meta-analysis by Pappa et al., which estimated an insomnia prevalence of 38.9% (19).

Similarly, other studies conducted in Iran reported higher levels of poor sleep quality among nurses (7, 11). Nurses often suffer from insomnia because of their demanding work schedules, which include long shifts and irregular hours (20). The high-stress nature of the job, coupled with the need to make critical decisions quickly, further exacerbates sleep disturbances (14). Moreover, exposure to emotionally challenging situations and the physical demands of patient care contribute to difficulty sleeping (5).

The study found that 26.5% of nurses rely on pharmacological interventions for insomnia, which is slightly higher than the 17.7% of nurses in Brazil who use sleep medications (21). In the Congo, 13.6% of shift nurses and 9.4% of day nurses reported occasional use (22). The discrepancy between these results and the current study's findings may reflect contextual factors unique to Iran, such as unrestricted access to benzodiazepines, their low cost, and the absence of prescription requirements (13), which likely contribute to their widespread use. Additionally, the psychological and occupational stressors inherent to nursing—excessive workloads, rotating shifts (22), and poor sleep hygiene—may drive nurses to prioritize immediate symptom relief through medication over long-term behavioral interventions (12).

According to this study, nurses who used sleep medications most commonly used benzodiazepines. However, multiple linear regression analysis revealed an unexpected inverse relationship; benzodiazepine use predicted lower ISI scores, suggesting improved sleep. This finding contrasts with a systematic review, which reported that nurses who used benzodiazepines experienced the lowest sleep quality and the highest daytime sleepiness (1). The paradoxical association may stem from methodological nuances. For instance, cross-sectional data cannot capture longitudinal benzodiazepine effects (e.g., tolerance, rebound insomnia). Additionally, nurses using benzodiazepines might underreport symptoms due to perceived efficacy or social desirability bias. Conversely, benzodiazepines may provide short-term relief but exacerbate sleep disturbances over time, as highlighted in studies linking chronic use to dependency and reduced sleep quality (13).

Although only about one-tenth of nurses reported using benzodiazepines for managing insomnia, this low percentage raises concerns about the need for targeted interventions. It highlights the urgency to address potential dependency issues and to promote safer alternatives. Workplace policy reforms are essential given the significant association between shift work, insomnia severity, and medication reliance. Optimizing shift schedules, such as implementing slower rotation patterns or limiting the frequency of night shifts (23), could help align with nurses' circadian rhythms and reduce sleep disturbances. Creating supportive work environments, such as providing designated rest areas during breaks and ensuring adequate rest periods between shifts, can alleviate fatigue and diminish the perceived need for pharmacological solutions (14).

Consistent with this study, Dorrian reported that nurses who used non-pharmacological interventions experienced significantly lower rates of insomnia than those who took medication (4). This finding suggests that non-pharmacological methods could be more effective in improving sleep quality among nurses, indicating that promoting these interventions may help reduce insomnia (1). One reason for nurses' underutilization could be a lack of awareness or training on these methods among healthcare professionals. Additionally, there may be a cultural preference for quick-fix solutions such as medication, leading to reluctance to try alternative approaches. Furthermore, time constraints and high workloads might discourage nurses from incorporating these interventions into their routines (8).

This study identified a significant association between nurses' use of pharmacological agents (including melatonin, benzodiazepines, non-benzodiazepine sedatives, antihistamines, herbal remedies, and selective serotonin reuptake inhibitors, or SSRIs) and the incidence of insomnia. These findings align with a Brazilian study in which 48.6% of nurses using sleep medications reported high-stress levels and diminished sleep quality (21). The widespread availability of these medications, coupled with self-administration practices, raises concerns about their indiscriminate use and long-term efficacy.

Notably, nurses with chronic illnesses (e.g., mental illness) exhibited significantly higher insomnia. However, in our regression model, chronic illnesses were not a significant

predictor of insomnia, suggesting that comorbidities may influence sleep quality through indirect pathways (e.g., pain, psychological stress) rather than directly causing insomnia.

Furthermore, in the current study, several background characteristics (gender, marital status, and frequency of night shifts) remained statistically significant predictors of insomnia. Compared with male nurses, female nurses exhibit higher insomnia scores. This difference may be related to hormonal fluctuations affecting sleep patterns (8). Additionally, they often juggle multiple roles, such as caregiving responsibilities at home, which contributes to stress and sleep disturbances. Workplace factors, like shift work and irregular hours, can further exacerbate sleep issues for female nurses (4).

Our analysis revealed that married nurses experience significantly higher insomnia compared to their single counterparts. This study's findings align with previous research (8). Married nurses may suffer from increased insomnia due to the added responsibilities of managing a household and family commitments. Balancing work with a partner's and children's demands can elevate stress levels (8), leading to difficulty achieving restful sleep. Furthermore, the emotional and physical needs of caregiving at home can leave little time for self-care and relaxation, contributing to poor sleep quality.

This study highlights that an increased frequency of night shifts significantly predicts higher rates of insomnia. Some studies have reported that night shift workers experience shorter sleep duration, lower efficiency, and prolonged latency compared to their day shift counterparts (2, 14, 24). These findings align with a study from Korea, which demonstrates disparities in sleep quantity, efficiency, and latency between day and night shifts (25), as well as a Chinese study where nurses working ≥4 monthly night shifts reported poorer sleep quality compared to those with fewer or no night shifts (20). While a Danish study found no difference in sleep medication use between nurses with and without night shifts (24). This may reflect regional variations in prescribing practices or coping strategies. Critically, the circadian cycle's two-day recovery period after night shifts supports recommendations for scheduling at least 48-hour intervals between shifts to mitigate sleep disruption. Such evidence highlights the need for institutional policies to optimize shift rotation and recovery. While forward-rotating shifts in Italy were linked to reduced fatigue and improved attention (23). The cumulative burden of frequent night shifts exacerbates circadian disruption and sleep debt.

Limitations

This study has important methodological limitations to consider. First, the low response rate (30–39%) raises concerns about selection bias, as non-responders might differ systematically from participants, affecting the sample's representativeness. Second, the reliance on self-reported data increases the risk of recall and social desirability biases, particularly regarding medication use, potentially leading to underreporting of prevalence rates. Third, the lack of details on medication type, dosage, and frequency limits the analysis of dose-response relationships and medication effectiveness. These limitations highlight the need for future research to adopt more robust methodologies.

Conclusion

The high prevalence of insomnia among nurses highlights the urgent need for multi-level interventions to improve sleep health. Educational programs on sleep hygiene and circadian management should be integrated into nursing training at all levels. Healthcare institutions must implement policies that minimize sleep disruption, such as limiting consecutive night shifts, providing recovery time, and offering supportive environments like nap rooms or bright-light therapy. Non-pharmacological approaches, including mindfulness and cognitive behavioral techniques, should be prioritized over benzodiazepines to manage insomnia.

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Conflicts of interest

The authors declare no conflict of interest in this study.

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