SciMedCentral

Journal of Sleep Medicine & Disorders

Research Article

Sleep Hygiene Practices and Excessive Fatigue among Nurses Working at Comprehensive Specialized Hospitals in Northwest, Ethiopia

Tesfaye Segon[1]*, Mekidem Aderaw[1], Girum Nakie[2], Getasew kibralew[1], Biazin Yenealem[3], Endris Seid[3] and Habtamu Kerebih[2]

[1]*Department of Psychiatry, College of Medicine and Health Science, Injibara University, Ethiopia*

[2]*Department of Psychiatry, College of Medicine and Health Science, University of Gondar, Ethiopia*

[3]*Department of Psychiatry, College of Medicine and Health Science, Dilla University, Ethiopia*

***Corresponding author**

Tesfaye Segon, Department of Psychiatry, College of Medicine and Health Science, Injibara University, Injibara, Ethiopia, Tel: +251933214662

Submitted: 23 December, 2025

Accepted: 26 January, 2026

Published: 28 January, 2026

ISSN: 2379-0822

Keywords

- Fatigue
- Sleep hygiene practices
- Nurse
- Burnout syndrome
- Job related stress
- Depression
- Sleep Quality
- Ethiopia

Abstract

Background: Sleep problems pose global public health concerns, particularly among nurses, with approximately two-thirds experiencing sleep disturbances and fatigue. Although poor sleep hygiene and fatigue can impair nurses' performance and alertness, increasing work-related accidents, chronic diseases, absenteeism, burnout, and medical errors, ultimately threatening both nurses' well-being and patient safety, no studies have been conducted on this population in Ethiopia. This study assesses sleep hygiene practices and perceived fatigue, examine the associations between poor sleep hygiene and excessive fatigue, and risk factors among nurses.

Methods: An institutional-based cross-sectional study was conducted among 424 nurses via simple random sampling. Data collected using self-administered Sleep Hygiene Index (SHI), Chalder Fatigue Scale (CFS), and Pittsburgh Sleep Quality Index (PSQI) questionnaires analyzed with SPSS Version 26.0. Bivariate, multivariate, and Pearson correlation analyses were performed to identify associations and risk factors.

Results: Among the 424 sampled nurses, 412 participated, yielding a response rate of 97.2%. The prevalence of poor sleep hygiene practices, and perceived fatigue among nurses was 52.3%, and 89.3%, respectively. A significant positive correlation was found between poor sleep hygiene and fatigue ($r = 0.67$, $P < 0.001$), poor sleep hygiene practices were associated with higher fatigue levels. Experiencing burnout syndrome (AOR = 4.51, 95% CI: 2.60, 8.05), depression (AOR = 2.52, 95% CI: 1.53, 4.09), current alcohol drinkers (AOR = 1.95, 95% CI: 1.25, 3.08), shift work sleep disorders (AOR = 2.03, 95% CI: 1.17, 3.82), poor sleep quality (AOR=5.04,95% CI:2.33,9.52) , and job-related stress (AOR = 3.54, 95% CI: 1.76-6.98) were risk factors.

Conclusions: The findings indicate that over half of nurses working in comprehensive specialized hospitals had poor sleep hygiene, and highly experienced perceived fatigue. A significant positive correlation was found between poor sleep hygiene practices and fatigue. Thus, promoting good sleep habits to manage and prevent fatigue among nurses are crucial.

ABBREVIATIONS

AOR: Adjusted Odds Ratio; BOS: Burnout syndrome; CFS: Chalder Fatigue Scale; DASS-21: Depression Anxiety Stress Scales; ICSD-3: International Classification of Sleep Disorders; PSQI: Pittsburgh Sleep Quality Index; SHI: Sleep Hygiene Index; SWSD: Shift Work Sleep Disorder; UOG: University of Gondar; WHO: World Health Organization

BACKGROUND

Nurses are the primary hospital workforce, responsible for providing direct and continuous care to patients with high pressure, which drastically alters nurses' sleep habits [1]. Nurses routinely work overtime, resulting in poor sleep quality, physical and emotional exhaustion, and patient safety hazards due to nursing errors [2]. Globally, nurses face sleep problems such as interruptions, deprivation, and poor quality [3]. Sleep deprivation and disturbances in nurses can lead to physical and mental fatigue, chronic diseases, reduced quality of life, impaired job performance, compromised care quality, and decreased patient safety [4]. Despite the widespread occurrence and detrimental

effects of sleep issues among nurses, this field of study has received inadequate attention.

Sleep problems like sleep deprivation, poor sleep hygiene practices, poorer sleep quality and other sleep disorders can lead to prolonged physical and mental fatigue [5]. Fatigue, characterized by tiredness, exhaustion, and reduced energy, impairs one's ability to perform daily functions [6]. The American Nurses Association (ANA) defines nurse fatigue as impaired function due to mental and physical exhaustion [7]. Excessive demands, challenges, a rapidly changing environment, and high turnover rates make nurses particularly susceptible to work-related fatigue [8]. Nurses are particularly susceptible to work-related fatigue due to demanding workloads and challenging environments, which impacts their ability to provide quality care, leading to decreased alertness, concentration difficulties, low productivity, and increased error risk [9]. Prolonged fatigue in nurses is associated with health risks such as stress, anxiety, depression, back pain, headaches, and joint discomfort. Professionally, fatigue contributes to declining productivity and demotivation [10]. In healthcare, high fatigue levels correlate with low empathy, poorer work performance, lack of concentration, resignation, and increased risk of medical errors [11]. These risks negatively impact nursing performance, healthcare services, and patient care/safety.

Sleep-related problems are a global public health challenge, particularly nurses [12]. A recent study found that nurses experience sleep problems at a higher rate than the general population [13]. Worldwide, 61.0% of nursing staff have poor sleep quality [14]. Studies in Africa, including those from Ethiopia, report sleep disturbances among nurses at 77.1% in Nigeria [15], and 70.6% in Ethiopia [16]. Although, the magnitude of sleep disorders in the nursing population is well-documented, research into their management and treatment remains limited. Optimal sleep health involves feeling satisfied with sleep, having appropriately timed and sufficiently long sleep durations, sleeping efficiently, and maintaining alertness while awake [17]. Strategies to promote sleep health in the workforce include screening, assessment, and treatment of sleep disorders, along with pharmacological and non-pharmacological approaches like educational, environmental, behavioral, supportive, and multicomponent therapies [18]. Cognitive-behavioral therapy and sleep hygiene are increasingly recognized as interventions to enhance sleep quality and quantity. Promoting good sleep hygiene can address poor sleep, and educating individuals on these practices has proven effective in mitigating sleep-related issues, particularly in nurses [19].

Sleep hygiene practices refer to a set of behavioral and environmental recommendations designed to promote regular, restorative, and sufficient sleep, which is critically important for nurses who often face shift work, rotating schedules, and high-stress environments [20]. Due to its affordability, ease of implementation, lack of side effects and potential for rapid results, sleep hygiene is a practical first-line approach for managing sleep problems by promoting regular and restorative sleep which is essential given shift work, rotating schedules, and high-stress environments inherent in nursing in resource-limited areas with constrained healthcare access [21]. For nurses, sleep hygiene extends beyond general advice, serving as a vital tool to counter circadian rhythm disruptions and cumulative sleep debt through consistent sleep-wake schedules, optimized sleep environments, and pre-sleep wind-down routines [22]. While good sleep hygiene can significantly enhance nurses' health, sleep quality, and patient safety, there is no statistical evidence regarding its current evidence base for the nursing population in Ethiopia.

Poor sleep hygiene is a primary driver in the development of chronic insomnia and the persistence of various other sleep disorders [23]. Poor sleep hygiene in nurses refers to the counterproductive behaviors and environmental choices such as inconsistent sleep schedules, exposure to blue light before bed, consuming stimulants like caffeine too close to a shift, alcohol, smoking or attempting to sleep in a non-conducive environment that directly exacerbate the sleep disruptions inherent to their profession, leading to insufficient and non-restorative sleep [17]. A lack of understanding regarding correct sleep hygiene often results in unhealthy sleep habits, which detrimentally affect one's health and overall wellness [24]. By practicing cognitively and emotionally stimulating behaviors at night, poor sleep hygiene directly contributes to psychophysiological insomnia by preventing the relaxation necessary for sleep [22].

Poor sleep hygiene is a widespread problem for nurses in major hospitals, largely driven by the strenuous nature of their roles, which involve prolonged shifts, rotating schedules, and high-pressure environments [25]. Nurses are essential to the healthcare system, yet the demanding nature of their work including long hours and shift patterns frequently disrupts their natural sleep-wake cycles, adversely affecting their daily functioning [26]. This condition may result in negative physiological, mental, and social consequences, indicating potential underlying health issues [2]. This impact leads to impairment in learning, focusing, safe functioning, and decision-making skills and increases the likelihood of making medical errors,

work-related accidents or injuries, and absence from the workplace [27]. Sleep problem challenges faced by nurses have gained significant social attention, impacting not only their health but also nursing quality, patient mental health, and the treatment process [28]. Thus, Enhancing sleep hygiene is fundamental for safeguarding nurses' physical and mental health, bolstering their professional well-being, and ensuring the highest standards of patient safety and care quality [27].

Nurses are the main workforce at hospital institutions responsible for direct and uninterrupted care to patients susceptible to poor sleep habits [21,25]. Poor sleep habits among nurses, particularly those working in large-scale hospitals, significantly impact their daily functioning and overall quality of life [3]. These habits can lead to mental, cognitive, and social issues, as well as physical health outcomes like metabolic, cardiovascular, and endocrine disorders [29]. Psychological distress, depression, fatigue, burnout, anxiety, and suicidal tendencies can also result [30]. This can lead to impaired learning, focus, safe functioning, decision-making skills, and increased risk of medical errors, work-related accidents, and absenteeism [28]. Addressing these issues and promoting better sleep strategies can enhance nurse well-being and patient care [12]. Previous studies have indicated a variety of important factors underlying sleep hygiene disturbances among nurses and potentially contributing to altered sleep behaviors, including female gender, years of experience, working departments, shift work, coexisting primary sleep disorders, substance use, and mental health problems [31-34].

Poor sleep hygiene and fatigue can impair nurses' performance and alertness, increasing work-related accidents, chronic diseases, absenteeism, burnout, and medical errors, ultimately threatening patient safety [35,36]. However, low and middle-income countries, including Ethiopia, receive insufficient attention regarding sleep hygiene practices, awareness, perceived fatigue, and the correlation between sleep hygiene and fatigue among nurses in large-scale hospitals. This study aims to assess the prevalence of poor sleep hygiene practices and perceived fatigue, examine the associations between poor sleep hygiene and excessive fatigue, and identify related risk factors among nurses in these hospitals. This research will provide healthcare leaders and policymakers with insights to develop effective strategies for mitigating fatigue and enhancing sleep hygiene among nurses.

MATERIALS AND METHODS

Study Design, Area and Populations

An institutional-based cross-sectional study was carried out at three Comprehensive Specialized Hospitals in the Amhara Regional State, Northwest Ethiopia (University of Gondar (UOG), Tibebe Ghion, and Felegehywot Comprehensive Specialized Hospitals). These institutions are teaching hospitals that deliver specialized and general clinical services to both inpatients and outpatients across the northwest region through a referral system. The study was conducted From March 1 to April 1, 2025.

The source population for this study was all nurses all nurses employed at the three comprehensive specialized hospitals. The study population was all staff nurses who were present and accessible at work throughout the data collection period. Staff nurses who were accessible at work during the data collection periods were included in this study. Nurses with less than six months of professional experience and those who were unable to communicate due to an acute illness at the time of data collection time were excluded.

Sample Size Determination and Procedures

The sample size was calculated by using the single population proportion formula, employing a 95% confidence level, a 5% margin of error, and an assumed prevalence (P) of 50% due to the absence of prior research on sleep hygiene practices among Ethiopian nurses. After adding a 10% non-response rate, the final calculated sample size required for the study was 424 participants. Study participants were selected using a simple random sampling technique. In the first stage, the sample of the study was drawn from the three comprehensive specialized hospitals in Northwest, Amhara region, Ethiopia. The number of nurses working on each CSH was obtained from each of the hospitals. Accordingly, the final sample size was proportionally allocated to each hospital based on the number of their nurses. Finally, a computer-generated simple random sampling method was employed to select nurses by using their sampling frame from each hospital.

Data Collection Instruments

Data were collected using self-administered questionnaires that included the **Sleep Hygiene Index (SHI)** to assess sleep hygiene practice. The Sleep Hygiene Index (SHI) is a 13-item instrument, derived from the International Classification of Sleep Disorders diagnostic criteria for inadequate sleep hygiene, and validated for research and clinical use. The SHI demonstrates adequate construct reliability and validity (Cronbach's alpha = 0.71) [37,38]. Participants rate the frequency of 13 specific behaviors on a five-point scale (0 = never to 4 = frequently), and items are summed for a global

sleep hygiene assessment (range 0-52). In this study, the SHI's Cronbach's alpha was 0.83. Participants scoring at or above the mean were classified as having poor sleep hygiene practices [37].

Excessive fatigue was assessed using the **Chalder Fatigue Scale (CFS),** an 11-item questionnaire evaluating physical and mental fatigue. Questions are scored on a 4-point Likert scale (0: better than usual; 1: no worse than usual; 2: worse than usual; 3: much worse than usual), with total scores ranging from 0 to 33 (higher scores indicate greater fatigue). The questionnaire assesses energy levels, strengths, weaknesses, and memory. The Cronbach's alpha for the CFS in this study was 0.81. Scores ≥ 4 were categorized as excessive fatigue [39].

Explanatory variables were measured using standardized tools, including the **Depression, Anxiety, and Stress Scale (DASS-21).** It consists of 21 items across three domains, each containing seven items that assess symptoms of depression, anxiety, and stress. Scores from each dimension were summed and then multiplied by two. The Cronbach alpha for the DASS-21 in this study was 0.78 for depression, and 0.76 for anxiety. A score of ≥ 10 on the depression subscale indicates depression, while a score of ≥ 8 on the anxiety subscale indicates anxiety [40]. Sleep quality was assessed using the **Pittsburgh Sleep Quality Index (PSQI),** a 19-item questionnaire evaluating seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep medication use, and daytime dysfunction. The global PSQI score ranges from 0 to 21, with scores >5 indicating poor sleep quality [41]. The PSQI has been validated in Ethiopia for community settings, demonstrating a sensitivity of 82%, a specificity of 56.2%, and a Cronbach's alpha of 0.81 [42]. In the current study, the PSQI's Cronbach's alpha was 0.79.

Job-related stress among nurses was evaluated using a modified nursing stress scale with 26 items. The items are divided into seven major subscales. Thus are workload (has five items), lack of support (has three items), conflict (has four items), uncertainty regarding patient treatment (has four items), dealing with death & dying (has three items), inadequate preparation (has three items), organizational decisions (has three items), and sexual harassment (has one item). The total stress score that provides the overall stress levels among nurses was obtained by adding all the scores on 26 items together. A minimum score of 26 and a maximum score of 104 was possible, the higher the score indicates the higher level of stress. A score above the median value indicates the presence of job-related stress [43].

Burnout syndrome (BOS) was assessed by the 19-item self-reported symptoms of BOS from the Astudillo and Mendinueta rated from 0 (never), 1 (sometimes), 2 (often), and 3 (always). The sum of the scores of the rating of the items was calculated with a total minimum score of 0 to a maximum score of 57. Nurses who scored more than 23 were considered burned out [44].

Shift Work Sleep Disorders (SWSD) were evaluated using three questions designed for diagnosing SWSD in epidemiological studies, aligned with the symptoms and criteria outlined in the ICSD-3. Respondents needed to answer 'yes' to all three questions to meet the criteria for shift work sleep disorder [45].

ASSIST (Alcohol, Smoking, and Substance Involvement Screening Test) questionnaire adapted from the WHO was used to assess substance use [46]. The Oslo 3 Social Support Scale measures the perceived level of social support. The scale divides the level of social support into three categories: poor (3-8), moderate (3-14), and strong (12-14) [47]. Structured questionnaires were used to collect socio-demographic, clinically related, comorbid medical illness, and mental illness history data.

Data Collection Procedure and Data Quality Control

The questionnaire, originally in English, was translated into Amharic and back-translated by language and mental health experts to ensure clarity and consistency. Standardized and validated assessment tools were used. Data collectors and supervisors were trained on study tools, procedures, and ethical considerations. The questionnaire was pre-tested on 5% of the total sample (n = 22) at Injibara General Hospital one week prior to the study; these participants were excluded from the main study. The data collection procedure was finalized two days prior to data collection. Completed questionnaires were reviewed daily for consistency under close supervision. Data were collected using self-administered, pre-tested, structured, and standardized questionnaires.

Data Processing and Analysis

Data were entered in Epi-Data (version 4.6.02) and analyzed using SPSS (version 26.0). Descriptive statistics (frequency, means, standard deviations, and percentage) summarized data distribution. Bivariate and multivariable logistic regression models were employed, with variables having $p < 0.2$ in bivariate analysis included in the multivariable model to control for confounding. Model fit was assessed using the Hosmer-Lemeshow test. Multivariable logistic regression identified significant

related factors using Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI) and $p < 0.05$. Finally, Pearson's correlation coefficient (r) was used to test the correlation between sleep hygiene practices and excessive fatigue.

RESULTS

Socio-Demographic Characteristics of the Respondents

This study included 412 voluntary participants, yielding a 97.2% response rate. Participants ranged in age from 18 to 45 years (mean age = 28.86, SD = 3.86). Of these, 227 (55.1%) were male, and 182 (44.2%) were single. The majority (294, 71.4%) of the participants were degree holders, 81 (19.7%) worked in the surgical unit, and nearly half of the participants had less than five years of work experience (Table 1).

Clinical Characteristics of the Participants

In the study, 170 (41.3%) of participants had burnout syndrome, and 35.4% (146) had depression. Over half the participants 57.5% (237) experienced job-related stress, and 11.7% (48) reported chronic medical illness (Table 2).

Table 1: Distribution of socio-demographic characteristics of nurses working at comprehensive specialized hospitals in Northwest Ethiopia, 2024 (n = 412).

Variables	Categories	Frequency	Percent (%)
Age	< 25 years	39	9.5
	25-30 years	232	56.3
	31-35 years	106	25.7
	> 35 years	35	8.5
Sex	Male	227	55.1
	Female	185	44.9
Marital status	Married	205	49.7
	Single	182	44.2
	Others*	25	6.1
Educational status	Diploma	47	11.4
	BSc degree	294	71.4
	MSc and above	71	17.2
Working unit	Internal medicine	77	18.6
	Surgery	81	19.7
	Gynecology and obstetrics	40	9.7
	Emergency	67	16.3
	ICU	47	11.4
	Psychiatry	7	1.7
	Pediatrics	51	12.4
	OPD	42	10.2
Work experience	<5 years	200	48.5
	5-10 years	170	41.3
	> 10 years	42	10.2
Monthly income	< 4185	40	9.7
	4185-6520	231	56.1
	> 6520	141	34.2
Working in shifts	Yes	153	37.12
	No	259	62.88

*Others: Divorced, widowed, and separated.

Psychosocial and Behavioral Characteristics of Study Participants

Among study participants, about one-third (30.1%) of nurses were current alcohol drinkers, 23 (5.6%) were current cigarette smokers, and 40 (9.7%) were current khat users. Regarding social support, the majority (36.9%) had reported moderate social support (Table 3).

Magnitudes of Poor Sleep Hygiene Practices among Nurses

A study found that 52.3% of nurses [95% CI (47.8, 56.3)] exhibited poor sleep hygiene practices. Most participants (63.9%) reported having no prior education on sleep hygiene, while 36.1% learned about it from media or other sources; none had received formal training. Specific poor sleep hygiene practices were common: 68.3% frequently

Table 2: Clinical characteristics of nurses working at comprehensive specialized hospitals in Northwest Ethiopia, 2024 (n = 412).

Variables	Categories	Frequency	Percentage (%)
Burnout syndrome	Yes	170	41.3
	No	242	58.7
Depression	Yes	146	35.4
	No	266	64.6
Anxiety	Yes	163	39.6
	No	249	60.4
Job-related Stress	Yes	257	62.4
	No	155	37.6
Chronic medical illness	Yes	48	11.7
	No	364	88.3
Shift work sleep disorder	Yes	153	37.1
	No	259	62.9
Sleep quality	Yes	284	68.9
	No	128	31.1

Table 3: Psychosocial and behavioral characteristics of nurses working at comprehensive specialized hospitals in Northwest Ethiopia, 2024 (n = 412).

Variables	Categories	Frequency	Percentage
Ever use of Khat	Yes	61	14.8
	No	442	85.2
Current use of khat	Yes	40	9.7
	No	372	90.3
Ever use of alcohol	Yes	150	36.4
	No	262	63.6
Current use of alcohol	Yes	124	30.1
	No	288	69.9
Ever use of cigarette	Yes	32	7.8
	No	380	92.2
Current use of cigarette	Yes	23	5.6
	No	389	94.4
Ever use of shisha	Yes	8	1.9
	No	404	98.1
Current use of shisha	Yes	5	1.2
	No	407	98.8
Social support	Low	136	33.0
	Moderate	152	36.9
	Strong	124	30.1

went to bed stressed, 78.7% used substances (alcohol, tobacco, or caffeine) before bed, 58.1% engaged in bedtime rumination (thinking, planning, and worrying), 83.4% had inconsistent bedtimes, 85.6% had inconsistent wake times, 48.3% spent excessive time in bed multiple times per week, 61.8% engaged in stimulating activities before bed (video games, internet), and 43.6% took daytime naps.

Risk Factors of Poor Sleep Hygiene Practices among Nurses

Variables with $p < 0.2$ in binary logistic regression were considered for multivariable analysis. In the multivariable model, Burnout Syndrome (BOS), depression symptoms, current alcohol consumption, job-related stress, shift work sleep disorder (SWSD), and poor sleep quality were significantly associated with poor sleep hygiene practice (95% CI, $p \leq 0.05$) among Ethiopian nurses.

The odds of poor sleep hygiene practices were four times more common among nurses who had experienced BOS as compared to those who had not experienced BOS (AOR = 4.51, 95% CI: 2.60, 8.05). Participants with depressive symptoms were 2.52 times more likely to have poor sleep hygiene practices than nurses who did not (AOR = 2.52, 95% CI: 1.53, 4.09). Participants who were current alcohol drinkers were nearly two times more likely to have poor sleep hygiene practices as compared to their counterparts (AOR = 1.95, 95% CI: 1.25, 3.08). Nurses who had SWSD were about two times more likely to have poor sleep hygiene practices than participants who did not have SWSD (AOR = 2.03, 95% CI: 1.17, 3.82). Participants who had job-related stress were about 3.54 times more likely to develop poor sleep hygiene practices when compared with those who had no job-related stress (AOR = 3.54, 95% CI: 1.78, 6.21). Moreover, nurses with poor sleep quality were five times more likely to develop poor sleep hygiene practices than those without sleep quality issues (AOR = 5.04, 95% CI: 2.33, 9.52) (Table 4).

Magnitudes of Excessive Fatigue among Nurses

In the current study, a Chalder Fatigue Scale (CFS) assessment revealed that 89.3% of nurses at comprehensive specialized hospitals were experiencing severe fatigue. The Pearson's correlation test showed a significant positive association between poor sleep hygiene and fatigue ($r = 0.67$, $P < 0.001$), indicating that poorer sleep hygiene practices were associated with higher fatigue levels in participants. Higher scores on the Sleep Hygiene Index (SHI) were strongly associated with higher scores on the Chalder Fatigue Scale (CFS), reflecting more severe fatigue. Nurses who engage in worse sleep hygiene practices are significantly more likely to report higher levels of excessive fatigue (Table 5).

DISCUSSION

Poor sleep hygiene practices and high levels of perceived fatigue can impair nurses' performance and alertness, increasing work-related accidents, chronic diseases, absenteeism, burnout, and medical errors, ultimately threatening both nurses' well-being and patient safety. To the best of our knowledge, this is the first study in Ethiopia on nurses' knowledge and practice of sleep hygiene, perceived fatigue, their association, and related risk factors. The failure to follow proper sleep hygiene, often stemming from a lack of knowledge, leads to poor sleep habits that compromise both health and well-being, leads to fatigue. The findings are useful for developing and applying better sleep hygiene practices for nurses in these specialized hospital settings. This study aims to assess the prevalence of poor sleep hygiene practices and perceived fatigue, examine the associations between poor sleep hygiene and excessive fatigue, and identify related risk factors among nurses in these hospitals.

The study revealed that, the magnitude of poor sleep hygiene practice among nurses was 52.3% (95% CI: 47.8, 56.3). This is in line with previous studies done in the United States [48], India [32], Taiwan [33], Korea [49], and Australia [50]. Enhancing nurses' knowledge of good sleep hygiene practices is an effective strategy for mitigating poor sleep and reducing sleep disturbances [50]. Hospitals should provide training on the importance of sleep hygiene and strategies to improve it, and integrate sleep hygiene promotion into nurses in health care services [48]. Encourage nurses to prioritize sleep as part of their self-care routine, provide access to mental health resources, and be seen as an integral part of managing and treating sleep disorders among nurses by promoting healthy habits [49]. However, the magnitude of poor sleep hygiene practice in this study was higher than in previous studies done in Australia 42.5% [51], and Turkiye 34.6% [52]. The possible explanation for this discrepancy might be due to systemic and socioeconomic differences, sampling population differences, level of mental health awareness, and data collection methods.

For example, the above study was conducted, and data were collected through an online survey (Google Forms) through a convenience sampling method, whereas for the current study, data were collected using semi-structured self-administered questionnaires by simple random sampling. Australian and Turkish nurses benefit from better-resourced healthcare systems that may promote

Table 4: Bi-variables and multi-variables regression analysis between poor sleep hygiene practices and explanatory variables among nurses working at comprehensive specialized hospitals in Northwest Ethiopia, 2024 (n = 412).

Variables	Category	Sleep hygiene practice		COR(95% CI)	AOR(95% CI)	*P*-value
		Poor	Good			
Sex	Female	110	75	1.53 (0.80-2.73)	1.17 (0.37-1.96)	0.160
	Male	111	116	1	1	
Work experience	< 5 years	101	81	1	1	
	5-10 years	75	95	0.63 (0.36-1.34)	0.73 (0.49-1.17)	0.402
	> 10 years	40	20	1.60 (1.01-2.92)	1.32 (0.68-2.01)	0.083
Burnout syndrome	Yes	130	40	5.89 (2.76-10.51)	4.51 (2.10-8.05)	0.001**
	No	86	156	1	1	
Depression	Yes	103	43	3.24 (2.01-5.23)	2.52 (1.53-4.09)	0.010**
	No	113	153	1	1	
Anxiety	Yes	118	45	4.04 (2.13-7.60)	1.70 (0.91-3.14)	0.062
	No	98	151	1	1	
Chronic medical illness	Yes	30	18	1.59 (0.79-2.74)	1.04 (0.60-1.78)	0.252
	No	186	178	1	1	
Current use of khat	Yes	27	13	2.01(0.86-3.87)	1.42 (0.58-2.37)	0.143
	No	189	183			
Current use of alcohol	Yes	87	37	2.89 (1.87-4.37)	1.95 (1.25-3.08)	0.004**
	No	129	159	1	1	
Job related stress	Yes	173	84	5.36 (2.71-9.24)	3.54 (1.76-6.98)	0.002**
	No	43	112	1	1	
Shift work sleep disorder	Yes	104	49	2.78 (1.68-4.37)	2.03 (1.17-3.82)	0.013*
	No	112	147	1	1	
Sleep quality	Good Poor	30 193	98 91	1 6.93 (3.01-11.76)	1 5.04 (2.33-9.52)	< 0.001**

Note: *p*-value = **< 0.01; *< 0.05
Hosmer-Lemeshow test = 0.78

Table 5: Pearson's Correlation for Sleep Hygiene Practices and Excessive Fatigue (N = 412).

Variables	Mean(SD)	Poor Sleep Hygiene	Excessive Fatigue
Poor Sleep Hygiene	28.7 (6.93)	_____	
Excessive Fatigue	14.53 (6.27)	0.67***	_____

Note: N = Sample Size, SD = Standard Deviation.
The value 0.67 is the Pearson's Correlation Coefficient (r).
***= indicates the correlation is statistically significant (*P* < .001).

well-being through sleep hygiene education, lower patient-to-nurse ratios, and predictable schedules [51]. Ethiopian nurses, however, often face heavy workloads, staff shortages, and disruptive shifts due to underfunding. Furthermore, economic instability, lower health literacy, and less emphasis on occupational well-being in Ethiopia further hinder the prioritization and practice of good sleep hygiene, even among tertiary hospital professionals [49,53].

In the this study, we found that participants who had experienced BOS were 4.51 times more likely to have poor sleep hygiene practices than those who had not. The findings are consistent with other research conducted in Spain [54], and Iran [1]. This could be because of nursing professionals are highly susceptible to chronic work stress due to their close relationship with patients, causing hyperarousal and poor sleep hygiene practices [55]. The other possible justification is stress hormones like cortisol disrupt sleep-wake cycles, making it difficult to maintain a consistent sleep schedule [30]. Moreover, individuals experiencing burnout can lead to rumination about work-related issues, emotional exhaustion, apathy, and neglect of self-care practices, including sleep hygiene, resulting in erratic sleep schedules and poor sleep hygiene [56]. To cope with burnout fatigue, nurses may rely on caffeine or other stimulants throughout the day and alcohol or sedatives to help them sleep, which can disturb sleep architecture and lower sleep quality [55]. To address poor sleep hygiene caused by burnout, help nurses with stress management or therapy to address the root causes of burnout.

Participants with depressive symptoms were 2.52 times more likely to have poor sleep hygiene habits than those who were not. The findings were consistent with previous research conducted in Taiwan [57], China [58], Jordan [59], and Iran [53]. This may be due to the fact that fatigue and amotivation associated with depression impair the executive function required to adhere to the structured routines essential for good sleep hygiene [33]. The link may also be explained by the role of serotonergic neurons in regulating sleep; their dysfunction in depressed individuals can lead to poor sleep habits [60]. Furthermore, depressed nurses may develop counterproductive coping mechanisms like excessive napping or caffeine use,

which worsen sleep quality and exacerbate depressive symptoms, creating a negative feedback loop [61]. Therefore, addressing depression in nurses is a critical step for improving their sleep hygiene.

The study also reported that, participants who experienced job-related stress had 3.54 times higher odds of poor sleep hygiene practices compared to their counterparts. This result was in line with studies done in Taiwan [2], China [31], and Korea [35]. This could be because nurses deal with human suffering daily, medical emergencies add to the tension of patient care, and nurses deal with grief and loss when a patient dies, which increases a nurse's stress level and affects nurse health, eventually leading to poor sleep hygiene practice [62]. Nurses under a persistently high state of stress may feel burned out, frustrated, irritated, and exhausted, accompanied by a decrease in slow-wave and rapid eye movement, and increased sleep deprivation results in poor sleep hygiene practices [30]. In addition, job stress persists for long periods; nurses may neglect their job requirements and inadvertently cause medical errors, needle stick injuries, incorrect operation of medical equipment, suffer from occupational burnout, or even resign, which affects their sleep hygiene habits [56]. Moreover nursing, by its nature, is a profession subjected to a high degree of stress, feelings of being overloaded, wound-up tight, tense, and worried that have a direct impact on their sleep hygiene practices [56].

Nurses who were current alcohol drinkers had approximately two times higher odds of having poor sleep hygiene practices compared to the reference group. Studies from Taiwan [33], Korea [49], and Japan [63], supported this. One of the possible explanations is that alcohol consumption directly disrupts sleep architecture by suppressing REM sleep, and increasing slow-wave sleep in the initial sleep cycle, thereby impairing sleep quality [64]. The other possible justification could be nurses with a lack of consistency in both quantity and quality of sleep, including difficulties falling asleep, frequent sleep disturbances, and daytime sleepiness, which can all contribute to poor sleep quality. The use of alcohol to induce sleep eventually leads to poor sleep hygiene practices [63]. Moreover, a nurse drinking alcohol is common among stressed-out nurses as a stress reliever to overcome the stress and may disrupt their sleep hygiene practices [65]. Furthermore, alcohol may be utilized by nurses to induce sleepiness, particularly if trying to sleep at non-traditional times; despite eliciting sleepiness, alcohol consumption near bedtime can adversely impact both sleep quantity and quality, negatively resulting in poor sleep hygiene practice [64,65].

This finding also revealed that, those nurses with SWSD were two times more likely to experience poor sleep hygiene practice. This is consistent with a previous study conducted in Australia [51], China [66], and Germany [67]. Nurses are required to provide round-the-clock patient care, which leads to irregular and highly disruptive work schedules, making them a high-risk group for developing shift work sleep disorder that results in poor sleep hygiene practice [68,69]. This may be due to in the hospital, rotating shifts change frequently from day to night shifts, and most nurses working night shifts struggle to adjust to daytime activities or normal night sleep patterns on days off that shift work interferes with the circadian and homeostatic regulation of sleep practice [70]. In addition, SWD is a circadian rhythm sleep disorder characterized by the presence of insomnia symptoms and/or sleepiness associated with shift work schedules that eventually lead to poor sleep hygiene practice [71].

Furthermore, nurses with poor sleep quality were five times more likely to have poor sleep hygiene practices. This is supported by other studies done in China [31], and Taiwan [2]. This could be due to the demanding, rotating shift work in tertiary hospitals subject's nurses to high stress, leading to poor initial sleep quality [72]. Exhaustion after night shifts further hinders structured wind-down routines and consistent sleep schedules, resulting in poor sleep hygiene [28]. Consequently, reduced mental, physical, and emotional well-being may cause nurses to adopt short-term, inappropriate coping strategies like increased caffeine, inconsistent sleep, and alcohol consumption, exacerbating poor sleep hygiene [73].

Fatigue Level among Nurses

Poor sleep hygiene and fatigue negatively affect nurses' mental and physical health, potentially compromising patient safety, quality of care, productivity, and increasing the risk of chronic diseases, medication errors, and burnout. This study assessed fatigue levels using the Chalder Fatigue Scale (CFS) and their association with poor sleep hygiene among nurses in Ethiopian comprehensive specialized hospitals. The prevalence of excessive fatigue was 89.3%, similar to findings in Saudi Arabia (90.2%) [74], but lower than in China (100 [75], and Taiwan (100%) [36]. These discrepancies may stem from the use of different fatigue assessment scales; for example, China [75], used the Lee Fatigue Scale-Short Form (C-LFS-SF), and Taiwan [36], used the Checklist Individual Strength (CIS) scale, while this study employed the CFS. Conversely, the prevalence of excessive fatigue in this study was higher than that reported in Norway (35.4%) [76]. The difference may stem from variations in human resources, facilities, and

occupational health systems. Nurses in developed countries like Norway likely benefit from safer working conditions and better resources due to stronger economies and supportive regulatory policies, unlike nurses in developing countries such as Ethiopia. In Ethiopia, a low nurse-patient ratio and limited qualified personnel, coupled with a high disease burden, can increase workload, stressors, physical exertion, and cognitive overload, ultimately leading to excessive fatigue [77,78].

Associations between Poor Sleep Hygiene Practices and Fatigue

In the current study, the Pearson's correlation analysis revealed that there were a significant positive correlation between poor sleep hygiene practices and overall fatigue ($r = 0.67$, $P < 0.001$), indicating that poorer sleep hygiene was associated with higher fatigue levels among nurses working at comprehensive specialized hospitals. This finding is consistent with studies in Saudi Arabia [74], Norway [76], Taiwan [36], and China [75], which have also demonstrated a significant positive relationship between poor sleep hygiene and excessive fatigue. Nurses who engage in worse sleep hygiene practices are significantly more likely to report higher levels of excessive fatigue. These results highlight the importance of promoting good sleep habits to manage and prevent fatigue among nurses.

LIMITATION OF THE STUDY

This study explores poor sleep hygiene practices and perceived fatigue, examine the associations between poor sleep hygiene and excessive fatigue, and identify related risk factors among nurses in Ethiopia. However, it has limitations. Firstly, the cross-sectional study design makes it difficult to establish cause-effect relationships between the outcome and explanatory variables. Secondly, the study did not assess the factors that influence perceived fatigue among nurses. Longitudinal studies that follow participants over time would provide a more comprehensive understanding of how poor sleep hygiene practices and various factors interact and influence each other.

CONCLUSIONS AND RECOMMENDATIONS

The study found that most nurses in comprehensive specialized hospitals had poor sleep hygiene and experienced high levels of fatigue. A significant positive correlation was found between poor sleep hygiene practices and high level of perceived fatigue. Experiencing burnout syndrome, depression, current alcohol drinkers, shift work sleep disorders, poor sleep quality and job-related stress were risk factors of poor sleep hygiene practices. Thus, regular screening, and promoting good sleep habits to manage and prevent fatigue among nurses are crucial. Training programs and awareness strategies to improve sleep hygiene are highly recommended. By addressing the risk factors and implementing strategies to promote healthy sleep habit, hospitals can improve the well-being of their nursing staff and enhance the quality of patient care. Hospitals should support nurses by offering sleep hygiene training, flexible scheduling, and stress management or therapy to combat burnout. Nurses should prioritize sleep for their well-being and professional performance.

DECLARATIONS

Ethics Approval and Consent to Participate

Ethical approval for this study was obtained from the Ethical Review Committee of Injibara University Department of Psychiatry. Informed written consent was obtained from each participant after providing a clear explanation of the study's purpose and objectives. Participants were assured that their participation was voluntary and that they had the right to withdraw at any time without any negative consequences. To ensure confidentiality, participants' identities were kept anonymous, and personal information was treated with strict confidentiality throughout the study.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Availability of Data and Materials

The raw data used in this study are available upon request from the corresponding author.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors Contributions

Tesfaye Segon: Conceived the study, and Design, Methodology, Carried out the statistical analyses, Curation, Supervision, Writing- Reviewing and Editing. Mekidem Aderaw: Data collection, Supervision and Reviewing. Girum Nakie: Interpretation of data and Reviewing. Getasew Kibralew: Data Collection, Interpretation of data and Reviewing. Biazin Yenealem: Interpretation of

data, and Reviewing. Endris Seid: Interpretation of data, Curation, and Reviewing. Habtamu Kerebih: Supervision, Curation, and Reviewing. All authors read and approved the final manuscript. All authors have given final approval of the present version to be published.

Acknowledgements

We would like to express our sincere gratitude to all the participants who generously gave their time and cooperated with us during this study. We also extend our appreciation to the dedicated data collectors and supervisors who played a vital role in ensuring the quality of the data.

REFERENCES

1. Sepehrmanesh Z, Mousavi G, Saberi H, Saei R.Sleep quality and related factors among the nurses of the Hospital of Kashan University of Medical Sciences, Iran. Int Arch Health Sci. 2017; 4: 17-21.
2. Lin SH, Liao WC, Chen MY, Fan JY. The impact of shift work on nurses' job stress, sleep quality and self-perceived health status. J Nursing Management. 2014; 22: 604-612.
3. Kaliyaperumal D, Elango Y, Alagesan M, Santhanakrishanan I. Effects of sleep deprivation on the cognitive performance of nurses working in shift. J Clin Diagnostic Res. 2017; 11: pCC01.
4. Gómez-García T, Ruzafa-Martínez M, Fuentelsaz-Gallego C, Madrid JA, Rol MA, Martínez-Madrid MJ, et al Nurses' sleep quality, work environment and quality of care in the Spanish National Health System: observational study among different shifts. BMJ open. 2016; 6: e012073.
5. Yuan SC, Chou MC, Chen CJ, Lin YJ, Chen MC, Liu HH, et al. Influences of shift work on fatigue among nurses. J Nurs Manag. 2011; 19: 339-345.
6. Phillips RO. A review of definitions of fatigue–And a step towards a whole definition. Transportation research part F: traffic psychology and behaviour, 2015; 29: 48-56.
7. Association AN. Addressing nurse fatigue to promote safety and health: Joint responsibilities of registered nurses and employers to reduce risks. Silver Spring, MD: American Nurses Association. 2014.
8. Min A, Kim YM, Yoon YS, Hong HC, Kang M, Scott LD. Effects of work environments and occupational fatigue on care left undone in rotating shift nurses. J Nursing Scholarship. 2021; 53: 126-136.
9. Sagherian K, Clinton ME, Abu-Saad Huijer H, Geiger-Brown J. Fatigue, work schedules, and perceived performance in bedside care nurses. Workplace Health Safety. 2017; 65: 304-312.
10. Caruso CC. Reducing risks to women linked to shift work, long work hours, and related workplace sleep and fatigue issues. J Women's Health. 2015; 24; 789-794.
11. Bell T, Sprajcer M, Flenady T, Sahay A. Fatigue in nurses and medication administration errors: A scoping review. J Clin Nursing. 2023; 32: 5445-5460.
12. Wells ME, Vaughn BV. Poor sleep challenging the health of a nation. The Neurodiagnostic J. 2012; 52: 233-249.
13. Shao MF, Chou YC, Yeh MY, Tzeng WC. Sleep quality and quality of life in female shift-working nurses. J Advan Nursing. 2010; 66: 1565-1572.
14. Zeng LN, Yang Y, Wang C, Li XH, Xiang YF, Hall BJ. Prevalence of poor sleep quality in nursing staff: a meta-analysis of observational studies. Behavioral Sleep Medicine. 2020; 18: 746-759.
15. Kolo ES, Ahmed AO, Hamisu A, Ajiya A, Akhiwu BI. Sleep health of healthcare workers in Kano, Nigeria. Nigerian J Clin Practice. 2017; 20: 479-483.
16. Olana DD, AM Ayana, ST. Abebe. Sleep quality and its associated factors among nurses in jimma zone public hospitals, Southwest Ethiopia, 2018. Sleep and Hypnosis. 2019; 21: p271-280.
17. Chung KF, Lee CT, Yeung WF, Chan MS, Chung EW, Lin WL. Sleep hygiene education as a treatment of insomnia: a systematic review and meta-analysis. Family practice. 2018; 35: 365-375.
18. Edinger JD, Arnedt JT, Bertisch SM, Carney CE, Harrington JJ, Lichstein KL, et al. Behavioral and psychological treatments for chronic insomnia disorder in adults: an American Academy of Sleep Medicine clinical practice guideline. J Clin Sleep Med. 2021; 17: 255-262.
19. Dopheide JA. Insomnia overview: epidemiology, pathophysiology, diagnosis and monitoring, and nonpharmacologic therapy. Am J Managed Care. 2020; 26: S76-S84.
20. Carney CE, Edinger JD, Kuchibhatla M, Lachowski AM, Bogouslavsky O, Krystal AD, et al. Cognitive behavioral insomnia therapy for those with insomnia and depression: a randomized controlled clinical trial. Sleep. 2017; 40: pzsx019.
21. Hsieh ML, Li YM, Chang ET, Lai HL, Wang WH, Wang SC. Sleep disorder in Taiwanese nurses: a random sample survey. Nursing Health Sci. 2011; 13: 468-474.
22. Cooke M, Ritmala-Castrén M, Dwan T, Mitchell M. Effectiveness of complementary and alternative medicine interventions for sleep quality in adult intensive care patients: A systematic review. Int J Nursing Stud. 2020; 107: 103582.
23. Stepanski EJ, Wyatt JK. Use of sleep hygiene in the treatment of insomnia. Sleep Med Rev. 2003; 7: 215-225.
24. Sun L, Li K, Zhang Y, Zhang L. Sleep-related healthcare use prevalence among adults with insomnia symptoms in Hebei, China: a population-based cross-sectional study. BMJ Open. 2022; 12: e057331.
25. Niu SF, Miao NF, Liao YM, Chi MJ, Chung MH, Chou KR. Sleep quality associated with different work schedules: A longitudinal study of nursing staff. Biological Res Nursing. 2017; 19: 375-381.
26. Kunert K, King ML, Kolkhorst FW. Fatigue and sleep quality in nurses. J Psychosocial Nursing Mental Health Services. 2007; 45: 31.
27. Lee HJ. Predictors of job performance, work satisfaction, and productivity among Korean hospital nurses. J Korean Academy of Nursing. 2001; 31: 571-583.
28. Caruso CC. Negative impacts of shiftwork and long work hours. Rehabilitation Nursing J. 2014; 39: 16-25.
29. Jung YJ, Kang SW. Differences in sleep, fatigue, and neurocognitive function between shift nurses and non-shift nurses. Korean J Adult Nursing. 2017; 29: 190-199.
30. Saini R, S Kaur, K Das. Assessment of stress and burnout among intensive care nurses at a tertiary care hospital. J Mental Health and Human Behav. 2011; 16: 43-48.
31. Dong H, Zhang Q, Sun Z, Sang F, Xu Y. Sleep disturbances among Chinese clinical nurses in general hospitals and its influencing factors. BMC Psychiatry. 2017; 17: 1-9.
32. Bindu S, Fareha K, Kuldip K. Assessment of sleep hygiene practices and sleep quality among nursing officers of selected Hospital in Delhi. Int J Nurs Midwifery Res. 2021; 8: 9-13.

33. Chou TL, Chang LI, Chung MH, The mediating and moderating effects of sleep hygiene practice on anxiety and insomnia in hospital nurses. Int J Nursing Practice. 2015; 21: 9-18.

34. Berry A, Richard J, Alison RY, Isabelle B. Examining the feasibility, acceptability and validity of physical activity, sedentary behaviour and sleep measures in people with schizophrenia. Predictors of physical morbidity and mortality in people with schizophrenia: 67.

35. Park E, Lee HY, Park CS. Association between sleep quality and nurse productivity among Korean clinical nurses. J Nursing Manag. 2018; 26: 1051-1058.

36. Chang WP, Wang CH. Wang, Influence of sleep fragmentation and fatigue on turnover of female nurses working rotating shifts. J Clinical Nursing. 2022; 31: 3573-3583.

37. Ozdemir PG, Boysan M, Selvi Y, Yildirim A, Yilmaz E. Psychometric properties of the Turkish version of the Sleep Hygiene Index in clinical and non-clinical samples. Comprehensive Psychiatry. 2015; 59: 135-140.

38. Mastin DF, Bryson J, Corwyn R. Assessment of sleep hygiene using the Sleep Hygiene Index. J Behav Med. 2006; 29: p223-227.

39. Cella M, Chalder T. Measuring fatigue in clinical and community settings. J Psychosomatic Res. 2010; 69: 17-22.

40. Henry JD, Crawford JR. The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. Brit J Clin Psychol. 2005; 44: 227-239.

41. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989; 28: 193-213.

42. Salahuddin M, Maru TT, Kumalo A, Pandi-Perumal SR, Bahammam AS, Manzar MD. Validation of the Pittsburgh sleep quality index in community dwelling Ethiopian adults. Health and quality of life outcomes. 2017; 15: 58.

43. Wei-Wen Liu, Feng-Chuan Pan, Pei-Chi Wen, Sen-Ji Chen, Su-Hui Lin. Job stressors and coping mechanisms among emergency department nurses in the armed force hospitals of Taiwan. 2010.

44. Astudillo W, Mendinueta C. Exhaustion syndrome in palliative care. Supportive care in cancer, 1996; 4: 408-415.

45. Rosenberg RS, Van Hout S. The American Academy of Sleep Medicine inter-scorer reliability program: sleep stage scoring. J Clin Sleep Med. 2013; 9: 81-87.

46. Group WAW, The alcohol, smoking and substance involvement screening test (ASSIST): development, reliability and feasibility. Addiction. 2002; 97: 1183-1194.

47. Abiola T, O Udofia, M Zakari, Psychometric properties of the 3-item oslo social support scale among clinical students of Bayero University Kano, Nigeria. Malaysian J Psychiatry. 2013; 22: 32-41.

48. Amy Witkoski M, Hospital staff nurses' work hours, meal periods, and rest breaks. Workplace Health & Safety. 2010; 58: 489.

49. Jung, BN, Han, Kihye, Yoo, Hae Young, Chung, Sophia Jihey. The Influence of Knowledge and Sleep Hygiene Performance on Sleep Disturbances Among Shift-Work Nurses. J Korean Biological Nursing Sci. 2020; 22: 308-316.

50. Rampling CM, Gupta CC, Shriane AE, Ferguson SA, Rigney G, Vincent GE. Does knowledge of sleep hygiene recommendations match behaviour in Australian shift workers? A cross-sectional study. BMJ Open. 2022; 12: e059677.

51. Booker LA, Barnes M, Alvaro P, Collins A, Chai-Coetzer CL, McMahon M, et al. The role of sleep hygiene in the risk of Shift Work Disorder in nurses. Sleep. 2020; 43: pzsz228.

52. Haylı,ÇM, GH Yönt, DD Kösem, Evaluation of Sleep Hygiene According to the Sociodemographic Characteristics of the Nurses. Online Turkish J Health Sci. 2023; 8: 296-306.

53. Yazdanshenas Ghazwin M, Kavian M, Ahmadloo M, Jarchi A, Golchin Javadi S, Latifi S, et al., The association between life satisfaction and the extent of depression, anxiety and stress among Iranian nurses: a multicenter survey. Iranian J Psychiatry. 2016; 11: 120.

54. Membrive-Jiménez MJ, Gómez-Urquiza JL, Suleiman-Martos N, Velando-Soriano A, Ariza T, et al. Relation between burnout and sleep problems in nurses: a systematic review with meta-analysis. in Healthcare. 2022; 10: 954.

55. Cañadas-De la Fuente GA, Vargas C, San Luis C, García I, Cañadas GR, De la Fuente EI. Risk factors and prevalence of burnout syndrome in the nursing profession. Int J Nursing Studies. 2015; 52: 240-249.

56. Dall'Ora C, Griffiths P, Ball J, Simon M, Aiken LH. Association of 12 h shifts and nurses' job satisfaction, burnout and intention to leave: findings from a cross-sectional study of 12 European countries. BMJ Open. 2015; 5: pe008331.

57. Chueh KH, Chen KR, Lin YH. Psychological distress and sleep disturbance among female nurses: anxiety or depression? J Transcultural Nursing. 2021; 32: 14-20.

58. Cheung T, Yip PS. Depression, anxiety and symptoms of stress among Hong Kong nurses: a cross-sectional study. Int J Environ Res Public Health. 2015; 12: 11072-11100.

59. AbuRuz ME, HMA Hayeah, Insomnia induced by night shift work is associated with anxiety, depression, and fatigue, among critical care nurses. Adv Stud Biol. 2017; 9: 137-156.

60. Kalmbach DA, Pillai V, Cheng P, Arnedt JT, Drake CL. Shift work disorder, depression, and anxiety in the transition to rotating shifts: the role of sleep reactivity. Sleep Med. 2015; 16: 1532-1538.

61. Eldevik MF, Flo E, Moen BE, Pallesen S, Bjorvatn B. Insomnia, excessive sleepiness, excessive fatigue, anxiety, depression and shift work disorder in nurses having less than 11 hours in-between shifts. PloS one. 2013; 8: pe70882.

62. Barthe B, Tirilly G, Gentil C, Toupin C. Job demands and resting and napping opportunities for nurses during night shifts: impact on sleepiness and self-evaluated quality of healthcare. Industrial Health. 2016; 54: 157-162.

63. Suzuki K, Ohida T, Kaneita Y, Yokoyama E, Uchiyama M. Daytime sleepiness, sleep habits and occupational accidents among hospital nurses. J Adv Nursing. 2005; 52: 445-453.

64. Thakkar MM, Sharma R, Sahota P. Alcohol disrupts sleep homeostasis. Alcohol. 2015; 49: 299-310.

65. Yang CM, Lin SC, Hsu SC, Cheng CP. Maladaptive sleep hygiene practices in good sleepers and patients with insomnia. J Health Psychol. 2010; 15: 147-155.

66. Zhang Y, Shen J, Zhou Z, Sang L, Zhuang X, Chu M, et al. Relationships among shift work, hair cortisol concentration and sleep disorders: a cross-sectional study in China. BMJ Open. 2020; 10: e038786.

67. Ell J, Brückner HA, Johann AF, Steinmetz L, Güth LJ, Feige B. Digital cognitive behavioural therapy for insomnia reduces insomnia in nurses suffering from shift work disorder: A randomised-controlled pilot trial. J Sleep Res. 2024; 33: pe14193.

68. Rajaratnam SM, Howard ME, Grunstein RR, Sleep loss and circadian disruption in shift work: health burden and management. Med J Australia. 2013; 199.

69. Gellis LA, Park A, Stotsky MT, Taylor DJ. Associations between sleep hygiene and insomnia severity in college students: cross-sectional and prospective analyses. Behavior Ther. 2014; 45: 806-816.

70. Waage S, Pallesen S, Moen BE, Magerøy N, Flo E, Di Milia L, et al. Predictors of shift work disorder among nurses: a longitudinal study. Sleep Med. 2014; 15: 1449-1455.

71. Wright KP Jr, Bogan RK, Wyatt JK. Shift work and the assessment and management of shift work disorder (SWD). Sleep Med Rev. 2013; 17: 41-54.

72. Silva-Costa A, Griep RH, Rotenberg L. Rotenberg, Associations of a short sleep duration, insufficient sleep, and insomnia with self-rated health among nurses. PLoS One. 2015; 10: pe0126844.

73. Moskal-Szybka MR, Dziubaszewska A. Moskal, Sleep hygiene among nurses employed in hospital wards. Nursing Problems/Problemy Pielęgniarstwa. 2025; 33: 5-10.

74. Alameri RA, Almulla HA, Al Swyan AH, Hammad SS. Sleep quality and fatigue among nurses working in high-acuity clinical settings in Saudi Arabia: a cross-sectional study. BMC Nursing. 2024; 23: 51.

75. Zhang X, Dai X, Jiao J, Lee SY. Impact of sleep-wake features on fatigue among female shift work nurses. Ann Medicine. 2023; 55: 2210843.

76. Hiestand S, Forthun I, Waage S, Pallesen S, Bjorvatn B. Associations between excessive fatigue and pain, sleep, mental-health and work factors in Norwegian nurses. PLoS One. 2023; 18: pe0282734.

77. Chang WP, Li HB. Differences in workday sleep fragmentation, rest-activity cycle, sleep quality, and activity level among nurses working different shifts. Chronobiology Int. 2019; 36: 1761-1771.

78. Jang HJ, Kim O, Kim S, Kim MS, Choi JA, Kim B, et al. Factors affecting physical and mental fatigue among female hospital nurses: The Korea Nurses' Health Study. in healthcare. 2021; 9: 201.