Cross-sectional Study

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Assessment of sleep quality and its factors among clinicians working in critical care units and operation theaters at North West Ethiopia, 2022: a multicenter cross-sectional study

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Background: The quality of sleep has an effect on the health of clinicians and the quality of patient care. Maintaining cognitive function/mood, facilitation of glucose metabolism, and strengthening of the immune system are among the roles that adequate sleep may contribute. Poor sleep quality is multifactorial, and studies had shown inconsistencies in the factors that contribute to the development of this poor sleep quality. The prevalence of poor sleep quality among clinicians working in the critical care unit and operation theater in the study setting was not investigated yet.

Objective: The objective of this study was conducted for the purpose of assessing the quality of sleep and associated factors among clinicians working in the critical care unit and operation theater.

Methods: A cross-sectional study was conducted from 15 May to 15 June 2022. Data were collected using a self-administered questionnaire from 421 clinicians selected by simple random sampling techniques. Sleep quality was measured by the Pittsburg sleep quality index. The data were entered into Epi-data and exported to SPSS. Frequency and percentage were used for the descriptive analysis. Binary and multivariate logistic regression analysis were used to identify factors associated with poor quality of sleep. The strength of the association was measured with an OR within the 95% CI and *P*-value of <0.05.

Result: About half 220 (52.3%) of the study participants age between 25 and 30 year old and the majority 321 (76.2%) of them were males. The prevalence of poor sleeps quality was 81.5% (95% CI: 77.9–85.5). Working night shift (AOR: 3.37, 95% CI: 1.754–6.484), having depressive symptoms (AOR: 3.25, 95% CI: 1.485–7.147) and having no regular exercises (AOR: 0.299, 95% CI: 0.166–0.537) were predisposing factors for poor sleep quality.

Conclusion and Recommendation: The prevalence of poor sleep quality among clinicians working in the ICU and operation room was high. Clinicians who had no regular exercise, who worked in night shift, and who had depressive symptoms were associated with poor quality of sleep. Clinicians should have an awareness on the symptoms of depression, implement sleep hygiene education programs and promoting regular exercise. The authors recommend healthcare policy makers for improving working schedules.

Keywords: clinicians, intensive care unit, operation theater, sleep quality

Introduction

Sleep is among the pillars of human basic needs and about one third time of person's life is devoted to asleep[1]. A person's overall pleasure with their sleep is considered to be a measure of their sleep quality and when it is challenging to fall asleep for shorter periods of time while waking up more frequently than usual, it is said that the quality of one's sleep is poor[2]. Sleep quality can be measured subjectively via the Pittsburgh sleep quality index (PSQI)[3].

Maintaining cognitive function and mood, facilitation of glucose metabolism, and strengthening of the immune system are among the roles that good quality of sleep contributes to the healthy functioning of humans[4]. The recommended time of sleep for healthy persons is 7–9 h per day[5–8]. This suggestion is not followed by around 33% of American people[9,10]. Furthermore, poor sleep quality may increase the risk of obesity, heart disease,

HIGHLIGHTS

- The prevalence of poor sleep quality among study participants was 81.5%.
- Working in night shift, having depressive symptoms and having no regular exercise were the factors.
- Clinicians should be engaged in regular exercise, establish a reasonable working schedule.

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stroke, type 2 diabetes, hypertension, cancer, and cognitive decline, limits performance, leads to job dissatisfaction, compromises quality of life, increases the likelihood of medical error, and lowers overall patient care quality[6,11–18].

Studies had showed inconsistent findings regarding the global burden of poor sleep quality among clinicians and ranged from 18.4 to 96.7%, the highest prevalence was in Egypt[19] and the lowest prevalence was in China[20]. In the USA, 68 of adults reported having poor sleep quality[21], 75.8 in Taiwan[22], and 68% in Jordan[23]. Poor sleep quality was 47.9 in Canada[24] and 41.8% in Brazil[25]. In Asian countries, the magnitude of poor sleep quality ranged from 24.4[26] to 84.6%[27]. In Iran, the burden of poor sleep quality among clinicians was 56[28], 55.1 in China[29], and 62% in Korea[30]. The burden of poor sleep quality among clinicians in European countries were Italy 54.6[31], Turkey 66.9[32,33], and United Kingdom 78%[27]. Poor sleep quality among clinicians in African countries ranged from 43.2 to 96.7%[19,34,35]. A study conducted in Addis Ababa showed that the prevalence of poor sleep quality was 25.6 and in Jimma its prevalence was 70.6%[36].

Sociodemographic factors (age, sex, marital status, educational status, level of income), behavioral factors (smoking, alcohol, khat, coffee), the health condition of health professionals, length and schedule of working hours were among the factors that contributed to poor quality of sleep[37,38]. The positive association between being a female professional and the development of poor sleep quality had found in Chinese study[39]. Studies revealed the direct relationship between increasing age and acquiring poor quality of sleep[1,35,40]. Being single had a better quality of sleep than divorces and marrieds[40]. Besides, professionals who had low income had a greater chance of getting poor sleep quality[41].

The studies showed that clinicians working in night shift had poor sleep quality than nonshift working clinicians[28,42,43]. Health professional who had worked long working hours had developed poor sleep quality[17,44]. Working in the critical care unit and operation theater was associated with poor quality of sleep[28,39,41]. Senior clinicians had poor quality of sleep than their junior counterparts[14]. Clinicians who had job related stress[14,45–48], anxiety[32] and depression[14,49–51]) had poor quality of sleep. A study conducted in Brazil showed the association between chewing khat, drinking alcohol, and poor quality of sleep[36,52]. Clinicians who had poor social support were more likely to develop poor sleep quality as compared to those who had strong social support[39]. Having regular physical exercise had found a protective effect for the development of poor quality of sleep[8,52]. Besides, studies have recommended sleep hygiene education, performing regular exercises, cognitive, and behavioral therapy to improve the sleep quality of clinicians[53–56].

Poor quality of sleep in clinicians affects the patients safety[57]. Clinicians working in highly stressful environments like the operating room and the ICU may be highly affected by sleep disturbances, which can influence a clinician's ability to sleep and the standard of care they give to the patients. As far as our search concerned, the prevalence of poor sleep quality among clinicians working in critical care unit and operation theater in North West Ethiopia has not been investigated yet. Therefore, the current study was aimed at determining the prevalence of poor sleep quality and identifying its factors that could enable to take necessary interventions. Besides, the current information is essential for health care policy planners when designing strategies to improve working schedule.

Method

The article has been reported in line with the strengthening the reporting of cohort, cross-sectional and case-control studies in surgery (STROCSS) 2021criteria[58].

Study design

A multicenter cross-sectional study design was conducted.

Study period

The study was conducted from May 15 to 15 June 2022.

Study area

The study was conducted in the operation theater and critical care units of three comprehensive specialized hospitals.

Sources population

All clinicians working in the critical care units and operation theaters of five comprehensive specialized hospitals.

Study population

All clinicians working in the critical care units and operation theaters of three comprehensive specialized hospitals during the study period (Table 1).

Eligibility criteria

Inclusion criteria

All clinicians working at OR and ICU of the three comprehensive specialized hospitals till the calculated sample size reached.

Exclusion criteria

Clinicians who were not present in a working place 1 month prior to data collection due to sick leave, annual leave, or any other reason were excluded since PSQI assess the quality of sleep 1 month prior to the date of assessment.

Table 1

The number of clinicians working in operation theater and critical care unit, 15 May–15 June 2022.

Professional	X	Y	Z	Total
Surgeons	46	45	14	105
Residents	107	111	0	218
Anesthesia professionals	60	25	19	104
OR Nurses	93	44	44	181
ICU Nurse	60	42	23	125
Total	366	267	100	733

X represents University of Gondar Comprehensive specialized Hospital (UOGCSH).
Y represents Tibebe Gion Comprehensive specialized Hospital (TGCSH).
Z represents Debre Markos Comprehensive specialized Hospital (DMCSH).

Variables of the study

Dependent variable

Quality of sleep.

Independent variables

Sociodemographic variables: age, sex, marital status, level of education, monthly income; Behavioral characteristics: smoking, alcohol, khat, caffeine, physical activity, and social support; Comorbidities: DM, HTN, asthma, stress, anxiety, and depression and BMI work related factors: working in night shift, type of occupation, work experience, working unit, working hour per week, and work over time, additional task.

Operational definition

Sleep quality was classified as poor or good based on the PSQI. PSQI greater than five represents poor sleep quality, and PSQI less than or equal to five represents good quality of sleep[59].

Sleep latency is the time required to fall asleep after going to bed.

Sleep efficiency is the amount of time actually spent on sleep.

Sleep duration is the amount of actual time spent in an hour.

Current substance users if they had been cigarette smokers, khat chewers, alcohol drinkers, or caffeine consumers, if they used it at least once in the past month prior to data collection[60–62].

Physical activity performing any kind of sports activity twice per week for at least 30 min[63].

Additional task is having extra paid work additional to the primary clinical activity.

Working overtime is defined as working more than 48 h per week[64].

Depression: a total physical health questioner-9 >/= 10 indicates major depressive symptoms[65].

Levels of anxiety were classified based on the generalized anxiety disorder scale (GADS). Based on the GADS scale. Scores 0–5: none to minimal, score 6–10: mild anxiety, score 11–15: moderate anxiety, and score 15–21: severe anxiety[66].

Level of stress was classified based on perceived stress score (PSS).

PSS less than 13: low stress, PSS 14–26: moderate stress, and PSS greater than 27–40: high perceived stress.

Social support was graded based on the Oscilo social support scale (OSSS-3) into poor social support (OSSS-3–8), moderate social support (OSSS 9–11), and strong social support (OSSS 12–14).

Sampling technique and sample size determination

Sample size determination

The sample size was calculated using a single population proportion formula $n = (Z\alpha/2)2p(1\text{-}p)/d2$ where n is the minimum

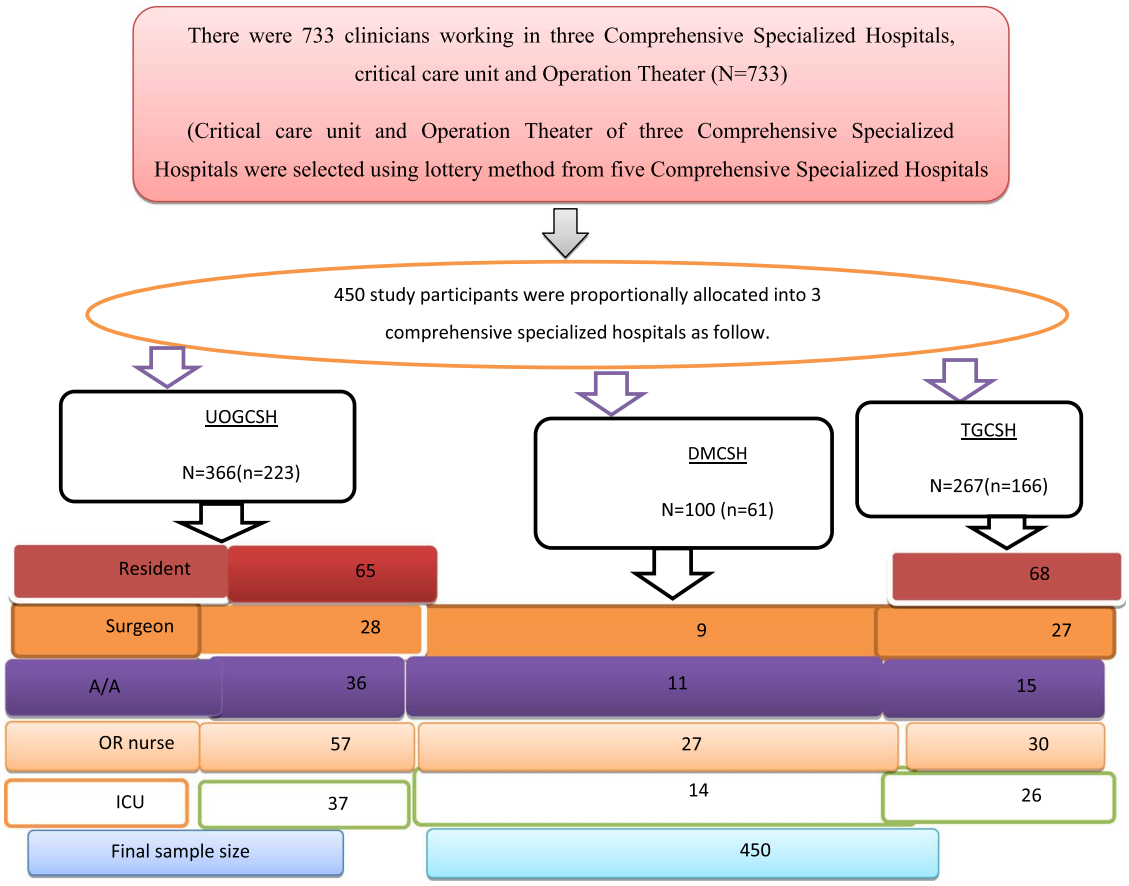

Figure 1. Sampling procedure for selection of clinicians working in operation theater and critical care unit, 15 May –15 June 2022 (A/A professionals = anesthesia professionals).

sample size, Z is the standardized normal distribution value at $\alpha/2$. Let P denotes proportion of poor sleep quality among clinicians. Maximum acceptable difference (d) $=5\%$, desired confidence level: at 95% confidence level and $P=50\%$ was be used.Therefore, sample size was $N=(1.96)2\times0.5(1–0.5)/0.052$.

$N=383$: nonresponse rate $10\%=38$, so the total sample size required was 421.

Sampling technique

Three hospitals were selected by lottery method from five comprehensive specialized hospitals. We wrote the hospital name on the piece of paper and one personnel blindly selected the three consecutive hospitals by chance.

A simple random sampling technique was used to recruit study participants who were fulfilling the eligibility criteria after 450 samples were proportionally allocated as shown below (Fig. 1).

Data collection tools and instrument

Following ethical approval, data was collected using semi-structured English-version questionnaires. The questioner had socio-demographic characteristics, sleep quality assessment, behavioral characteristics, anxiety, depression, and stress assessment tools. The data collection was performed by three trained data collectors.

Sleep quality was assessed by the PSQI, which contains 19 self-rated questions that generate seven component scales (subscales). Each component scores 0–3 points, where score 0 indicates no difficulty and score 3 indicates severe difficulty. The total scores of the seven components were added together to give one global score ranging from 0–21 points[67].

The PSQI was calculated by summing up its seven components (sleep duration, sleep latency, sleep efficiency, sleep disturbance, daytime dysfunction, use of sleep medication, and subjective sleep quality). Sleep duration was scored after the conversion of question 4 into an hour. Sleep latency was calculated by summing the values of question 2 in minutes and question 5a. Sleep efficiency was scored after dividing question 4 in an hour by the difference between question 3 and question 1. Sleep disturbance was scored after summing up questions 5a through j. Daytime dysfunction was scored after summing up questions 7 and 8 of PSQI[67]. The reliability of the tool was tested by similar studies conducted and has a Cronbach alpha of (0.83)[59]. The following variables were measured as contributing factors to poor sleep quality: BMI, depression, anxiety, stress, and social support.

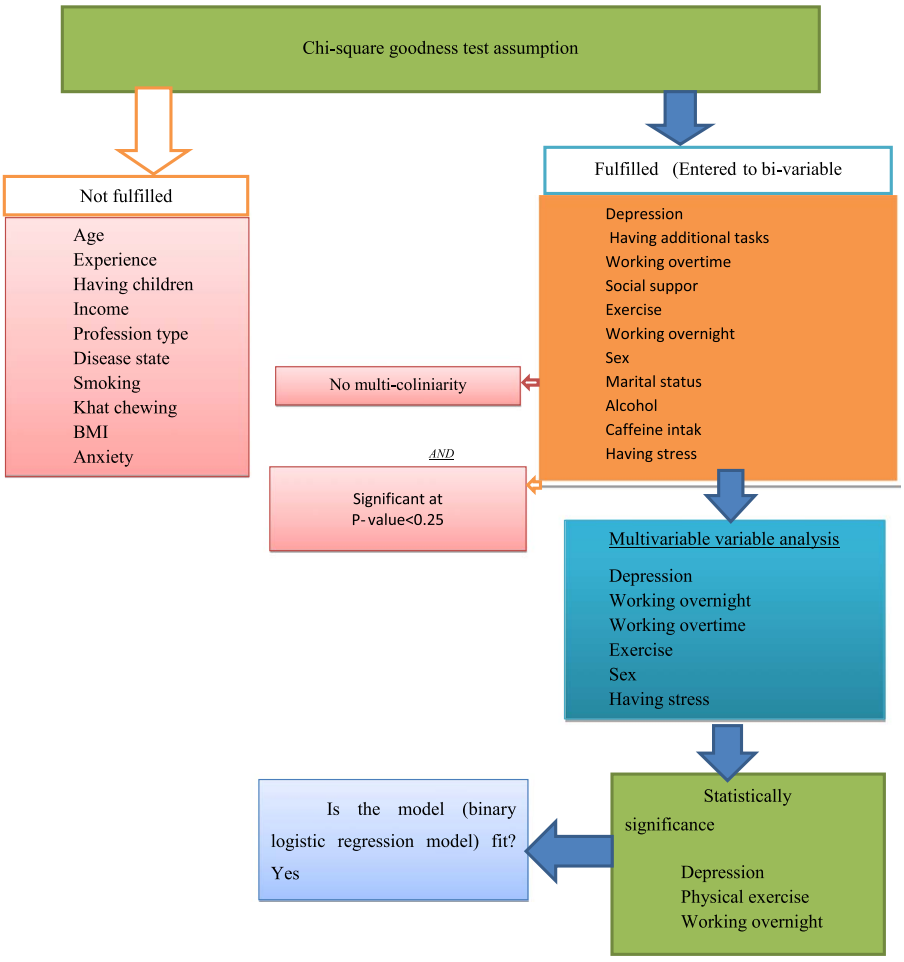

Figure 2. Data analysis stages of factors associated with poor quality of sleep among clinicians working in operation theater and critical care unit 15 May–15 June 2022.

BMI was calculated by dividing the documented weight of participants in kilograms by the square of their height and classified as normal, underweight, overweight, and obesity[36].

Depression symptoms was assessed by patient health questioner-9. It has nine self-rated questions with a total score of 0–27 and a Cronbach alpha of 0.81[65] .

Anxiety was assessed by generalized anxiety disorder scale questioner (GADS 7), which has 7 item self-rated questions with a total score of 0–21 and has a Cronbach alpha 0.92[66]. Each item was rated on a 4-point Likert-scale ranging from 0 (not at all) to 3 (nearly every day) on the symptoms in the previous 2 weeks.

The perceived stress scale (PSS) consists of a 10 item self -rated 5 point Likert scale (0 = never, 4 very often) was used to measure level of stress. The overall score was obtained by reversing the sore of selected items (items 4, 5, 7, and 8) and then summing of all 10 items. Total score ranges from 0 to 40[68].

Social support was measured based on the Osilo social support scale, which has three questions with a total score ranging from 3 to 14[69].

Data quality control and assurance

Validated assessment tools were utilized to make sure the data quality and the validity of the PSQI was tested in the studies conducted[59]. Pretesting was carried out at comprehensive specialized hospital on 5%[23] of the sample population. Obtaining comments led to an update and modification being made. The data collectors received instruction on how to use the data collection materials, how to handle each tool used in the study, and what the study's goal was. The lead researcher supervised the data for quality, completeness, and consistency.

Data processing and analysis

The acquired data were verified as complete before being input, cleaned, coded, and exported to the SPSS version 26 software program for additional analysis. Descriptive (frequency and percentage) and inferential data analysis (χ^2 and logistic regression containing COR and AOR with their corresponding 95% CI) were used to identify and record the overall poor quality of sleep and associated factors. The statistical significance was defined as a *P*-value 0.05. Statistical model's fitness and normality of the continuous variable (age), were examined (Fig. 2).

Result

Sociodemographic factors

The response rate of current study was 93.5%. About half 220 (52.3%) of the study participants were the age between 25 and 30 year old and the majority 321 (76.2%) of them were males. The majority 416 (88.8%) of study participants were degree and above level of education. Around 1/3rd 133 (31.6%) of the participants were medical residents (Table 2).

Behavioral characteristics of clinicians

About 11 (91.7%) of smokers had poor quality of sleep, and all of those participants who chewed khat were victims of poor sleep quality. However, the majority of clinicians working in the operation theater and critical care unit were nonsmokers, nonalcoholic drinkers, and nonkhat chewers, apart from having poor social support (Table 3).

Table 2

Socio-demographic characteristics of clinicians working in the operating rooms and critical care units between May 15 and 15 June 2022.

Variables	Frequency percentage	Poor sleep quality (PSQI > 5) (%)
Age		
< 25	17 (4)	15 (88.2)
25–30	220 (52.3)	177 (80.5)
31–35	123 (29.2)	101 (82.1)
> 35	61 (14.5)	50 (81.9)
Sex		
Male	321 (76.2)	255 (79.4)
Female	100 (23.8)	88 (88)
Marital status		
Single	152 (36.1)	127 (83.5)
Married	228 (54.2)	183 (80.3)
Others	41 (9.7)	33 (80.5)
Income		
> = 6520	345 (81.9)	276 (78.2)
4185–6520	72 (17.2)	63 (87.5)
< 4184	4 (0.9)	4 (100)
Level of education		
Diploma	5 (1.2)	4 (80)
Degree	340 (80.8)	274 (80.6)
Master	22 (5.2)	20 (90.9)
> Masters	54 (12.9)	45 (83.3)
Profession		
Surgeon	58 (13.7)	48 (82.7)
Resident	133 (31.6)	100 (75.2)
A/A professionals	62 (14.7)	50 (80.6)
ICU nurse	63 (14.9)	55 (87.3)
OR nurse	105 (24.9)	90 (85.7)

Note: A/A professionals, anesthesia professionals >; Master, PHD and senior physicians; OR, Operation Theater; PHD, Doctor of philosophy.

Clinical factors

Based on the report of the study participants most of them had a normal BMI, were free from known medical and mental illness, but did have a moderate level of stress (Table 4).

Table 3

Behavioral characteristics of clinicians working in operation theater and critical care unit, 15 May–15 June 2022.

Variables	Category	Frequency percentage	Poor sleep quality (PSQI > 5) (%)
Smoking cigarette	Yes	12 (2.9)	11 (91.7)
	No	409 (97.1)	332 (81.1)
Alcohol drinking	Yes	138 (32.8)	113 (81.8)
	No	283 (67.2)	231 (81.6)
Khat chewing	Yes	7 (1.7)	7 (100)
	No	414 (98.3)	336 (81.1)
Caffeine intake	Yes	207 (49.2)	169 (81.6)
	No	214 (50.8)	174 (81.3)
Physical exercise	Yes	316 (71.1)	272 (86.1)
	No	105 (24.9)	71 (67.6)
Social support	Low	216 (51.3)	174 (80.5)
	Moderate	121 (28.7)	104 (85.9)
	Strong	84 (20)	65 (77.3)

Table 4

Physical and mental health status of clinicians working in operation theater and critical care unit, 15 May–15 June 2022.

Variables	Frequency Percentage (%)	Poor sleep quality (PSQI > 5) (%)
Comorbidities		
Yes	10	9 (90)
HTN	2 (0.5)	
DM + HTN1	1 (0.2)	
Complain ofdyspepsia-	4 (1.0)	
Kidney stone-	1 (0.2)	
Complain of back pain-	2 (0.5)	
No	411 (97.6)	334 (81)
Stress		
Mild	93 (22.1)	76 (81.7)
Moderate	327 (77.7)	266 (81.3)
High	1 (0.2)	1 (100)
Anxiety		
None	207 (49.1)	158 (76.3)
Mild	170 (40.4)	145 (85.3)
Moderate	37 (8.8)	33 (89.2)
Sever	7 (1.7)	7 (100)
Depressive sx		
Yes	316 (75.1)	247 (78.1)
No	105 (24.9)	96 (91.4)
BMI		
< 18.5	29 (6.9)	26 (89.6)
18.5–24.9	304 (72.2)	241 (79.3)
25–29.9	77 (18.3)	66 (85.7)
> 30	11 (2.6)	10 (90)

Depressive sx, depressive symptoms; DM, Diabetes mellitus; DM + HTN, Hypertension and diabetes mellitus; HTN, Hypertension.

Work related factors for poor quality of sleep

The majority of the study participants who participated in clinical activities that took place during night shifts 296 (85.1%) and extra hours 225 (84.9%) had experienced poor quality of sleep (Table 5).

Table 5

Work related factors of clinicians working in operation theater and critical care unit, 15 May–15 June 2022.

Variables	Category	Frequency Percentage (%)	Poor sleep quality (PSQI > 5) (%)
W/night shift	Yes	348 (82.7)	296 (85.1)
	No	73 (17.3)	47 (64.3)
W/overtime	Yes	265 (62.9)	225 (84.9)
	No	156 (37.1)	118 (75.6)
Additional tasks	Yes	61 (14.5)	47 (77)
	No	360 (85.5)	296 (82.2)
W/experience (year)	= < 5	282 (67.0)	226 (80.1)
	5–9	119 (28.3)	100 (84.1)
	> = 10	20 (4.8)	17 (8.5)
Working area	Z	53 (12.6)	47 (88.6)
	Y	145 (34.5)	113 (77.9)
	X	223 (52.9)	182 (81.6)

X represents University of Gondar Comprehensive specialized Hospital (UOGCSH).
Y represents Tibebe Gion Comprehensive specialized Hospital (TGCSH).
Z represents Debre Markos Comprehensive specialized Hospital (DMCSH).
w/night, work in night shift; w/overtime, work overtime; w/unit, working unit; yr, age in year.

Prevalence of poor sleep quality

The prevalence of poor sleep quality among study participants was found to be 81.5% (95% CI: 77.9–85.5) and the global mean score of PSQI was estimated to be 7.9 with a 95% CI (7.66–8.14) (Fig. 3).

The majority of participants 232 (55.1%) had fairly good subjective sleep quality and 210 (49.9%) had mild dysfunctional sleep latency (Table 6).

Factors associated with poor quality of sleep

Variables that were associated with poor sleep quality and met the χ^2assumption were fitted into bivariable analysis. The factors that appeared to have an association at a *P*-value of < 0.25 in bivariable analysis were further transported to multivariate analysis. Finally, clinicians who had depressive symptoms, study participants who exercised regularly and night shift work were statistically significant variables in multivariable binary logistic regression analysis.

The odds of developing poor sleep quality among clinicians who had depressive symptoms was 3.25 times higher as compared to their depressive-free counterparts (AOR: 3.25, 95% CI: 1.485–7.147). The likelihood of poor sleep quality among study participants who exercised regularly was reduced by 70.1% when compared to participants who did not exercise regularly (AOR: 0.299, 95% CI: 0.166–0.537). Clinicians who worked the night shift had a 3.37 times more likely chance of developing poor sleep quality as compared to their non-night shift time worker counterparts (AOR: 3.37, 95% CI: 1.754–6.484) (Table 7).

Discussion

Having adequate time of sleep for clinicians working in operation room and ICU is not only important for sustaining the health of individuals but also for improving patient outcomes. Sleep deprivation had hindered the performance of clinicians and patient safety[70].

The prevalence of poor sleep quality among study participants was 81.5%, which is in line with the findings of the studies conducted in Saudi Arabia (84.6%) and Italy (78%). However, the prevalence of poor quality of sleep in this study is higher than the findings of studies conducted in Canada 47.9[24], China 55.1[29], Turkey 54.6[31], Brazil 41.8[25], Japan 24.4[26], Nigeria 43[34], Egypt 43.2[19], Addis Ababa 25.6[71], and Jimma70.6%[36]. This discrepancy could be due to the variation of population and tools

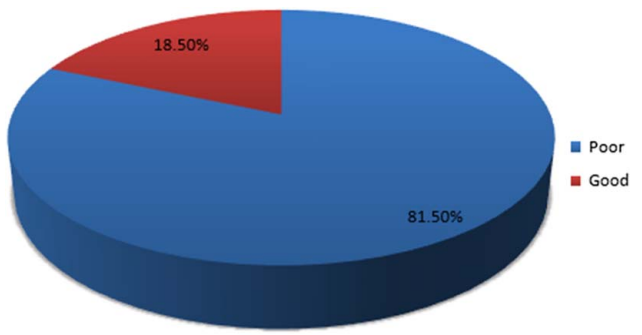

Figure 3. Prevalence of poor sleep quality among clinicians working in operation theater and critical care unit, 15 May–15 June 2022.

Table 6

Severity of sleep quality components among clinicians working in operation theater and critical care unit, 15 May–15 June 2022.

Component	Normal (%)	Mild dysfunction (%)	M/ dysfunction (%)	S/dysfunction (%)
Sub/S/quality	Very good	Fairly good	Fairly bad	Very bad
	144 (34.2)	232 (55.1)	32 (7.6)	13 (3.1)
Sleep latency	< = 15 min	16–30 min	31–60 min	> 600 min
	76 (18.1)	210 (49.9)	126 (29.9)	9 (2.1)
Sleep duration	> 7.01 h	6–7 h	5–5.59 h	< 5 h
	54 (12.8)	248 (58.9)	90 (21.4)	29 (6.9)
Sleep efficiency	> = 85	75–84.9	65–74.9	< 65
	1 (0.2)	5 (1.2)	42 (10)	373 (88.6)
Sleep medication	Not/month	< 1/week	1/2/ week	3/ > /week
	372 (88.4)	35 (8.3)	7 (1.7)	7 (1.7)
Sleep disturbance	Never	< 1/week	1/2/week	3/ > /week
	75 (17.8)	301 (71.5)	42 (10)	3 (6.7)
Daytime dysfunction	0	1–2	3–4	5–6
	163 (38.8)	199 (47.4)	55 (13.1)	4 (0.9)

< 1/week, less than once per week; 1/2, once or twice per week; 1/2, once or twice per week; 3/ > /week, three or more times per week; h, hour; M/dysfunction, moderate dysfunction; min, minute Not/month, not during the past month; S/dysfunction, sever dysfunction; Sub/S/quality, subjective sleep quality.

to measure the quality of sleep. It could also be due to the exaggerated response of respondents since the data were collected through a self-administered questionnaire. On the other hand, the finding of the current study is lower when compared with the finding of the study conducted in Egypt 96%[19]. This discrepancy could be due to a smaller sample size as seen in the Egyptian study and variation in the study population since study participants of Egyptian study were only residents.

The findings of the current study identified that working in night shift and having depressive symptoms were contributing factors for the development of poor quality of sleep and doing regular physical exercise was found to be protective.

In the current study, clinicians having depressive symptoms had associated with poor quality of sleep. This is consistent with the findings of studies conducted in Turkey, Thailand, and Ethiopia[51,72,73]. This similarity may be due to the fact that depression reduces or delays the secretion of melatonin, a hormone secreted from the pineal gland in response to dark light and has the role of controlling the onset and offset of sleep[74–77]. On the other hand, previous studies revealed that poor quality of sleep was predictor of depression[78,79]. This bidirectional association between depression and poor quality of sleep implies that screening and prevention of depression might prevent poor quality of sleep and vice versa.

The result of this study has showed that clinicians who had worked in night shift were more likely to develop poor quality of sleep as compared to their non-night shift worker counterparts. This is in line with the findings of studies conducted in Turkey, China, Southern Brazil, Taiwan, and Iran[28,35,43,80–82]. The possible explanation of the association could be due to a reduction of melatonin hormone production secondary to excessive light exposure during night[83–85]. It could also be due to the impact of an irregular sleep schedule on the circadian rhythm associated with nightshift work. This implies that the need for a regular sleep schedule since a regular schedule help to align body clock with the sleep pattern[18,86].

Table 7

Bivariable and multivariable binary logistic regression analysis of factors associated with poor quality of sleep among clinicians working in operation theater and critical care unit, 15 May–15 June 2022.

Variable		Prevalence of poor sleep quality		Total	OR (95% CI)		P
		Good	Poor		COR	AOR	
Sex	Male	66	225	321	I	I	I
	Female	13	88	100	0.535 (0.276–1.037)	0.705 (0.335–1.486)	0.358
Profession	Surgeon	10	48	58	I	I	I
	Resident	32	101	133	0.889 (0.326–2.422)	0.486 (0.199–1.188)	0.113
	A/A professionals	12	50	62	0.526 (0.234–1.182)	0.644 (.219–1.888)	0.422
	OR Nurses	15	90	105	0.694 (0.270–1.788)	0.598 (0.219–1.634)	0.316
	Icu Nurses	9	54	63	1.000 (0.410–2.441)	0.782 (0.251–2.433)	0.671
Exercise	No	34	71	105	I	I	I
	Yes	44	272	316	0.330 (0.196–0.555)	0.299 (0.166–0.537)	***
Social_support	Strong	19	65	84	I	I	I
	Moderate	17	104	121	1.900 (0.912–3.957)	2.143 (0.949–4.840)	0.067
	Poor	42	174	216	1.211 (0.657–2.234)	1.570 (0.415–6.101)	0.448
W/night shift	No	50	298	73	I	I	I
	Yes	27	56	348	2.87 (1.988–6.114)	3.372 (1.754–6.484)	***
Depression	No	9	96	105	I	I	I
	Yes	69	247	316	2.9 (1.513–6.583)	3.258 (1.485–7.147)	0.003
w/overtime	No	38	118	156	I	I	I
	Yes	40	225	265	1.764 (1.070–2.906)	1.105 (0.610–1.999)	0.742
Having stress	No	17	76	93	I	I	I
	Yes	60	268	328	0.995 (0.549–1.806)	1.045 (0.512–2.132)	0.904

***P-value < = 0.001, A/A profess, anesthesia professionals; I, reference; P-v, P-value; w/night, working night shift; W/overtime, work overtime.
AOR, Adjusted odd ratio; COR, Crude odd ratio; OR, Odd ratio; PSQI, Pittsburg sleep quality index.

The current study found that having regular exercise had decreased the occurrence of poor sleep quality. This finding agrees with the findings of studies conducted in China, Brazil, and Spain[23,58,77]. The rationale behind this inverse relationship between having exercise and poor quality of sleep could be due to the fact that regular exercise decreases the risk of excessive weight gain, which decreased obesity associated obstructive sleep apnea[87]. It might also be due to the preventing effect of exercise on anxiety and depression[88]. The preventive effect of exercise on poor sleep quality could also be due to the release of exercise induced neurotransmitors (cytokine and dopamine) and melanin hormone, which had modulating effect on sleep artichters[89]. Furthermore, exercise facilitates melatonin hormone release, which further activates senthesis and releases of GABA, which is known hypnotic[90]. The effect of exercise on body temperature alteration may be also the possible reason for this inverse relationship.

In the current study, no statistical significance was found between being female, drinking alcohol, having stress, and poor quality of sleep. This could be due to the limited female participants in this study. The short study period in this study might be the rationale behind the insignificant relationship between alcohol drinking, level of stress, and poor quality of sleep. Moreover, statistical insignificancy does not mean clinical insignificancy.

Strength and limitation

The study's being a multicenter study with a higher sample size, minimization of social isolation, and interviewer biases by the use of self-administered questionnaires were among the strengths of this study.

The first limitation was the inability to draw a causal relationship (temporal relationship) and between poor sleep quality and its factors due to its cross-sectional nature. Another limitation is that the data was gathered through a self-reported questionnaire, which could introduce report bias and overestimate the prevalence of poor sleep quality. Because cigarette smoking and khat chewing were rare in our study participants, we anticipated that recruitment may not meet the targets.

Conclusion

The prevalence of poor sleep quality among clinicians working in the ICU and OR was high. Clinicians who had no regular exercise, who worked in night shift, and who had depressive symptoms were associated with poor quality of sleep.

Recommendation

To improve their quality of sleep, clinicians can implement sleep hygiene education programs, and promoting regular exercise. In addition, clinicians should have an awareness on the symptoms of depression and its prevention.

We recommend healthcare policy makers for improving working schedules.

We suggest researchers to emphasize further research to establish a cause-effect relationship between the identified factors and poor sleep quality. Besides, to establish the association between rare factors (smoking and khat chewing) and poor quality of sleep, researchers had to conduct control studies.

Ethical approval

Ethical approval for this study has been received from the institutional review board of School of Medicine, College of Medicine and Health Science, University of Gondar with reference number of 1269/2022. The objective, risk, benefit, voluntary nature, the right to withdraw and not to answer any individual question or all the questions, and confidentiality of the study were explained to participants, and participation in this study was voluntary. Following an explanation of the study, participants were asked to either sign or continue without signing, whichever was their preference. To ensure confidentiality, data were coded and was not recognized by name, and no individual identifiers were collected.

Consent

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Debre Markos University.

Author contribution

Y.T. has done conceptualization, data curation, formal analysis, investigation, and methodology; N.R.A., D.Y.F., M.M.W., B.A. T., and Y.W.B. have participated in approval of the title, analysis, result interpretation, supervision, edition, and manuscript preparation.

Conflicts of interest disclosure

There was no conflict of interest.

Research registration unique identifying number (UIN)

Research registry Unique Identifying number or registration ID: 9011 Hyperlink to your specific registration (must be publicly accessible and will be checked):: https://www.researchregistry.com/browse-the-registry#home/.

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Availability of data and materials

The data and material used to analyze the study are available from the corresponding author on request.

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