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ORIGINAL ARTICLE

Sleep quality and its associated factors among nurses in jimma zone public hospitals, Southwest Ethiopia, 2018

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ABSTRACT
Background: Sleep is a state of reduced consciousness and responsiveness from which an individual can be aroused by external stimulus. In humans, is also associated with reduced movement. It enables to restore energy in the body and initiate neural plasticity for learning and memory. Several studies in the world identified poor sleep quality among nurses and tried to explore associated factors. But there is no any study in Ethiopia on sleep quality and associated factors among nurses. Objectives: the main aim of this study was to determine the prevalence of sleep quality and associated factors among nurses in Jimma zone public hospitals. Methods: An institution based cross-sectional study was conducted on 550 nurses from June 1 to July 1, 2018. Data was collected using self-administered questionnaire; sleep quality was measured using PSQI which is standard validated tool. Collected data was checked for completeness, entered Epi data version 3.1 and exported to SPSS Version 20.0. Frequencies, means and percentages were used for the descriptive analysis of data. Bivariate analysis was done to select candidate variables. Variables having $p< 0.05$ was considered statistically significant. Results: A total of 528 nurses were included in the study with a response rate of 96%. The mean age was 31.73 7.36 years and 54.7% of nurses were females. Prevalence of poor sleep quality among nurses was 70.6%. According to the multiple logistic regression analysis current khat chewing, BMI in overweight individual, BMI in Obese individual, medium job related stress, high job related stress , and Shift working were significantly associated with poor sleep quality. Conclusion: The magnitude of poor quality of sleep among nurses working in hospitals, Jimma Zone was very high. Independent predictors of poor sleep quality as identified by this study were current khat chewing, overweight, obesity, job related stress, and shift work.
Keywords: Sleep quality, nurses, prevalence, associated factors, sleep disturbances, Jimma zone

Introduction

Sleep is a state of reduced consciousness and responsivenessfrom which an individual can be aroused by external stimulus. In humans, is also associated with reduced movement (Zielinski, McKenna, & McCarley, 2016). Sleep quality is a complex mix of domains, including quantitative aspects such as the duration of sleep, time taken to get to sleep (sleep latency), and arousal times, as well as more subjective aspects such as depth, restfulness, and refreshment from sleep (Girschik, Heyworth, & Fritschi, 2012).

Despite its wide ranging public health impact, sleep health is under-appreciated by the general public and is only rarely considered by policy makers, employers, schools, and others whose policies and structures can adversely affect sleep (Jackson, Redline, & Emmons, 2015). The high prevalence of poor sleep quality in a group of an healthy Employees can be taken as an important early sign of underlying undetected physical or mental health issues (Pournik, 2013). Sleep disorders and burnouts appear to be related, and seems to have adverse effects on the job performance of Nurses (Giorgi, Mattei, Notarnicola, Petrucci, & Lancia, 2018).

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Shift work among health care professionals is associated with poor sleep quality and Health care professionals performing shift work have PSQI(Pittsburgh Sleep Quality Index) scores slightly higher than non-shift work health professionals (Alshahrani, Baqays, Alenazi, AlAngari, & AlHadi, 2017). Sleep disorder was significantly higher in shift workers than in non-shift workers Nurses (Kolo, Ahmed, Hamisu, Ajiya, & Akhiwu, 2017). Abnormal sleep durations and quality were associated with significantly increased risk of total mortality (P.-L. Chien et al., 2013), increased risk of coronary heart diseases (Chernyshev, McCarty, & Chesson, 2018), impaired social relationships, drowsy driving, occupational accidents, and heightened risk of cardiovascular events (Lemma, Gelaye, Berhane, Worku, & Williams, 2012).Problems associated with long-term sleep disorder include the following such as thought retardation, memory loss, slow response, irritability and even the increase in the possibility of depression and suicidal tendency (Mieda & Sakurai, 2013). Number of sleep-disorder patients has been increasing exponentially and exceeds more than 25% of the total population in most countries(Hayaishi, 2011). Sleep disorders have become an uprising public health problem in the modern society; in addition, the correlation between sleep disorders and the development of late chronic diseases has been extensively studied, finding an important causality between them (Aragón-Arreola, Moreno-Villegas, Armienta-Rojas, & Alberto, 2016).

According to economic estimates, sleep disorders are associated with large financial and non-financial costs. Given that the greatest financial costs appear to be non-medical costs related to loss of productivity and accident risk (Hillman & Lack, 2013). According to the study done in Philadelphia, workers who report that they "always" experience trouble sleeping were associated with a mean $5,206 in healthcare expenditures above those who "never" had sleep problems (Hui & Grandner, 2015).

Burden of poor sleep quality among Nurses as done independently worldwide were, 85.7% in Iran (Akbari, Hajian, & Mirhashemi, 2016), 79.8% in Korea (Park, Lee, & Park, 2018), 79.1% in Turkey (Zencirci & Arslan, 2011), 65% in Egypt (Attia & Attia, 2016), 61% in Nigeria (Aliyu et al., 2017), 62.68%in China (Han, Yuan, Zhang, & Fu, 2016), 74.7% in Iran(Kazemi, Hosieni, Rezaeian, Fasihih, & Akbary, 2015), 69% in India (Kaliyaperumal, Elango, Alagesan, & Santhanakrishanan, 2017), 75% in Nepal (Thapa, Malla, & Kc, 2017), and 63.9% in China(Dong, Zhang, Sun, Sang, & Xu, 2017).

Several factors can affect sleep quality of Nurses including shift-based duty schedules (Aliyu et al., 2017), working area(Dong, Zhang, Sun, Sang, & Xu, 2017),(Giorgi et al., 2018), high BMIs (Beebe, Chang, Kress, & Mattfeldt-Beman, 2017), job related stress (Kunzweiler et al., 2016), obesity, current alcohol consumption, low monthly income, and current khat chewing (Berhanu, Mossie, Tadesse, & Geleta, 2018), Sex (Ganasegeran et al., 2017; Kazemi, Hosieni, Rezaeian, Fasihih, & Akbary, 2015; Kolo et al., 2017),and alcohol consumption (Ebrahim, Shapiro, Williams, & Fenwick, 2013).

Nursing is the main workforce at hospital institutions and these professionals' work is fundamental, as they are responsible for direct and uninterrupted care to the patient. And has a unique perspective on patient care and hospital operations and stands at the frontline of these health services (Dagget, Molla, & Belachew, 2016).The nursing profession is associated with busy and difficult work schedules, especially the running of shifts which has been associated with cardiovascular and metabolic complications (Aliyu et al., 2017).

Despite of available study worldwide on sleep quality among Nurses, there are only few studies in African country and even no study in Ethiopia. Therefore, this study was to determine sleep quality and factors associated among Nurses in Jimma Zone public hospitals, Southwest Ethiopia, 2018. It can serves as an alert for further study on sleep quality among other occupation at risk.

Methods

Study area and period

The study was conducted in Jimma University Medical Center (which is located in Jimma University main campus), Shenan Gibe hospital (located in Jimma town), Seka hospital (located in Seka town-

which is 18 km away from Jimma town), and Agaro hospital (located in Agaro town which is 45 km away from Jimma town). There were a total of seven public hospitals in Jimma zone, Oromia region, Southwest Ethiopia, from which these four hospitals were selected randomly. Study was conducted from June 1 to July 1, 2018.

Study design

An institutional based cross sectional study design was conducted.

Eligibility criteria

All Nurses in selected sample hospitals that were available at a time of data collection and willing to participate in this study were included. Those pregnant women and individuals with diagnosed depression disorder were excluded from the study.

Sample size determination

Because of the absence of study on sleep quality of Nurses in Ethiopia, by taking into consideration the assumption that prevalence of poor sleep quality of 50%, and by using single proportion formula,

$$n = \frac{(z^{\alpha}/_{2})2\ p\ (1-p)}{d2}$$

Accordingly, 'n' was calculated to be 384. Total number of Nurses (N) was 718, which is less than 10,000. Then sample minimization formula was used as:

$$n_f = \frac{n}{1+\frac{n}{N}} \quad , n_f = 250.$$

Where:

n = sample size,

N = total population

By taking into consideration 10% non-response rate, the sample size was 275. By considering possible design effect (two), the final sample size was 550.

Sampling procedure

Multistage cluster sampling technique was employed. Accordingly, out of seven hospitals in Jimma zone, four of them were selected randomly. Total sample size was proportionally allocated to the selected hospitals. The study subjects from each selected hospital were recruited by simple random sampling technique. Finally, the following were included in the study: 450 from Jimma University Medical Center, 44 from Shenan gibe hospital, 27 from Seka hospital, and 29 Nurses from Agaro hospital were included after proportional allocation to each hospital.

Data collection procedures (instrument, personnel, andtechniques)

Data collection was done by using English version structured self-administered questionnaire. Data collection instrument contain three parts. Part one contains socio-demographic characteristics. Part two contain validated, standard Pittsburgh sleep quality index (PSQI) used to measure sleep quality status of Nurses, it was validated in Ethiopia (Salahuddin et al., 2017). PSQI total score >5 were considered as a diagnostic of poor sleep quality and those with PSQI ≤5 were considered to have good sleep quality.

Part three contains factors associated with sleep quality. To measure job-related stress among Nurses, data was collected using modified nursing stress scale, validated in Ethiopia (Dagget et al., 2016). Individual's job-related stress was classified according to level of their stress based on a data driven tertian rank classification.

The following measurements were done. Weight measured with light cloth at standing position, height measured at standing position with straight standing body posture, BMI was calculated by dividing weight in kg to height in M2, blood pressure at sitting position from left arm three times and average was taken after at least five minutes rest, waist circumference at the border of lowest rib in both sides with the level of umbilicus at center, and hip circumference at the largest diameter of the buttock both at standing position(Rinaldo & Gualdi-Russo, 2015). Data were collected by four bachelors of Nurses and supervised by a bachelor of degree in public health.

Data analysis procedures

The collected data was checked for its com-

pleteness, entered to Epi data version 3.1(Odense, Denmark), and then exported to SPSS version 20.0 (IBM, Armonk, NY, USA) for analysis. Frequencies, means, standard deviation and percentage were used for the descriptive analysis of data. Bivariate analysis was done to select candidate variables. All variables with p-value < 0.25 on bivariate logistic regression were included in multivariate logistic regression analysis. From all the variables entered into backward multivariate logistic regression model odds ratio for the associated variables were calculated. Confidence interval of 95% and p-value < 0.05 were considered statistically significant.

Data quality management

Training for data collectors were given regarding the purpose of the study and measurement techniques (weight, height, and blood pressure). Before the actual data collection, the questionnaire was pre-tested on (5% of the population) on Nurses working in Jimma town health centers. Based on the finding of pretest some modification was made on tool development.

Ethical consideration

Ethical clearance was obtained from Jimma University Health Institute Ethical Review Board to conduct the study. Permission letter was obtained from Jimma University Medical Center and respective hospitals. Prior to the data collection, the entire study participants were given information on the study. Informed verbal consent was obtained from the study participant to start data collection and assured that their data would kept confidential. Participant were given full right to refuse and cease participating at any time before, during and after study was started.

Results

A total of 550 Nurses working on selected four Jimma zone public hospitals (Jimma University Medical Center, Shenan Gibe hospital, Agaro Hospital and Seka Hospital) were given the self-administered questionnaire. About 96 % (528) of Nurses responded to the given questionnaire, producing 4% non-response rate.

Table 1: Socio-demographic characteristics of the Nurses in Jimma zone public hospitals, 2018

Variables		Frequency	Percentages
Sex	Male	239	45.3
	Female	289	54.7
Age	<25 years	83	15.7
	25 to 30 years	182	34.5
	31 to 35 years	123	23.3
	>35 years	140	26.5
Marital status	Single	162	30.7
	Married	309	58.5
	Others*	57	10.8
Educational status	Diploma	146	27.7
	Degree	375	71.0
	Masters	7	1.3
Monthly income (in ETB)	< 4185	236	44.7
	4185 to 6520	224	42.4
	> 6520	68	12.9

* Divorced, Widowed, and separated.
** Catholic, Adventist, Jehovah and wakefata.
***Tigre, Gurage, Kafa, Dawaro, Yem, and Sidama.

Majority of study participants were male. About 73.5 % of participants were below age 35. Majority were married. About 72.3 % were at least Degree holders. About 87.1% of study participants monthly income was bellow 6520 ETB. (As indicated in table 1)Majority of study participants were male. About 73.5 % of participants were below age 35. Majority were married. About 72.3 % were at least Degree holders. About 87.1% of study participants monthly income was bellow 6520 ETB. (As indicated in table 1)

Prevalence of poor sleep quality

Prevalence of the poor sleep quality among the study participants was 70.6% (373) as indicated in figure one.

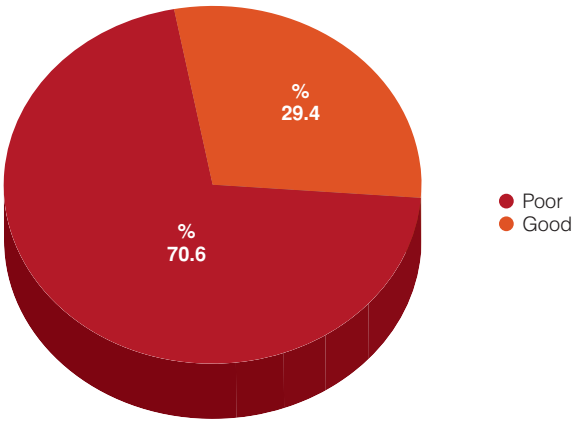

Figure 1: Magnitude of sleep quality among Nurses in Jimma zone public hospitals, 2018

Table 2: Severity of sleep quality components among Nurses in Jimma zone public hospitals, 2018

Factor	Normal	Mild Dysfunction	Moderate Dysfunction	Severe Dysfunction
Subjective Sleep Quality	Very good	Fairly good	Fairly bad	Very bad
	132 (25 %)	375 (71%)	14 (2.7%)	7 (1.3%)
Sleep Latency	≤15 minutes	16-30 minutes	31-60 minutes	>60 minutes
	185 (35%)	178 (33.7%)	107 (20.3%)	2 (0.4%)
Sleep Duration	>7 hours	6-7 hours	5-6 hours	<5 hours
	343 (65%)	152 (28.8%)	32 (6.1%)	1 (0.2%)
Sleep Efficiency*	>85%	75-84%	65-74%	<65%
	267 (50.6%)	178 (33.7%)	66 (12.5%)	17 (3.2%)
Sleep Disturbances	Never	Once or twice a month	Once or twice a week	≥times a week
	51 (9.7%)	297 (56.3%)	159 (30.1%)	21 (4%)
Sleep Medication Use	not during past month	less than once a week	once or twice a week	Three or more times a week
	453 (85.8%)	49 (9.3%)	26 (4.9%)	0
Daytime Dysfunction	0	1-2	3-4	5-6
	123 (23.3%)	228 (43.2%)	136 (25.8%)	41 (7.8%°)

*(Number of hours slept/Number of hours slept in bed) x 100

Table 3: Behavioural factors and body composition of Nurses in Jimma zone public hospitals, 2018

Variables		Frequency	Percentages (%)
Previous alcohol drinking	Yes No	221 307	41.9 58.1
Current alcohol drinking	Yes No	206 322	39 61
Previous khat chewing	Yes No	238 290	45.1 54.9
Current khat chewing	Yes No	235 293	44.5 55.5
Previous physical activity	Yes No	245 283	46.4 53.6
Current physical activity	Yes No	243 285	46 54
Body mass index	Normal Underweight Overweight Obese	259 38 167 64	49.1 7.2 31.6 12.1
Systolic BP	Normal Hypertensive	512 16	97 3
Diastolic BP	Normal Hypertensive	470 58	89 11

About 41.9% of study participants were previous alcohol drinkers, while only 39 % where current drinkers. Almost previous and current chat chewers were the same. Body mass index of participants were majorly normal (49.1%). Almost all participants' systolic and diastolic blood pressure was normal. (As indicated in table 3)

Factors Independently Associated with Sleep Quality

All variables with p< 0.25 on Bivariate logistic regression were included in multivariate logistic regression analysis. From all the variables entered into multivariate logistic regression model, those with p< 0.05 were considered to be statistically significant. The model was tested for Hosmerlemshow goodness of fit (p=0.761), and this result indicate that the model was fit. In this manner four variables were found to be significant. Accordingly, current khat chewing status, shift work, BMI, and job related stress were significantly associated with sleep quality in multivariate logistic regression.

Current khat chewers were 1.587 more likely [AOR = 1.587, CI= (1.037, 2.428) p-value =.033] to develop poor sleep quality than those non-current khat chewers as indicated in table 9. Participants with BMI between 25 and 29 (overweight) were about twice more likely to develop [AOR = 1.776, CI = (1.104, 2.856) p = 0.018] poor sleep quality than those with BMI between 18.5 and 24.99 (normal). Those with BMI greater than or equal to 30 (obese) were three times more likely [AOR = 3.090, CI = (1.637, 5.832) p = 0.001] to develop poor sleep quality than those with BMI between 18.5 and 24.99 (normal) as indicated in table 4.

Respondents with medium job-related stress were about twice [AOR = 2.178, CI = (1.256, 3.778) p = 0.006] more likely to develop poor sleep quality than those with low job related stress. Participants with high job related stress were also twice more likely to develop [AOR = 2.008, CI = (1.262, 3.19) p=0.003] poor sleep quality than those with low job related stress. Shift worker Nurses were 2.577 times [AOR =2.577, CI = (1.38, 4.791) p = 0.003] more likely to develop poor sleep quality than non-shift workers as indicated in table 4.

Factors like sex, age, current coffee consumption, current physical activity status, diabetes mellitus, and work experience were significant (with p < 0.25) on bivariate logistic regression. But, were not found to be significantly associated (p > 0.05) on multivariate logistic regression as indicated in table 4.

Table 4: Multivariate logistic regression among Nurses in Jimma zone public hospitals, 2018

Variables		Global PSQI score		Total (N)	Bivariate		Multivariate	
		Poor	Good		p	COR (95%CI)	p	AOR (95%CI)
Sex	Male	175	64	239	1	1	1	1
	Female	198	91	289	.237	1.257 [.860,1.836]	.060	1.485 [.983, 2.245]
Age	< 25yrs	59	24	83	1	1	1	1
	25 to 30 yrs.	135	47	182	.598	.856 [.480,1.527]	.293	.718 [.388, 1.331]
	31 to 35 yrs.	96	27	123	.257	.691 [.365,1.309]	.121	.574 [.284, 1.158]
	>35 yrs.	83	57	140	.078	1.688 [.943, 3.022]	.195	1.546 [.800, 2.990]
Current khat chew	No	153	82	235	.013*	1	1	1
	Yes	220	73	293	1	1.615 [1.108, 2.355]	.033*	1.587 [1.037, 2.428]
Current Coffee drink	Yes	293	130	423	.165	1.420 [.866, 2.328]	.508	1.210 [.689, 2.126]
	No	80	25	105	1	1	1	1
Current Physical activity	Yes	164	79	243	.142	.755 [.519, 1.099]	.146	1.354 [.900, 2.036]
	No	209	76	285	1	1	1	1
Work Experience	< 5 yrs.	191	63	254	1	1	1	1
	5 to 10 yrs.	146	65	211	.150	1.350 [.898, 2.030]	.424	1.207 [.761,1.915]
	.>10 yrs.	36	27	63	.005	2.274 [1.280, 4.039]	.068	1.818 [.957, 3.454]
Work schedule	Shift work	297	139	436	.007	2.223 [1.250, 3.953]	.003*	2.577 [1.38, 4.791]
	No shift work	297	16	92	1	1	1	1
Body mass index	Normal	194	65	259	1	1	1	1
	Underweight	28	10	38	.872	1.066 [.491, 2.313]	.874	1.067 [.475, 2.397]
	Overweight	115	52	167	.173	1.350 [.877, 2.078]	.018*	1.776 [1.104, 2.856]
	Obese	36	28	64	.004	2.321 [1.315, 4.097]	.001*	3.090 [1.637, 5.832]
Diabetes mellitus	Yes	15	10	25	.235	1.646 [.723, 3.749]	.284	1.637 [.664, 4.035]
	No	358	145	503	1	1	1	1
Job related stress	Low	177	54	231	1	1	1	1
	Medium	66	36	102	.025	1.788 [1.076, 2.970]	.006*	2.178 [1.256, 3.778]
	High	129	65	194	.021	1.652 [1.078, 2.530]	.003*	2.008 [1.262, 3.197]

*p –value < 0.05

Discussion

In this study, sleep quality was investigated among Nurses working in Jimma zone public hospitals. The data indicate that there was high prevalence of poor sleep quality. Furthermore, predictors for increased odds of sleep quality were determined.This study found that the prevalence of poor sleep quality among Nurses in Jimma zone public hospitals was 70.6%. The current study is consistent with the study done in Nepal 75% (Thapa et al., 2017), independently done in India 74.7% (Kazemi, Hosieni, Rezaeian, Fasihih, & Akbary, 2015)and 69% respectively(Kaliyaperumal et al., 2017).

The prevalence of poor sleep quality in this study was lower than study done in Iran 85.7% (Akbari et al., 2016), among Nurses in Kano Nigeria 77.1% (Kolo et al., 2017), and among Korean Nurses 79.8%(Park et al., 2018). The probable reason of this difference may be due to the fact that Nurses included in those three study were only shift working Nurses.the prevalence of poor sleep quality was higher than study done in Harbin China 62.68% (Han et al., 2016), north west Nigeria 61% (Aliyu et al., 2017), and among Nurses in Chinese general hospital 63.9% (Dong, Zhang, Sun, Sang, & Xu, 2017). This difference with our study may be due to the difference in human power, adequate facility, and pattern of shift work as compared to our study.

This study identified that current khat chewing was significantly associated with poor sleep quality. Similar findings were reported from a study done in Ethiopia among adults (Berhanu et al., 2018), as well as in College students (Lemma et al., 2012).

The current study identified that shift work was significantly associated with poor sleep quality. Several study discovered Similarity. Among healthcare workers in Iran (Pournik, 2013); among Nurses in China(Zhang, Sun, Li, & Tao, 2016), and among Nurses in Greece (Korompeli, Chara, Chrysoula, & Sourtzi, 2013) shift work was significantly associated with sleep quality.

Shift work was not significantly associated with poor sleep quality in study done Nurses in USA (Beebe et al., 2017). This difference may be because of facility and also due to the difference in the shift work classification, and small sample size in study done by Beebe D et al.

The result of this study identified that participants with BMI between 25 and 29 (Overweight) and BMI greater than or equal to 30 (Obese) were significantly associated with poor sleep quality. Our finding was in line with the study done in among adults in Jimma town (Berhanu et al., 2018), Chinese men and women(Cai et al., 2018), USA Nurses (Beebe et al., 2017), and youth in USA(Gohil & Hannon, 2018). In contrast to this finding in study done among Nurses in northeastern Ohio, USA, BMI was not significantly associated(Jennifer J, Aris Eleiades, Colleen Handwork, Jennifer L, 2013), perhaps this difference may be due the fact that self-reported BMI was used by Jennifer J et al., which may be subjected to recall bias.

This study found that medium and high job-related stress was significantly associated with poor sleep quality. Similar associations were reported from a study done in Chinese (Dong, Zhang, Sun, Sang, & Xu, 2017) , in Korean (Kim, Min, Jung, Paek, & Cho, 2016), and in Germany (Kunzweiler et al., 2016) in which job-related stress was significantly associated with poor sleep quality. In contrast, in study done in china, job-related stress was not significantly associated with sleep quality may be because only female Nurse were included (P. Chien et al., 2013).

Limitation of the study

This study did not use objective measurement to assess sleep quality and did not cover or assess about the difference between short period and long period shift rotation. Factors like type of meal consumed in relation to sleep, and any undiagnosed pregnancy were not considered objectively. Depression as the one of the factors affecting sleep quality was not considered.

Conclusion

Majority of Nurses in Jimma zone public hospitals were poor sleepers which accounts to about three fourth of them. Current khat chewing, overweight, obesity, job related stress, and shift works were independent predictors of poor sleep quality among Nurses in Jimma zone. Factors like sex, age, coffee consumption, physical activity status, diabetes mellitus, and work experience which were significant ($p < 0.25$) on bivariate logistic regression were

not significantly associated (p > 0.05) on multivariate logistic regression.

Recommendations

Jimma zone health administrative and hospital leaders should plan periodic screening of sleep disorders among Nurses to prevent complications of sleep problems. Policy makers should plan any alternative or adjustment method on current shift working practices. Nurses should be given education on how to adapt in different shift pattern and should prevent risky behavior like khat chewing and promote healthy behavior such as regular physical activity. Hospital should plan to fulfill human power on nursing professionals and promote safe environment to decrease load of job related stress. Further researchers recommended undertaking objective measurement to assess sleep quality among Nurses.

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Conflict of interest

The authors declare no conflict of interest.

Informed consent

Informed consent was obtained from all the participants included in the study.

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