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Original research article

The effect of insomnia and shift working on psychological well-being among general public hospital nurses

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Abstract
Introduction: There are few studies on the association between insomnia and categories of psychological well-being among nurses in clinical settings. Therefore, in this study, we aimed to explore the effect of insomnia and shift working on psychological well-being among nurses in public hospitals.
Methods: A total of 107 nurses (20–44 years old) were included using a non-random technique. The nurses were selected from four public hospitals in Iraqi Kurdistan in 2019.
Results: The mean age of the nurses was 29.94 (20–44 years). They had diploma (48.6%) and bachelor's degrees (51.4%), worked morning (36.4%), evening (19.6%), and night shifts (14.0%), and some (29.9%) were shift rotators. Most nurses worked in the public sector (56.1%) or both sectors (43.9%). The mean sleep score of the nurses was 10.68 out of a total of 24. The prevalence of insomnia among nurses was 80.4%. The mean value of general psychological well-being was 26.64 out of a total 36. Working morning shifts and having a high level of insomnia were predictors of worse psychological well-being. Nurses who worked in the morning or as shift rotators were more likely to feel unable to overcome difficulties. They were also less likely to enjoy normal day-to-day activities, less likely to feel reasonably happy, and more likely to lose confidence in their lives. The level of facing up to one's problems increased according to the severity of insomnia.
Conclusions: The study showed that nurses with insomnia had worse psychological well-being than nurses without insomnia in public hospitals.

Keywords: Insomnia; Nurse; Psychological well-being; Sleep

Introduction

Healthcare system nurses play a crucial role in providing healthcare services (Saleh et al., 2014). They are engaged in shifts, working continuously in healthcare for patients (Zverev and Misiri, 2009). The unusual work schedule results in insomnia, sleep disorders, or workplace accidents. Insomnia is difficulty in initiating or maintaining sleep, which leads to daytime sleepiness (Roth, 2007).

There are different prevalence rates of sleep disturbance and sleep disorders among nurses based on geographic, environmental, social, or personal factors. Different prevalence of sleep disturbances has been reported between and within geographic areas. For example, one study reported the prevalence of sleep disturbance to be 69.7% among nurses (An et al., 2016). Others reported varying prevalence rates when it comes to exhibiting insomnia or excessive sleepiness. For example, 75% among shift workers, 32.1% among night-shift workers, and 26.1% among rotating shift workers (Lin et al., 2012). A study conducted among nurses in the Kurdistan Region reported that 28.9% are short-sleepers (less than 6 hours sleep/24 hours) (Ali et al., 2020). Some of the sleep problems reported in the literature are as follows: between 57% and 83.2% (Jafari Roodbandi et al., 2015; Shao et al., 2010) of shift-working nurses have reported sleep problems, including sleep disturbances (Hsieh et al., 2011), sleep deprivation (Kaliyaperumal et al., 2017), and poor sleep quality (Andiappan et al., 2014; De Martino et al., 2013).

Several factors have been reported to relate to sleep disturbance or insomnia among nurses. For example, a study conducted in Malaysia reported that age, marital status, and working environment are associated with the development of sleep disturbances in nurses (Nazatul et al., 2008). Nurses who experience poor sleep are more likely to have anxiety, feelings of depression, and a poor working environment (Hsieh et al., 2011). In addition, sleeplessness impacts patient safety because patients may not receive suitable and prompt treatment, or nurses may cause injuries to patients or themselves (Hughes, 2008). Poor sleep quality and sleeplessness have been reported to be associated with several health issues, such as metabolic syndrome and disturbances in the endocrine and immune systems. These changes in the human body result in several psychophysiological health disturbances. These psy-

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chophysiological health disturbances include cardiovascular diseases, emotional issues, cancer, daytime distress, fatigue, and an impairment in daily life (Kang et al., 2019; Korsiak et al., 2018; Lee et al., 2015) and quality of life (Nutt et al., 2022). Nurses who experience insomnia and are under time pressure are more likely to cause injuries to patients during caregiving, as well as to incorrectly administer medication (Abdulah and Suleman, 2021). The association between insomnia and categories of psychological well-being in nurses in clinical settings has not been sufficiently investigated. There is no initial data on insomnia and psychological well-being among nurses in public hospitals in this region. Therefore, in this study, we aimed to explore the relationship between insomnia and shift working on psychological well-being among nurses in public hospitals.

Materials and methods

Study design and sampling

In the current cross-sectional study, a total of 107 nurses (aged 20–44 years) were included using a non-random technique. The nurses were full-time workers with various levels of experience and education. They were selected from four public hospitals in Duhok city in the Kurdistan Region. The hospitals included in this study were one general, one pediatric, one emergency, and one burn hospital. We included nurses from the following medical settings: medical, surgical, outpatient, and emergency wards. The nurses were invited to fill out a pre-designed questionnaire which took 20 minutes. All the data were collected by the second author. Some nurses were too busy in the hospital, so we gave them the questionnaires to fill out at home and asked them to return them in the following days. Nurses received the necessary information and explanation before being included in the study.

To obtain a representative sample of nurses in this region, we included nurses working in the various clinical departments of the aforementioned hospitals in Duhok city in 2018. In addition, we tried to include nurses with different socio-demographic backgrounds. To obtain a sufficient number of nurses, we invited nurses with different ages, nursing experience, from different clinical wards, with various socio-demographic backgrounds. The nurses included in this study graduated from a nursing institute (diploma degree) or a nursing college (bachelor's degree). Those who complete two years of nursing study at a university receive a diploma degree, while those who complete four years of nursing study at a nursing college receive a bachelor's degree.

We only included nurses from public hospitals. However, in this region most nurses work in both the public and private sectors. Of the total 125 nurses invited to participate in the current study, 112 (response rate: 89.6%) returned the completed questionnaire. The questionnaires were reviewed in detail for missing data. The authors excluded 5 questionnaires as they had more than 20% missing information. 107 nurses (net response rate: 85.6%) were included in the analysis. We collected the data between 20th May 2018 and 28th August 2018.

Data collection and measures

The following information was obtained during data collection: age, gender, and education – categorized as diploma and bachelor. Nurses who engaged in walking, running, cycling, climbing, and swimming were categorized as physically active. Nurses who had smoked for the last six months were considered smokers. Working shifts were recorded based on the local health system in this region; the working times are 8am–2pm (morning shift), 2pm–8pm (evening shift), and 8pm–8am (night shift). Nurses were defined as temporary shift rotators if they worked more than one shift at hospitals. Nurses worked in public or both public and private sectors. The socio-demographic characteristics were taken from the previous studies in the literature (Abdulah and Suleman, 2021; de Cordova et al., 2016).

Sleep difficulty

We used the Athens Insomnia Scale (AIS) to measure the severity of sleep difficulty. This scale is a self-assessment psychometric tool that measures sleep difficulty according to the International Classification of Diseases (ICD-10). The scale has eight items to measure sleep difficulty: sleep onset, night and early morning waking, time of sleeping, sleep quality, frequency of complaints and their duration, distress due to insomnia, and its interference with daily functioning. This scale has been validated for both insomniac and healthy populations aged between 18 and 79 years. Between 3 and 5 minutes is required to fill this scale. Sleep difficulty was measured over the last month, according to a four-point Likert scale. The severity of sleep difficulty was measured from 0 (no sleep problems) to 3 (more acute sleep difficulties). A cut-off of 6 was used to distinguish insomniacs from healthy nurses (Shahid et al., 2012). The interconnection reliability of sleep difficulty was 0.879.

General health status

To measure mental well-being over the past several weeks, we employed the short form of the General Health Questionnaire-12 (GHQ-12). This scale has 12 items to measure healthy functioning and the onset of new distressing symptoms. These symptoms are related to the following health issues: anxiety, depression, somatic symptoms, and social dysfunction. The scale only measures minor psychiatric disorders and is suitable for broad age groups (Goldberg et al., 1997). The 12 items included in the scale measure mental well-being using a 4-point Likert scale. The severity of mental well-being ranged from 0 to 36. The items on the scale were rated from 0 to 3. Positively expressed questions were rated differently from negatively expressed questions. Six positively expressed questions were rated from 0 (more than usual) to 3 (much less than usual). The remaining six negatively expressed questions were rated from 0 (not at all) to 3 (much more than usual). A higher score means a higher level of general psychiatric distress. The reliability is between 0.83 and 0.85 (Cronbach's alpha) (Doi and Minowa, 2003). Various cut-offs have been reported in the literature. In this study, we used the mean score of GHQ-12 (Goldberg et al., 1998). The interconnection reliability of the general health status of 12 items was 0.688.

Statistical methods

The mean and standard deviation were used for the numerical variables. Numbers and percentages were used for nominal variables and the prevalence of insomnia. We determined the severity of insomnia by mean and standard deviation. We checked the normality of the variables by drawing a histogram. Predictors of general psychological well-being were examined using the standard least squares with effect leverage. We used a p-value of less than 0.05 to reject the null hypothesis. Statistical calculations were performed using JMP pro 14.3.0.

Ethical considerations

We received ethical approval from the Health Ethics Committee of the Directorate General of Health-Duhok. The protocol was registered on 12th July 2017 with reference number 12072017-5. The health ethics committee is a joint health committee comprising the University of Duhok and the Directorate General of Health-Duhok. The nurses had the right to refuse to participate in the study and we guaranteed the confidentiality of their personal information (we did not document their names on the questionnaires). We also obtained verbal consent before they completed the questionnaire.

Results

The mean age of the nurses was 29.94 (SD: 5.26), ranging from 20 to 44 years. The nurses were male (50.4%) and female (49.5%) and had different levels of education – diploma: 48.6%, bachelor: 51.4%. The nurses were physically active (57.9%) with irregular exercise patterns (61.3%). A small percentage of nurses were smokers (19.6%). The nurses worked morning shifts (36.4%), evening shifts (19.6%), night shifts (14.0), and 29.9% were shift rotators. Most nurses worked in the public sector (56.1%), those remaining worked in both the public and private sectors (Table 1). The mean sleep score of the nurses was 10.68 (SD: 6.11), ranging from 2 to 24. The study revealed that 80.4% of the nurses were insomniacs as defined by the cut-off ≥6. The mean value of total psychological well-being was 26.64 out of 36 (Table 2).

Nurses who were not physically active had worse psychological well-being than the physically active, 27.76 vs. 25.82; $P = 0.0236$. A worse psychological well-being score was found among smokers than non-smokers; 28.86 vs. 26.09; $P = 0.0089$. Nurses who worked in the morning had worse psychological well-being compared to other working shifts ($P = 0.002$, Table 3, Fig. 1).

The study showed that morning shift work and worse insomnia status were predictors of worse psychological well-being among nurses in public hospitals in the Kurdistan Region (Table 4, Fig. 2). The older nurses felt they conduct useful activities in their lives. Nurses working in the morning or as shift rotators were more likely to feel an inability to overcome difficulties. The level of enjoying normal day-to-day activities significantly decreased with an increasing level of sleep difficulty among nurses who worked the morning shift. In addition, the

Table 1. General characteristics of nurses

Nurses' characteristics (n = 107)	Statistics	
	Number	Percentage
Age (20–44 years) Mean (SD)	29.94	5.26
Gender		
Male	54	50.5
Female	53	49.5
Education		
Diploma	52	48.6
College	55	51.4
Physically active	62	57.9
Regular	24	38.7
Irregular	38	61.3
Smokers	21	19.6
Duration (1–15 years) mean (SD)	7.05	4.40
Working shift		
Morning	39	36.4
Evening	21	19.6
Night	15	14.0
Shift rotators	32	29.9
Working sector		
Public	60	56.1
Both public and private	47	43.9

Table 2. Level of sleep, functioning, and general psychological well-being

Nurses' characteristics (n = 107)	Statistics	
	Mean	Std. deviation
Total sleep score (Range: 2–24)	10.68	6.11
Healthy	21	19.6
Insomniac	86	80.4
Psychological well-being (Range: 1.5–3.0)	2.22	0.37
Been able to concentrate on what you're doing?	2.15	0.76
Lost much sleep due to worry?	2.27	0.71
Felt you were playing a useful part in things?	2.50	0.50
Felt capable of making decisions about things?	2.09	0.81
Felt constantly under strain?	2.17	0.81
Felt you couldn't overcome your difficulties?	2.12	0.80
Been able to enjoy your normal day-to-day activities?	2.25	0.77
Been able to face up to your problems?	2.19	0.83
Been feeling unhappy and depressed?	2.11	0.81
Been losing confidence in yourself?	2.29	0.81
Been thinking of yourself as worthless?	2.31	0.77
Been feeling reasonably happy, all things considered.	2.19	0.81
Total GHQ: Range: 18–36	26.64	4.38

Table 3. Comparison of total general psychological well-being among nurses with different characteristics

General characteristics (N = 107)	Total GHQ		p-value (two-sided)
	Mean	St. deviation	
Gender			
Male	26.56	4.68	0.8500[a]
Female	26.72	4.11	
Education			
Diploma	26.62	4.03	0.9634[a]
College	26.65	4.73	
Physical activity			
No	27.76	4.64	**0.0236[a]**
Yes	25.82	4.03	
Physical pattern			
Irregular	25.84	4.10	0.9622[a]
Regular	25.79	4.01	
Smoking			
No	26.09	4.19	**0.0089[a]**
Yes	28.86	4.54	
Working shift			
Morning	28.38	4.70	
Evening	27.95	4.74	**0.0002[b]**
Night	25.00	2.27	
Shift rotators	24.41	3.22	
Working sector			
Public	26.40	4.13	0.5326[a]
Both public and private	26.94	4.72	

[a] An independent t-test and [b] ANOVA one-way were performed for statistical analyses.

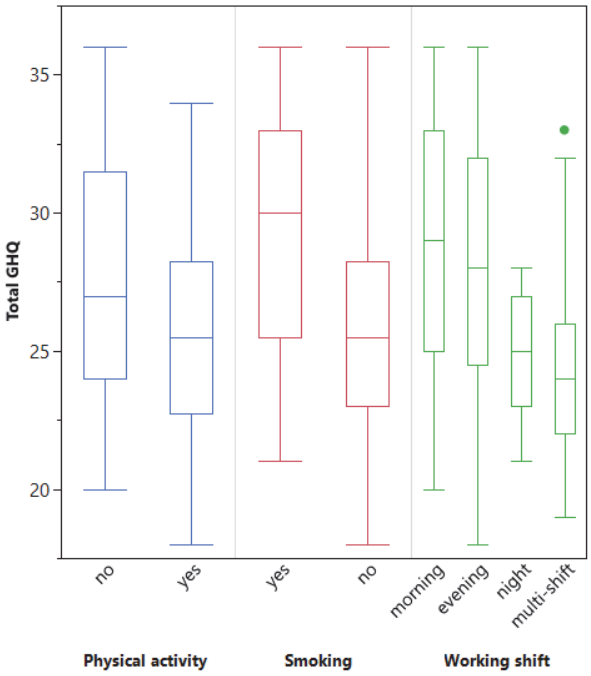

Fig. 1. Comparison of total general psychological well-being among nurses with different characteristics

Table 4. Factors related to general psychological well-being in nurses

Controlling factors (n = 107)	Outcome: Psychological well-being — Presentations	P-value
Whole model		
Working shift		**0.00402**
Total sleep score		**0.02213**
Gender		0.15909
Smoking		0.26230
Physical activity		0.31015
Education		0.34046
Working sector		0.34283
Age		0.64951

Note: Standard least squares with effect leverage was performed for statistical analysis.

level of facing up to problems increased along with the increasing level of sleep difficulty among nurses. Nurses who worked in the morning or as shift rotators were more likely to lose confidence in their lives. Older nurses, females, non-smokers, and those working in both public and private sectors were more likely to consider themselves worthless. Nurses who worked as shift rotators or had a higher sleep difficulty score were less likely to feel reasonably happy (Table 5 and Fig. 2).

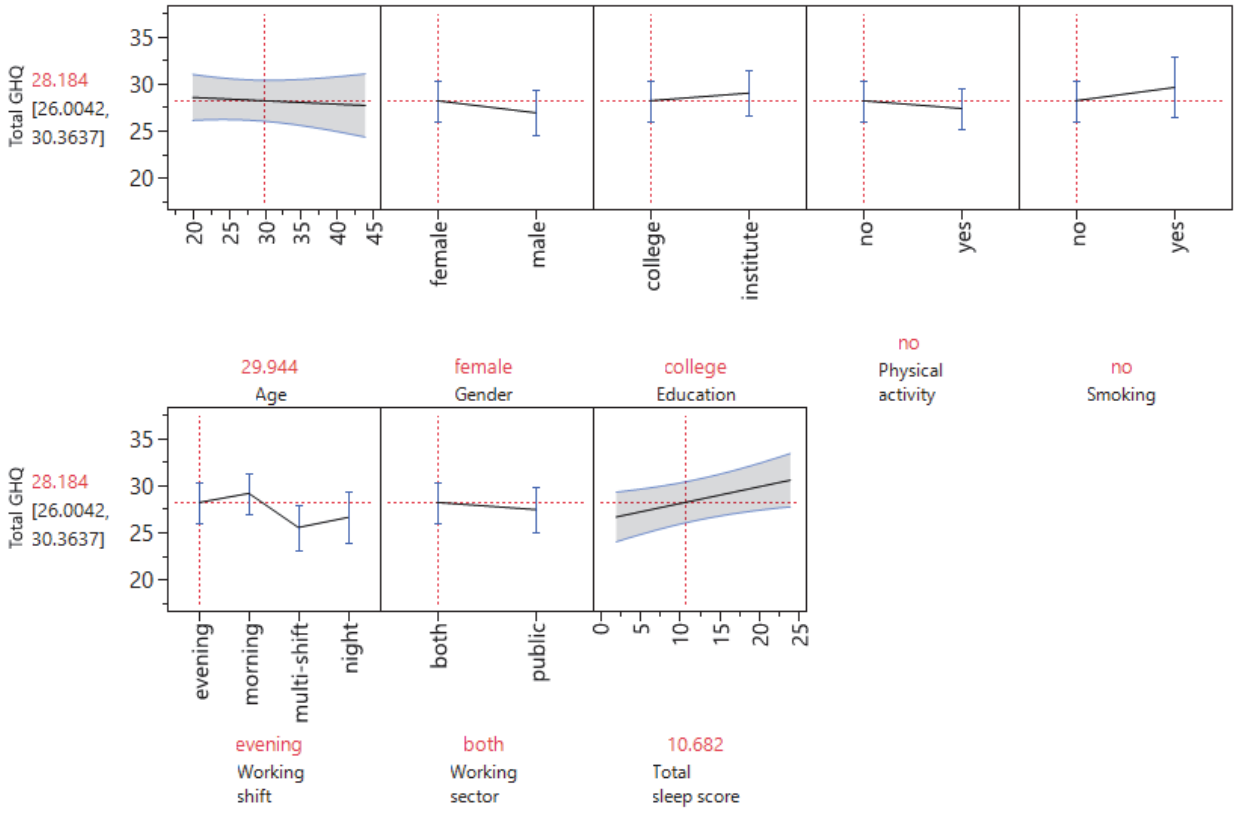

Fig. 2. Factors related to general psychological well-being in nurses

Table 5. Factors contributing to items of psychological well-being among nurses

Models for items of psychological well-being	Outcomes: Items of psychological well-being	
Concentration on activities	No factor	NA
Lost a lot of sleep due to worry	No factor	NA
Feeling working on useful activities	Age	0.0231
Decision-making ability	No factor	NA
Feeling under constant strain	No factor	NA
Feeling unable to overcome difficulties	Working shift (morning) Working shift (shift-rotating)	**0.0133** **0.0197**
Enjoying normal day-to-day activities	Working shift (morning) Total sleep score	**0.0240** **0.0220**
Facing up to problems	Total sleep score	**0.0494**
Feeling unhappy and depressed	No factor	NA
Losing confidence	Working shift (morning) Working shift (shift-rotating)	**0.0005** **0.0253**
Thinking of oneself as worthless	Age Gender (female) Smoking (no) Working sector (both)	**0.0321** **0.0443** **0.0111** **0.0388**
Feeling reasonably happy	Working shift (shift-rotating) Total sleep score	**0.0445** **0.0201**

Note: Standard least squares with effect leverage was performed for statistical analysis.

Discussion

This study indicated that the psychological well-being of nurses was worse among those with worse sleep and who worked the morning shift in public hospitals. The morning shift is the busiest shift due to physician consultations and the increased number of tests, procedures, and other management instructions. Nurses are unable to deal with the heavy workload during this shift, which negatively affects their psychological well-being.

The study revealed that 80.4% of shift-working nurses suffer from insomnia. Poor sleep quality and inadequate sleep duration could be due to extended shift work and their working in a private clinic (13–14 hours among nurses included in this study). This is in agreement with the results observed on the cognitive performance of nurses who work in shifts with similar work schedules (Kaliyaperumal et al., 2017). There was evidence of a relationship between nurses' psychological well-being and insomnia. The insomnia affects their performance on the night shift or during shift rotation and leads to the development of psychological and physical diseases (Ferri et al., 2016; Øyane et al., 2013; Waage et al., 2014). Studies including meta-analysis proved that nurses who worked ≥12.5 hours have a problem staying awake at work. This difficulty was lower among nurses who work less than 12.5 hours (Lockley et al., 2007; Scott et al., 2007).

A causal relationship has been found between sleep deprivation and fatigue. The impacts of sleep deprivation on performance has been approved among clinicians (Axelsson et al., 2008).

The prolonged working hours of nurses in the Kurdistan region are due to them working in both the public and private sectors. Most nurses in this region work in both the public and private sectors. The majority of these nurses have only one day per week for rest (Abdulah and Suleman, 2021).

It seems that the effects of sleep difficulty or insomnia on lowering psychological well-being are mostly due to fatigue, because insomnia is a causative factor for this. In our study, working morning shifts along with insomnia predicted that nurses would be unable to perform useful activities in their lives, or enjoy normal day-to-day activities, and think they are worthless. The morning shift is the main working shift in the Kurdistan region because most patients attend public hospitals in the morning, rather than during the evening or night shifts. Therefore, the morning shift places too much pressure on the nurses. In this study, most nurses work in the morning (36.4%) or multi-shifts (29.9%). Nurses who work the night shift have to work for 12 hrs. The insomnia of the nurses in this study may be due to night shift work (long shifts) or a high load during morning shifts. We did not measure fatigue, but it seems that most of the nurses are psychologically fatigued. Fatigue and sleep deprivation are the result of long working hours and shift work. This leads to personal safety risks, such as an increase in work-related accidents and clinical errors at hospitals (Kecklund and Axelsson, 2016). Clinical errors can occur due to long working shifts.

Long working hours are prevalent in the health industry. This overtime work – whether voluntary or mandatory – is used to compensate for staff shortages and a high number of medical visits. Nurses who work long hours are at risk of causing injury and providing lower quality healthcare, resulting in adverse patient outcomes. In addition, it has a negative effect on their well-being and practice (Doi, 2005). The authors recommend that policymakers attend to this issue in medical settings.

We did not measure fatigue, but it has been confirmed that sleep is a causative factor for this. Therefore, we are sure that

the nurses with insomnia are also fatigued. We suggest the effects of sleep quality on safety events be investigated in future studies. In addition, we recommend a comparative study of nurses with and without insomnia to establish a clear connection between insomnia and psychological well-being (because in this study most nurses were insomniac/sleepless). Health authorities should pay attention to the sleep quality of nurses in the health system because poor sleep quality may be due to a lack of physical activity and shift work. Working schedules of the nurses could be adjusted based on their work routines. We suggest that nurses be trained in coping mechanisms because these act as a mediating factor between stress and insomnia. Nurses (especially novice nurses) must be trained in using appropriate coping mechanisms as a tool for reducing stress. Novice nurses mostly use acceptance, denial, and self-blame to reduce the severity of insomnia. They report that emotional support and venting decrease the severity of insomnia (Serafin et al., 2021). Health policymakers may train nurses in emotional intelligence as a coping mechanism against insomnia. A previous study reported that nurses need to appraise others' emotions to manage self-blame, and utilize these emotions to positively reframe this negative emotion (Ali et al., 2020).

We need to decrease the level of stress on nurses to improve their sleep quality (Lin et al., 2014). Nurses who work in the local health system in the Kurdistan Region have a high level of stress (Ali et al., 2020). This may be due to an insufficient number of skilled nurses in our region. When it comes to the number of nurses, there are many nurses in each hospital in this region. Many of these graduated from a nursing institute (Abdulah et al., 2021) or a nursing high school. Nurses who complete two years of study at university receive a diploma degree in nursing. Therefore, the shortage of nurses in the Kurdistan Region is due to an insufficient number of skilled nurses. This shortage places a high level of stress and pressure on nurses, especially those working morning shifts.

Limitations of the study

We attempted to include as many eligible nurses as possible from the main public hospitals. Not all nurses were available during data collection due to working different shifts. We encouraged the nurses to respond to all questions as much as possible.

Conclusions and recommendations

This study suggests that insomnia has a worse effect on the psychological well-being of nurses in public hospitals. Nurses with worse sleep scores do not enjoy their normal day-to-day activities, cannot face up to problems, and do not feel reasonably happy. We recommend that health policymakers pay attention to the sleep of nurses in medical settings. Lower quality of sleep among nurses can lead to patients receiving lower quality healthcare services – and can also cause injury to nurses. Hospitals may need to create a more appropriate work schedule for nurses to assist in alleviating the sleep issue. In addition, the health system can hire newly graduated nurses to compensate for staff shortages in public hospitals.

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Ethical aspects and conflict of interests

The authors have no conflict of interests to declare.

Vliv nespavosti a práce na směny na psychickou pohodu sester všeobecných nemocnic

Souhrn

Úvod: Existuje jen málo studií o souvislosti mezi nespavostí a kategoriemi duševní pohody u sester v klinickém prostředí. Proto jsme se v této studii zaměřili na prozkoumání vlivu nespavosti a práce na směny na duševní pohodu sester ve veřejných nemocnicích.

Metodika: Náhodným výběrem bylo zařazeno celkem 107 sester (20–44 let). Zdravotní sestry byly vybrány v roce 2019 ze čtyř veřejných nemocnic v irácké Kurdistánu.

Výsledky: Průměrný věk sester byl 29,94 (20–44 let). Měly diplom (48,6 %) a bakalářský titul, (51,4 %), pracovaly na ranní (36,4 %), večerní (19,6 %) a noční směny (14,0 %) a některé (29,9 %) směny obměňovaly. Nejvíce sester pracovalo ve veřejném (56,1 %) nebo v obou sektorech (43,9 %). Průměrné spánkové skóre sester bylo 10,68 z celkových 24. Prevalence nespavosti u sester byla 80,4 %. Průměrná hodnota obecné duševní pohody byla 26,64 z celkových 36. Práce na ranní směny a vysoká míra nespavosti byly prediktory horší duševní pohody. Sestry, které pracovaly ráno nebo obměňovaly směny, se častěji cítily neschopné překonat potíže. Bylo také méně pravděpodobné, že si budou užívat běžné každodenní činnosti a cítit se přiměřeně šťastné. Pravděpodobně budou mít sklony k negativismu. Úroveň čelit problémům se zvyšovala podle závažnosti nespavosti.

Závěr: Studie ukázala, že sestry trpící nespavostí se cítily duševně mnohem hůře než sestry bez tohoto problému pracující ve veřejných nemocnicích.

Klíčová slova: duševní pohoda; nespavost; sestra; spánek

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