The Prevalence of Sleep Quality and Quantity among Emergency Department Nurses in Indonesia

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Abstract: Sleep disturbance is a frequent complaint in nurses, particular in nurses of emergency department (ED). Increase the occurrences of medical errors and impact patients' safety. Rapid rotating shift work is a common type of shift work in nurses in Indonesia. The question is whether the quality and quantity of nurses' sleep is disturbed and what factors influence nurses' sleep in East Java, Malang- Indonesia. The study was conducted in four hospitals. A total of 115 ED nurses with mean age of 32.3 years. The parameters (i.e., total sleep time, sleep onset latency, wake after sleep onset, and sleep efficiency were retrieved based on 7-day sleep diaries. PSQI was used to measure sleep quality. One-sample T-test and correlation Spearman were used for data analyses. Finding, approximately 82% ED nurses had poor sleep quality (PSQI > 5). With exception of WASO, ED nurses reported shorter TST, longer SOL, and poorer SE than normal. The factors correlated with sleep only Body Mass index and exercise. This study suggests that fast rotating-shift ED nurses experienced poor sleep quality and quantity.

1 INTRODUCTION

Sleep and rest are very important for human life. One-third of human life is spent sleeping. Kazemi et al., (2005) in Akbarzadeh et al., (2014) a person's sleep needs differ depending on the level of development. the benefits of sleep for cellular improvement, comfort, calm, and mental-physical relaxation are created during sleep. The mechanism can restore, help human physical and mental regeneration question is whether the quality and quantity of nurses sleep is disturbed and what factors influence nurses' sleep (Park, Lee, & Park, 2018).

Park et al., (2018) The prevalence of poor sleep quality in nurses causes a lower in performance to caring patients, these factors are caused by work shifts and age. Shift working is a common characteristic health professional. The impact of shift work to strongly interfere with sleep, especially for nurses' work in ED (Weaver, Stutzman, Supnet, & Olson, 2016).

Two dangerous elements and affect the nurse's health status, as well as patient safety and quality of care, are the effects of poor sleep Dorrian et al., (2008) in (Ruggiero & Avi-Itzhak, 2016). The eight-hour shift patent with faster rotation is common in the medical field in Indonesia. It consists of three shifts, such as morning shift seven hours, from 7:00 to 14:00), evening shift (seven hours, from 14:00 to 21:00 hours), and night shift (10 hours, from 21.00 to 7.00). On average, each ED nurse may experience three different types of shifts in a week in Indonesia (Saftarina & Hasanah L, 2014).

The purpose of this study examined the sleep pattern of nurses' ED such as; sleep efficiency, wake time after sleep onset, sleep latency, total sleep time, and sleep quality in ED nurses, and examine which correlation sleep and demographic characteristic.

2 METHODS

2.1 Participants

Data collected from 115 ED nurses from four hospitals in Malang City, Indonesia. The participants who met the following inclusion criteria that 1)

nurses had worked more than three months in the ED, 2) worked for consecutive seven-day duty and one day off during study period, 3) were required to have the ability to sleep diary and PSQI. A multi-stage sampling technique was used to recruit the participants and used design the cross-sectional.

2.2. Research Procedures

Data were collected from nurses working in four hospital on ED. This study used information sheet to collect participants' demographic characteristics (e.g., personal income, education level, work experiences, gender, age, material status, body mass index [BMI], comorbidity, hypnotic use, back depression inventory, and habit drink alcohol, coffee, and tea).

In the coment study, it was used to assess six-duty day and one on day off . TST is a total sleep time during the night or after the participant duty. SE is a proportion of the total sleep time and total time in bed multiplied by 100%. SOL is the length of time that is calculated from lying down to sleep onset after light off. WASO refers to the time of wakefulness after sleep initiation. Those parameters represent sleep quantity in our participants.

2.3. Data Analysis

All data analyses ware performed by using the statistical Package for the Social Sciences 23 (IBM Corp., Armonk, NY, USA). Descriptive analyses was used to estimated the social-demographic data, sleep parameters and Trail Making Test score using the mean ± standard deviation for continuous variables, and case number and percentage for categorical variables. one-sample T-Test was used to test the differences between sleep parameters data compared with norm data (M. Ohayon et al., 2017).

3 RESULTS AND DISCUSSION

Regarding the consequence of score BDI and hypnotic use, no one in the study has symptoms of depression and does not use any medication for sleep disorders. The mean age of the respondents was 32.24 years (SD = 8.77). Approximately half of the participants were female (54.8%). In terms of BMI, the mean BMI was 23.59 (SD = 3.02). Furthermore, the majority participants have working experience > 5 years (60.9%). Half participants' monthly personal income was < $ 250.

Besides, the education level of participants more than a half percent was Licensed practical nurse (LPN) the rest had Associated Diploma-3 nurse (79%). There were 52.2% and 65.2% of participants having habits of consuming coffee and tea, and more than half of participants (n = 58) regularly exercise every week (Table 1).

Table 1: Number and percentage of demographic characteristics of participants (*n*=115).

Characteristics of the respondent	Total	
	n	(%)
Age (mean, SD)	32.2	(8.8)
20 – 29	60	(52.2)
30 – 39	32	(27.8)
≥ 40	23	(20.0)
Gender		
Male	52	(45.2)
Female	63	(54.8)
BMI (mean, SD)	23.6	(3.0)
Marital Status		
Single and divorced	44	(38.3)
Married	70	(60.9)
Education level		
Diploma-3	91	(79.1)
Registered nurse (RN)	24	(20.9)
Working experience (year)	9	(8.5)
< 4 years	45	(39.1)
≥ 5 years	70	(60.9)
Personal income a month		
< $ 250	59	(51.3)
≥ $ 250	56	(48.7)
Coffee intake every day		
No	55	(47.8)
Yes	60	(52.2)
Tea intake every day		
No	40	(34.8)
Yes	75	(65.2)

Characteristics of the respondent	Total	
	n	(%)
Exercise habit every week		
No	57	(49.6)
Hypnotic use	0	(0)

BMI	0,45**	< 0,001
Marital status	0,04	0,65
Education	0,06	0,95
Working experience	0,11	0,22
Drink coffee	0,09	0,32
Drink Tea	0,06	0,47
Exercise	0,25**	0,008

Note: **: Correlation is significant at the .01 level (2-tailed);
* : Correlation is significant at the .05 level (2-tailed)
Correlation Spearman

The distribution in sleep parameters in ED nurses.

Results of sleep parameters, including WASO, TST, SOL, SE, and the global score of PSQI presented in Table 3. The mean (SD) of ED nurses more likely to have prolonged SOL, shorter TST, poorer SE, lower WASO and a higher global score of PSQI compared to norm published 29.89 (20.49), 327.7 (66.59), 88 (6), 8.7 (5.5) and 7.68 (2.73), respectively (all the *p* < 0.001) (M. M. Ohayon, Carskadon, Guilleminault, & Vitiello, 2004) .

Table 2: Distributions of self-reported sleep parameters and TMT scores of the study (n=115).

	Norm	Participants		
Variable	Mean	Mean	SD	*p*
WASO	15	8.7	5.5	<0.001
TST	420	327.7	66.6	<0.001
SOL	12	29.89	20.5	<0.001
SE (%)	92	88	6	<0.001
PSQI	5	7.68	2.73	<0.001
< 5 (n, %)	-	21	18.3	
>5 (n, %)	-	94	81.7	

Note:
WASO = Wake After Sleep Onset, TST = Total Sleep Time, SOL = Sleep onset Latency, SE = Sleep Efficiency, PSQI = Pittsburgh Sleep Quality Index (Ohayon, Carskadon, Guilleminault, &Vitiello, 2004; Sánchez-Cubillo et al., 2009)

The analysis shows that BMI and exercise have a positive correlation with nurses' sleep patterns. Spearman correlations were used to connect sleep with characteristic demographics, show in table 3.

Table 3: Correlation between sleep quality and independent variables (n=115).

Independent variables	*r*	*p*
Age	0,01	0,894
Gender	0,02	0,80

The interpretation of this study is limited by the cross-sectional design. The results cannot be generalized to all nurses who work shifts, selection bias is introduced by recruiting nurses from four high-quality hospitals in Indonesia and one education hospital. We also understand the emotional health of participants. In addition, we did not evaluate family commitment factors, such as caring for the child and family because the majority of participants were married and had children.

The possible explanation is that our participants had only five hours sleep averagely and thus WASO decreased when comparing with norm population who had seven to eight hours sleep. Consistent with previous studies that supported nurses have a reduced cognitive function associated sleep deprivation (Wolf et al., 2017; Kaliyaperumal et al., 2017). Our finding suggested that ED nurses who involved in rapidly rotating shifting work had a poor executive function. Both sleep disturbance and rapidly rotating shifting work may contribute to the consequence; however, our study could not confirm the possible effects or mechanism of sleep and/or shifting works on executive functions. Further investigation should examine the matter (Niu et al., 2013; Magee et al., 2016). Another finding in our study was that our participants might have difficulty starting a deep sleep, we found that they had WASO longer than the norm.

The findings in our study that nurses slept worse because of the demands of work. In related studies, poor sleep quality in French adults was found to be a strong contributor to poor concentration, difficulty performing tasks and more work-related accidents and injuries (Lockley et al., 2007). Similarly, other findings from Japanese workers having poor sleep quality were found to have a much higher prevalence of work injuries (Grandner, Williams, Knutson, Roberts, & Jean-Louis, 2016). However, the findings of the opposite relationship, nurses who work in shifts have experienced work-related injuries are more susceptible to poor sleep quality. Occupational accidents caused by poor sleep cause nurses to take sick leave, and this has a serious

impact on their income. As such, their sleep quality may be affected not only by their injuries but also by stress or workload in the ED.

Our study found that WASO, TST, and SE in our participants were lower than the norm. Supported by a study of Roach et al. (2006) in S.-F. Niu et al., (2013) that sleep nurses will experience interference due to work shifts. Someone who sleeps between 20: 00-24: 00 has the longest TST and the highest level of melatonin release, while those who sleep at 12: 00-14: 00 experience the shortest TST because melatonin is at the lowest level. In addition to changes in circular rhythms, it is found that the sleep patterns and activities of night shift workers who sleep during the day are different from the others and make them more sensitive to environmental disturbances such as light, noise, improper temperatures, and telephone ringing, and so on. , which causes them to have more WASO than day shift workers who sleep at night. In this study, the biological hours of night shift workers are interrupted by their work at night and sleep during the day. By sleeping during the day, cortisol levels still rise and melatonin levels can decrease, which damages the sleep schedule and can explain why the night shift group has lower SE than the day shift group.

Accumulation of sleep deprivation and sleep deficits can cause chronic fatigue and an increase in the amount of sleep needed for recovery. Thus, nurses in the shift group who work the night shift may have accumulated sleep debt and, consequently, experience fatigue, which leads to a reduction in the interval between sleep time and sleep onset on the second day of the night shift (Shu-Fen Niu et al., 2017).

Therefore, the findings cannot be generalized to quickly rotate the shift schedule. Next, participants were female nurses from the general surgical and medical ward. The level of activity of nursing staff and work stress is related to the severity of their patient's condition. Our results cannot be generalized to all nurses in different wards. Future studies should explore the sleep quality of nursing staff in hospitals in various regions and work with different shift patterns.

In our study found that influences sleep in the participant if it was related to the demographics only BMI and exercise habits. Several potential pathways, both biological and behavioral, where the duration of sleep problems is related to being overweight/obese. Laboratory results have shown how sleep restriction is related to changes in the production of hormones that control appetite, such as leptin and ghrelin, which can cause weight gain Omizade (2010) in (Bogossian et al., 2012; Lim, Huang, Chua, Kramer, & Yong, 2016). The relationship between short sleep and obesity is a stronger distribution of BMI Mitchell (2010) in (Lim et al., 2016). Other studies found short sleep duration can also affect eating patterns, with a stronger preference for fatty foods when tired. Furthermore, waking up gives more opportunities for snacking and dinner which will add to your total calorie intake. Although there are changes in diet and hormones may be small, it has been shown that even small changes in diet can cumulatively change the energy balance.

4 CONCLUSIONS

Shift rotation is a complex problem that is simultaneously influenced by several factors, including disruption in the sleep-wake cycle, circadian misalignment, individual inclinations, and family factors, especially in parenting. In this study that influenced nurses' sleep was BMI factors and exercise habits. ED nurses with rapidly rotating shifts have poor sleep quality, longer sleeping latency, worse sleep efficiency, shorter sleep duration, lower WASO compared with a healthy population. Only BMI and exercise have influenced the sleep pattern of nurses.

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