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Sleep Disturbance and General Health Status in Patients with Chronic Conditions

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Abstract

Patients with chronic conditions often report sleep disturbance that affects their daily activities and health status. Information about the association between sleep disturbance and general health status in patients suffering from chronic conditions is limited, especially in relation to the developing countries of Asia. This study was conducted to estimate the prevalence of sleep disturbance and its relationship with the general health status of patients with chronic conditions in Indonesia. This cross-sectional study included 9,807 patients with chronic conditions who had participated in the Indonesian Family Life Survey (IFLS) wave 5. While sleep disturbance was measured by using the PROMIS sleep disturbance 4a short-form v1.0, general health status was assessed from self-rated health. Multivariable logistic regression was performed to assess the association between sleep disturbance and general health status. The study found that 75.7% of the patients with chronic conditions experienced sleep disturbance. In addition, the odds of being unhealthy among patients with sleep disturbance was 18% higher than those who did not experience sleep disturbance after being controlled by other covariates (p-value = 0.002; AOR 1.18; 95% CI 1.06–1.30). Sleep disturbance was associated with a poor general health status in patients with chronic conditions. Therefore, early detection of sleep disturbance and immediate intervention may lead to better health outcomes in patients with chronic conditions.

Keywords: sleep disturbance, health status, chronic conditions, Indonesia

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1. Introduction

Sleep is a basic need of the living organism. During sleep, there are various processes that play an important role in optimizing brain function, restoring energy, improving physical health, maintaining hormonal balance, promoting growth and development, repairing damaged cells, and increasing the immune system [1, 2]. Besides maintaining

the homeostatic of physiological function, sleep also has an important role in maintaining psychological conditions [1, 2]. Although sleep is a basic necessity, studies showed that the prevalence of sleep disturbance in the general population ranged from 3.9 - 40% [3–5].

Sleep disturbance is reported as a predictor of worse health status [6]. Among healthy people, sleep disturbance can affect the health status in the short-term, medium-term, and long-term [6, 7]. The short-term effects of sleep disturbance include pain in the body, mood and emotional disorders, decreased productivity and memory [7]. In the medium-term, sleep disturbance can affect cognitive performance, while long-term consequences that are caused by sleep disturbances include increased risk of hypertension, cardiovascular diseases, cancer, type 2 diabetes mellitus, and even mortality [6, 7]. The risk of getting poor health status is doubled among people that experienced sleep disturbance [8–10]. Previous studies found that sleep disturbance increases the risk of getting physical and mental problems [11–15].

Currently, the epidemiological transition shows that the trend of non-communicable diseases is increasing significantly. Apart from the morbidity rate, these diseases have also displaced infectious diseases as the leading cause of death. Each year, 41 million people die due to non-communicable diseases [16]. It contributes to more than 70% of all deaths globally [16]. Most of the deaths that are caused by non-communicable diseases (85%) occur in low and middle-income countries, one of which is Indonesia [16]. Based on Indonesia Basic Health Research 2018, the prevalence of non-communicable diseases showed an increasing trend compared to the previous survey that was conducted in 2013 [17, 18]. These conditions need to get more attention considering they are at risk of experiencing sleep disturbance that can worsen their health condition.

Previous studies have reported that more than 25% of patients with chronic conditions have sleep disturbance [15,19–23]. Information regarding the relationship between sleep disturbance and health conditions in patients with various types of chronic conditions in developing country settings is still limited. Most of the studies conducted have focused on the association of sleep disturbance in the general population, only in one specific type of chronic condition, and were carried out in high-income countries [8–13,24]. Therefore, this study was conducted using national survey data to determine the association between sleep disturbance and health conditions in patients with chronic conditions in Indonesia. Having sufficient information regarding those issues can be useful to optimize the management of patients with chronic conditions in improving their health status.

2. Material and Method

This cross-sectional study was carried out by analysing secondary data from the Indonesian Family Life Survey (IFLS) wave 5. IFLS was a continuity population-based study that collected individual, household, and community data regarding economic and non-economic aspects included health aspects. This survey has been conducted five times. The fifth wave was conducted between the fourth trimester of 2014 and April 2015 [25]. All respondents aged ≥ 15 years old who participated in IFLS wave 5 and had chronic diseases were included in this study (n=11419). Respondents who had uncompleted data were excluded as study participants. As many as 9807 respondents were included in the analysis.

The general health status was the outcome variable of this study. It was assessed based on the respondent's rated of their health condition by a single question item. The question was stated in the IFLS wave 5 questionnaires on code KK01, section KK, book 3B [25]. They gave ranks on their health levels. The answers were very healthy, somewhat healthy, somewhat unhealthy, and unhealthy [25]. The general health status was classified into healthy (somewhat healthy and very healthy) and unhealthy (somewhat unhealthy and unhealthy) [26].

The independent variable in this study was sleep disturbance. Sleep disturbance was measured by using PROMIS sleep disturbance 4a short-form v1.0 that consisted of 4 questions. It was recorded in section TDR Book 3B [27]. Respondents were asked to give their responses about their sleep in the past week. There was a five-point scale (1=not at all, 2=a little bit, 3=somewhat, 4= quite a bit, 5= very much) that could be chosen by respondents [25]. The score of each item was added up and converted into a T-score [28]. Respondents with a T-score> 50 are categorized as having sleep disturbance [28].

Covariates in this study included sex, age, educational level, marital status, smoking habit, body mass index, and physical activity. Basic socio-demographic data (sex, age, educational level, and marital status) were obtained from book 3A [25]. Smoking habit was determined based on the respondent's answer to the question "Do you still have a smoking habit or already quit?" (section KM book 3B). It was categorized as never smoke, ever smoke but already quit, and still smoking [27]. The results of height and weight measurements were transformed into body mass index. Respondents with body mass index < 18.5 m/kg^2 were classified as underweight, 18.5 – 24.9 m/kg^2 = normal, 25.0 – 29.9 m/kg^2 = overweight, and ≥ 30.0 m/kg^2 = obese [29]. Physical activity was measured by questions adapted from the International Physical Activity Questionnaire

(IPAQ) that were listed in section KK of the IFLS questionnaire [25]. It was categorized as low, moderate, and high physical activity) [30].

Descriptive analysis was used to describe the frequency distribution of the variables under study. Bivariate analysis was performed to assess the association between two variables. The association between sleep disturbance and general health status that was controlled by the covariates was analysed by using multivariable logistic regression. The association had a significant value if the p-value < 0.05. The adjusted Odds Ratio was presented in point estimate and 95% Confidence Interval. Data analysis was performed by using SPSS version 22.0.

All procedures of IFLS wave 5 has been reviewed and approved by RAND's International Review Boards (United States) and Universitas Gajah Mada (Indonesia). The protocol approval number was s0064-06-01-CR01.

3. Results

Most of the participants in this study were female (59.3%), aged 26-45 years old (45.5%), had completed their secondary education (50.4%), and had married (76.3%). More than half of respondents reported that they were never smoking (68.3%). Respondents who had a normal body mass index were 51%. The proportion of having low and moderate physical activity was almost the same, 34.5% and 35.8%, respectively. Three–quarters of respondents were classified as having sleep disturbance (75.7%). Respondents who rated their health status was unhealthy reached 32.5%. The distribution of respondent's characteristics were highlighted in Table 1.

Based on the type of chronic conditions that was suffered by the respondents, the proportion of sleep disturbance ranged from 75.5 – 86.7% (Table 2). The memory-related illness was the type of chronic diseases that most reported sleep disturbance (86.7%). In more detail, the distribution of sleep disorders by the type of chronic conditions could be seen in Table 2.

In bivariate analysis, sleep disturbance had a significant association with general health status (OR = 1.21; 95% 1.09 – 1.34; p-value = 0.000). All covariates, except body mass index, were also had an association with general health status (Table 3). The result of multivariable logistic regression was also presented in Table 3. In the final model, it was found that patients with chronic conditions who experienced sleep disturbance had a poorer general health status than those who did not experience sleep disturbance after adjusted by sex, age, educational level, smoking habit, body mass index, and physical activity (AOR = 1.18; 95% 1.06 – 1.30; p-value = 0.002).

Table 1: Distribution of respondent's characteristics.

Variable	Number (n)	Percentage (%)
Sex		
Male	3996	40.7
Female	5811	59.3
Age (yr)		
≤25	1724	17.6
26–45	4465	45.5
46–65	3016	30.8
>65	602	6.1
Educational level		
Primary	3178	32.4
Secondary	4940	50.4
Tertiary	1655	16.9
Others	34	0.3
Marital status		
Unmarried	1417	14.4
Married	7479	76.3
Separated/divorced/widowed	911	9.3
Smoking habit		
Never smoking	6697	68.3
Already quit	672	6.8
Still smoking	2438	24.9
Body mass index		
Underweight	993	10.1
Normal	5002	51
Overweight	2696	27.5
Obese	1116	11.4
Physical activity		
Low	3387	34.5
Moderate	3507	35.8
High	2913	29.7
Sleep disturbance		
No	2388	24.3
Yes	7419	75.7
General health status		
Unhealthy	3187	32.5
Healthy	6620	67.5

Source: Author's own work.

Table 2: Frequency sleep disturbance in each type of chronic conditions.

Type of chronic conditions	Sleep disturbance (n)	Percentage (%)
Hypertension	2576	76.0
Diabetes	484	75.5
Tuberculosis	210	77.2
Asthma	654	76.0
COPD	405	78.0
Heart attack	360	78.6
Liver disease	241	78.0
Stroke	133	77.3
Cancer	145	77.1
Arthritis	1088	78.7
High cholesterol	942	75.7
Prostate	63	75.9
Kidney disease	308	75.7
Stomach disorders	3006	75.6
Psychic problems	33	80.5
Memory-related illness	39	86.7

Source: Author's own work.

4. Discussion

Sleep disturbance was often suffered by patients with chronic conditions. This study found that three out of four patients had experienced sleep disturbance in the last seven days. It was much higher than the other studies [4,14,15,21,31–33]. The prevalence varied between 25% and 65.4% [4,14,15,21,31–33]. The results differences among those studies could be explained by the different measurement methods included its instruments that were used [4, 13, 32]. In this study, PROMIS sleep disturbance 4a short-form v1.0 was used to determine the sleep disturbance status. The others studies measured sleep disturbance by using a single question regarding sleeping problems that suffered in the last month [32], Pittsburgh Sleep Quality Index [21], an instrument that was developed by INDEPTH and WHO-SAGE [4], or the insomnia severity index (ISI) [15]. The case definition, scoring, and cut-off points that were used in each instrument could affect the classification of sleep disturbance [4]. Then, the different characteristics of the respondents might also explain these findings. This study was analysed the data from all patients with chronic conditions included hypertension, diabetes, tuberculosis, asthma, COPD, heart attack, liver disease, stroke, cancer, arthritis, high cholesterol, prostate, kidney disease, stomach disorders, psychic problems, and memory-related illness. Sleep disturbance had a significant association with these chronic conditions

Table 3: Association between sleep disturbance and covariates with general health status

Variable	Bivariate		Multivariate	
	OR (95%)	*P-value*	AOR (95%)	*P-value*
Sleep disturbance				
No	Ref	0.000*	Ref	0.002*
Yes	1.21 (1.09 – 1.34)		1,18 (1.06 – 1.30)	
Sex				
Male	Ref	0.000*	Ref	0.000*
Female	1.35 (1.24 – 1.48)		1.53 (1.33 – 1.76)	
Age (yr)				
≤25	Ref	0.000*	Ref	0.000*
26–45	1.18 (1.04 – 1.34)	0.011*	1.14 (0.99 – 1.30)	0.064
46–65	2.18 (1.91 – 2.48)	0.000*	1.87 (1.62 – 2.16)	0.000*
>65	3.37 (2.78 – 4.10)	0.000*	2.65 (2.16 – 3.26)	0.000*
Educational level				
Primary	Ref	0.000*	Ref	0.000*
Secondary	0.54 (0.49 – 0.60)	0.000*	0.69 (0.62 – 0.76)	0.000*
Tertiary	0.35 (0.31 – 0.40)	0.000*	0.42 (0.37 – 0.49)	0.000*
Others	1.03 (0.52 – 2.04)	0.933	1.21 (0.60 – 2.43)	0.598
Marital status				
Unmarried	Ref	0.000*		
Married/cohabited	1.62 (1.42 – 1.85)	0.000*		
Separated/divorced/wido	2.66 (2.22 – 3.18)	0.000*		
Smoking habit				
Never smoking	Ref	0.001*	Ref	0.003*
Already quit	1.40 (1.17 – 1.67)	0.000*	1.21 (1.01 – 1.46)	0.044*
Still smoking	1.13 (1.02 – 1.25)	0.017*	0.86 (0.74 – 0.99)	0.043*
Body mass index				
Underweight	Ref	0.151	Ref	0.072
Normal	0.94 (0.82 – 1.09)	0.436	0.91 (0.78 – 1.06)	0.239
Overweight	0.92 (0.79 – 1.08)	0.301	0.83 (0.70 – 0.98)	0.028*
Obese	1.08 (0.90 – 1.30)	0.39	0.97 (0.80 – 1.17)	0.733
Physical activity				
Low	Ref	0.028*	Ref	0.038*
Moderate	0.88 (0.79 – 0.97)	0.009*	0.87 (0.79 – 0.97)	0.011*
High	0.97 (0.87 – 107)	0.51	0.95 (0.85 – 1.06)	0.351

Source: Author's own work.

* sig. (p-value < 0.05)

OR = odds ratio

AOR = adjusted odds ratio

[32]. It made this study could find more sleep disturbance cases than other studies that only assessed in one type of chronic conditions [19–21,24,32].

The memory-related illness was the type of chronic conditions that most reported sleep disturbance. A previous study also reported that approximately 70-80% of patients with dementia were estimated to suffer sleep disorders [22]. Patients with memory-related illnesses, such as dementia, experience degradation in the neural pathways and impairment in part of the brain that regulates the sleep-wake cycle [19, 22]. Disruption of the circadian rhythm that is regulated by the suprachiasmatic nucleus (located in the hypothalamus) and disturbance in neurotransmitters secretion (hypocretin and melatonin) are the explanation why they suffer sleep disturbance [19, 22].

This study also reported that sleep disturbance had a significant association with the health status of the patients. A similar result was found in prior studies [8–11]. The odds of poorer self-rated health was twice higher among them that were classified as having sleep disturbance [8–10]. Studies that were conducted in India and China also reported that sleep disturbance was a strong predictor of poor health status [12]. The mechanism of this association might be due to the disturbance of the metabolic system, decreased the immune system, changes in behaviour, and the occurrence of emotional problems [6, 12]. These conditions contribute to interfere normal function of the body's organs. Sleep disturbances cause a person to have less sleep duration and poor sleep quality. Consequently, they are unrefreshed when they wake up and become more emotional when handling stressors [6, 12]. They have poor physical activity because of the fatigue that is suffered. Sleep disturbance can accelerate aging and decline in cognitive function so it increases the risk of experiencing more health problems [6, 12].

There were some limitations to this study. The causal relationship between sleep disturbance and self-rated health could not be explained because of the cross-sectional study design used. Bias might exist because the measurement of sleep disturbance and health status variables were based on the respondent's self-reported. However, the instrument used had good validity and reliability in measuring these variables. Data collectors had also received training so that bias could be minimized [25, 27]. This study gave more understanding regarding the association between sleep disturbance and self-rated health among patients with various chronic conditions in developing country settings. These findings could help health providers to improve the health outcome of patients with chronic conditions. The use of national survey data allowed the results of this study to be generalized to the population.

Sleep disturbance could worsen health status. Therefore, the management of patients with chronic conditions needs to pay attention to the sleep problems that may be

occurred. Providing counselling and education services about healthy lifestyles and how to have a good quality of sleep may help improve the health status of patients with chronic conditions.

5. Conclusion

Sleep disturbance was experienced by most patients with chronic conditions. The type of chronic conditions that most reported sleep disturbance was memory-related illness. Sleep disturbance had a significant association with general health status. Sleep disturbance increased the odds of having a poor health status among patients with chronic conditions. Early detection of sleep disturbance may lead to better health outcomes for patients with chronic conditions. Health providers should be more attentive when treating patients with chronic conditions. Giving more advice to sleep well, promoting a healthy lifestyle, and informing how to have good sleep quality would be beneficial to improve their health status.

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Conflict of Interest

The authors state that there is no conflict of interest in this study.

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