The Differences of Sleep Quality between Nurses with Two-shifts of Work and Nurses with Three-shifts of Work

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Abstract

Objectives: Humans generally have two times, which are daytime for activity and night for rest (circadian rhythm). Shift system of working can cause a lack of sleep or disruption of a person's sleep cycle, especially those who have a night shift. The shift of working can cause sleep deprivation of the nurses. This study aim was to identify the differences in sleep quality between nurses with two-shifts of work and nurses with three-shifts of work.

Method: This study conducted on June-July 2019 in one private hospital in Jakarta, with a cross-sectional approach. This study used quantitative method. The sample of this study was 90 nurses (two-shifts: n=35; three-shifts: n= 55). Pittsburgh Sleep Quality Index was used as the instrument that has passed for Validity and Reliability (Chronbach alpha=0.820). Univariate and Mann-Whitney U were used to analyze the data.

Results: This study found that most of the respondents were women (83,3%), range of ages 26-65 (51,11%), and nurses with two-shifts have poor sleep quality as 15.56%, nurses with three-shifts have poor sleep quality as 46.67%. There are differences in sleep quality between nurses with two-shifts and nurses with three-shifts (p value=0.002).

Conclusion: The shift work system can cause poor sleep quality of the nurses, especially for the nurses with three-shifts. Future researches expected to explore the factors that affect the poor sleep quality of nurses.

Keywords: nurses, shift of work, sleep quality, two-shifts, three-shifts

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INTRODUCTION

Circadian Rhythm is the biological rhythm of the body that follows the rotation of day and night, repeated every 24 hours [1]. This Rhythm can cause humans to have two times in life that is day and night [2]. Generally, humans will do activities during the day and rest or sleep at night. Sleep is a physiological process whereby a cycle turnover, where there are longer wakefulness periods, physiological functions, and behavioral responses determined by the sleep-wake cycle [3]. American Thoracic Society stated that adult sleep needs are 7-9 hours [4].

Good sleep quality is crucial for health, but to date, the quality of sleep cannot be defined in particular and precise [5]. The experts of the National Sleep Foundation describe that the indicators that measure a person's sleep quality such as sleep efficiency, sleep lag, rapid eye movement Ratio (REM) and non-rapid eye movement (NREM), naps, Arousals, and Awakenings [6]. Another related factor is the time to work, especially the shift working system [7]. Shift work with an unsettled and changeable schedule can lead to a decrease in the quantity and quality of sleep of a
person, especially those with night shifts [8]. Reid and Abbott say that in this modern generation, the most common cause of Circadian rhythm disorder is jet lag and shift work. Shift work inadvertently administered in factory working environments [9]. Not only there, but the shift work system also applied in the police station, fire department, and Hospital [10].

Nurses are health workers with a shift work system that can cause poor sleep quality [11]. Nurses play a critical role in the health service team to provide 24-hour nursing care to patients [12]. The shift work system has a broad scope of regulation, depending on the policies of each related hospital. One type of shift system implemented in China is that nurses work 8 hours in 1 shift and then apply night shifts three times a week. This circumstance resulted in nurses there experiencing poor sleep quality when they had time to sleep [13]. In Hong Kong, more than 70% of nurses reported experiencing tension, stress, and difficulty sleeping due to shift work [14]. Besides, in drug administration procedures, human errors often occur. Treatment errors committed by nurses were around 23.1%, accompanied by a lack of sleep by nurses [12]. Nurses with long shifts and night work reported to have a very close relationship with the onset of chronic disease [15]. However, several previous studies stated that there was no significant relationship between poor sleep quality and the shift work system [16],[17].

In Indonesia, the nurse shift work system in hospitals is very dependent on the policies of each hospital. The shift system in Indonesia generally consists of morning shifts, day shifts, and night shifts where each shift nurse will work approximately 7 hours for morning and evening shifts, and 10 hours for night shifts [18]. In other country like Denmark, nurses also working in day, evening, and night shift [8]. Nurses with two-shifts (morning and evening shifts) are nurses who handle patients in the Outpatient Department (OPD), and special care such as Endoscopy Department, Catheterization Lab, Chemotherapy and so on. Meanwhile, the three-shift nurse is a nurse who cares for the patient for 24 hours. A study in two military hospitals in Jakarta found a significant and meaningful relationship between the quality of sleeping nurses with shift working system (two shifts and three-shifts) [19]. In line with that, a study said that as much as 60.9% of nurses in internal space had poor sleep quality after shift work [18]. Research several years earlier said that there was a significant relationship between the shift work system with nursing work fatigue [20]. Besides, the problem of lack of sleep is related to the performance of the nurse, which is due to poor quality of sleep nurse (61.4%), there is a high percentage for the poor performance of nurses (56.1%) [21]. However, another study stated that there was no significant relationship between poor sleep quality and the shift work system [18]. This study aims to determine whether there are differences in sleep quality among two-shifts nurse and three-shifts nurse in one private hospital in Jakarta.

**METHOD**

This study used a quantitative method with a cross-sectional approach. This study was in one private hospital in Jakarta, especially in the outpatient room, haemodialysis department, endoscopy department, catheterization lab, chemotherapy, operating room, inpatient room, emergency unit, high care unit, and intensive care unit on June-July 2019. The sample of this study was 90 nurses (two-shifts: n=35; three-shifts: n= 55) that taken by a purposive sampling technique. The exclusion criteria of this study were 1) nurses who are on maternity leave, 2) Head Nurse, 3) 30 nurses who already participate as the respondents in the validity and reliability (VR) test.

The instruments of this study were a demographic questionnaire to determine the respondent's characteristics and work shift division, and the Pittsburgh Sleep Quality Index (PSQI) questionnaire for measuring the respondents'
sleep quality. The PSQI questionnaire was translated to the Indonesian language by the previous researcher, then the researchers tested the VR to 30 nurses and declared valid and reliable with a Cronbach Alpha 0.820.

This study has passed the Research Ethics Committee of Faculty of Nursing Universitas Pelita Harapan with letter number, No. 006-RCTC-EC/R/SHTBBGR/VI/2019. The study used four principles of ethics: autonomy, confidentiality, beneficence, justice, non-maleficence to avoid unethical and illegal research. This study’s ethical principles then applied in the granting of informed consent, respecting the privacy and confidentiality of the subject of study, respecting the fairness and inclusivity, and taking into account the benefits and losses arising from this study to the respondents.

This study used univariate and bivariate analysis. In univariate analysis, researchers saw the description of each variable that is the quality of sleep and the division of work shift nurses, while the bivariate analysis to see the differences in sleep quality of nurses with two-shifts of working and nurses with three-shifts of working. Furthermore, researchers conduct a normality test using a Kolmogorov-Smirnov test to evaluate whether the type of sufficient analysis in the form of a non-parametric test or parametric test will be applied.

<table>
<thead>
<tr>
<th>Table 1. Distribution Of Normality Test Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistics</td>
</tr>
<tr>
<td>Shift work</td>
</tr>
<tr>
<td>Sleep quality</td>
</tr>
</tbody>
</table>

After testing for the normality data, Table 1 showed that the data distribution was not normal, so that the bivariate analysis used was the non-parametric test. This study used the Mann-Whitney U test using a statistical data processing software program.

RESULTS

A. Characteristic of Respondents

<table>
<thead>
<tr>
<th>Table 2. Distribution of Work Shift Based on the Characteristics of Respondents (N=90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>18-25</td>
</tr>
<tr>
<td>26-65</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

In Table 2, it was known that the majority of respondents were in the age range 26-65 years as many as 46 people (51.11%), and the majority of respondents were female as many as 75 people (83.33%). In Table 2, it was also known that 35 (38.89%) respondents with two shifts, while the respondents with three-shifts were 55 people (61.11%).
B. Sleep Quality

<table>
<thead>
<tr>
<th>Shift work</th>
<th>Good n (%)</th>
<th>Poor n (%)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-shifts</td>
<td>21 (23.33)</td>
<td>14 (15.56)</td>
<td>35 (38.8)</td>
</tr>
<tr>
<td>Three-shifts</td>
<td>13 (14.44)</td>
<td>42 (46.67)</td>
<td>55 (61.11)</td>
</tr>
<tr>
<td>Total</td>
<td>34 (37.78)</td>
<td>56 (62.22)</td>
<td>90 (100)</td>
</tr>
</tbody>
</table>

In Table 3, it was known that nurses with three-shifts mostly (46.67%) had poor sleep quality, while the majority of nurses with two-shifts had good sleep quality (23.33%). Overall, the nurse with a poor sleep quality amounts to 62.22% while the nurse with good sleep quality as much as 37.78%.

<table>
<thead>
<tr>
<th>Sleep Quality</th>
<th>Total (N)</th>
<th>Mean</th>
<th>Z</th>
<th>( \rho ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (n)</td>
<td>Poor (n)</td>
<td>(N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-shifts</td>
<td>21</td>
<td>14</td>
<td>35</td>
<td>35.01</td>
</tr>
<tr>
<td>Three-shifts</td>
<td>13</td>
<td>42</td>
<td>55</td>
<td>52.17</td>
</tr>
<tr>
<td>Total (N)</td>
<td>34</td>
<td>56</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

In Table 4, bivariate analysis used the Mann-Whitney U test to determine the difference in sleep quality of nurses on two-shifts with three-shifts, Table 4 showed the mean of nurses with two-shifts was 35.01 which different with the mean of nurses with three-shifts of work (mean=52.17). It also known \( \rho \) value was 0.002. Therefore, these results indicate that there were differences in sleep quality between two-shift nurses with two-shifts and with three-shift nurses.

DISCUSSION

Respondents Characteristics

This study saw two main characteristics of respondents: gender and age. The results showed that the respondents were the most female genders (83.33%), and were at the age range of 26-65 years (51.11%). The nurse is an adequately dominated profession of women [22]. The ratio of the number of male and female nurses is quite far. Not only in Indonesia, but this is also the case in Guizhou province in China that reported from between 1190 nurses, 97.2% of whom are female nurses [23]. Similar things also occur in Taiwan and Spain, where the number of female nurses is much more than the male nurse [22,24]. In Chinese culture, there is a male career impediment as a nurse [25]. Hoffart et al., in their study, say men choose a career as a nurse because it is influenced by economic factors and the availability of jobs automatically after completion of the study, different from women who are more focused on careers as nurses to serve [26]. Gender differences in the nursing profession are still the current trend issues in which male nurses are still considered a minority.
Based on age, the number of nurses at the age range of 26-65 years (51.11%), has an amount not much different from the nurse in the age range of 18-25 years (48.89%). This data is different from research results in Taiwan, where the number of nurses at the age of > 25 (74.1%) much more than at the age < 25 years [22]. The same thing happened in Taiwan, where nurses were > 25 years old has a considerable amount compared to the age range under 25 years [23]. Liu et al. said that there is no significant relationship between gender and age with a caring attitude that is shown by nurses when nursing care to patients [27].

Hospital policy where this study conducted is that nurses work in two-shifts when placed in the OPD (Out Patient Department), Hemodialysis, Endoscopy, Catheterization lab, Chemotherapy, and Operating Theater (OT). Three-shifts if the nurses work in the In-Patient Department (IPD), Emergency Department (ED), High Care Unit (HCU), and the Intensive Care Unit (ICU). Two-shifts nurses are those who placed on areas that care for patients who only need treatment in less than 24 hours, while three-shifts are nurses who care for patients with longer (more than 24 hours) treatment in the hospital. Based on the results of the study, the number of nurses with two-shifts was 35 people (38.89%) compared to nurses who worked with three-shifts who had a higher number of 55 people (61.11%). The number of nurses with three-shifts is much higher because their duties and responsibilities are more so that more personnel needed in handling patients. Chien et al. said that nurses with three-shifts are fully responsible for patient management while the patient is in hospital care. Due to the shift work system, nurses experience various types [17].

Nurse Sleep Quality
The results showed that most of the nurses had poor sleep quality (62.22%). A nurse needs good sleep quality when it comes time to rest. But in reality, nurses often have poor sleep quality [28][17][29][30]. Poor sleep quality more common in female nurses. This study found that nurses with three-shifts who were dominated by female nurses had a worse sleep quality. Giorgi et al., in their research, found that female nurses had a much higher sleep quality disturbance than male nurses [31]. Previous research has also stated that female nurses have poor sleep quality than male nurses [28][17].

Poor sleep quality can affect the work productivity of nurses [30]. Poor sleep quality can also lead to errors in carrying out nursing care [32]. In addition, poor sleep quality can affect nurses’ quality of life [28]. The emergence of disease due to poor sleep quality cannot be avoided. Nurses with poor sleep quality often experience digestive disorders, musculoskeletal disorders, and even increased sensitivity to pain [33][34]. Aside from physical disturbances, poor sleep quality also has an impact on the emotional nature of nurses [35].

The Differences of Sleep Quality between Nurses with Two-shifts of Work and Nurses with Three-shifts of Work
The result of this study showed that there was a difference in sleep quality between nurses with two-shifts of work and nurses with three-shifts of work. The shift of working can result in impaired sleep-wake cycles, which affects the Circadian rhythm disorder that leads to poor sleep quality of a person [36][37][38]. The difference in sleep quality between nurses with two-shifts of working and nurses with three-shifts of working due to the existence of night shift for nurses with three-shifts, so that the poor sleep quality’ rate occurs mostly in nurses with three-shifts (46.67%).

Night shift assessed as the main factor of poor sleep quality in nurses [39][40]. It is also said by Jeong et al. that the sleep efficiency of nurses decreased during the night shift, and experienced an increase in the resting day [41]. Zhang
et al., also finished the research on nurses with night shift said that nurses who are already undergoing the night shift at least the last six months have a higher frequency of poor sleep quality than nurses who have not long been at night shift (PSQI ≥ 5) [13]. It also stated that the poor sleep quality of nurses at night shifts due to they have to take care of 30-35 patients and only given resting time for one day after served for three consecutive nights. On the day they had to rest, they suffered a sleep disorder [13]. Further, Dai et al. said that the night shift resulted in a high number of poor-quality sleep and became a trigger for depression in nurses [38]. Previous research in 2013 stated that nurses with three-shifts, especially with night shifts, have a higher rate of sleep disorder than nurses with two-shifts [11]. On the other hand, on existing studies, there have been far earlier saying that there is no significant relationship between shift work with a person's sleep quality [42][43][16][33][44].

Another factor that can cause differences in sleep quality in nurses with two-shifts and nurses with three-shifts is due to the rotating shift system. With shift rotation, the circadian rhythm becomes increasingly disturbed because the nurse's sleep time will change every day of the week. This phenomenon also supported by previous research, which states that rotating shifts result in the sleep quality of nurses getting worse than the regular shift work [24][45].

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REFERENCES


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44. Surani S, Murphy J, Shah A. Sleepy Nurses: Are We Willing to Accept the Challenge Today? Nursing Administration Quarterly. 2007; 31(2):146-151. Doi: 10.1097/01.NAQ.0000264863.94958.40