RESPIRATORY RATE AGAINST THE SLEEP QUALITY OF TUBERCULOSIS PATIENTS

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ABSTRACT

The patients with tuberculosis have symptoms, such as breathlessness, fatigue, lower appetite, decreased weight, malaise sweating, and fever for more than a month. This norepinephrine causes an individual to awake and makes the individual unable to sleep. Sleeping problems in TB patients happen due to hypoxia and hypercapnia during sleeping. This research determined the correlation between respiratory rate and sleeping quality of patients with tuberculosis. This research used a design cross-sectional which measures respiratory rate and sleep quality at the same time. The number of samples in this study was 30 respondents with a purposive sampling technique. The measuring instrument used in this study was the observation sheet for respiratory rate and Pittsburgh Sleep Quality Index (PSQI) for sleep quality. Analysis data used the statistic test fisher exact. The results indicated the correlation score of the Fisher Exact Test with a p-value of 0.002. The score indicated the correlation between respiratory rate and sleeping quality of patients with tuberculosis. The recommendations of this study can be a references for nurse to assess the sleep quality of tuberculosis patients so the nurses can give implementation for sleep disorders.

Keywords: Respiratory Rate, Sleep Quality, Tuberculosis

INTRODUCTION

Pulmonary tuberculosis (TB) is a chronic infection caused by mycobacterium tuberculosis that attacks the tissue of the pulmonary parenchymal. Mycobacterium tuberculosis is a positive salic acid-resistant strain and can be identified by an acid coloring that is microscopically called acid-resistant basil (BTA). Tuberculosis was one of the top 10 causes of death. Millions of people continue to get sick with TB every year (Dewi, 2019).

The World Health Organization predicts that by 2020, 10 million individuals worldwide will have TB, which would result in 1.2 million annual fatalities. One of the nations with the worst rates of tuberculosis (TB) in the world was Indonesia, where an estimated 845.000 people were afflicted with the disease, and 98.000 of those individuals die from it every hour. Indonesia had 842.000 cases of pulmonary tuberculosis in 2018, ranking third. According to the National Plan of Action for TB Control of the Indonesian Territory, the target of TB prevalence in 2019 was 245 per 100.000 population (Kementrian Kesehatan RI, 2017).

In Central Java, the number of cases of tuberculosis (TB) during January to June 2020 was 23.919. However, the Brebes area, home to 1.840 people, has the greatest number of tuberculosis cases in Central Java. District of Tegal with 1.500 people, District of Cilacap with 1.447 people, District of Banyumas with 1.334 people, and District of Kudus with 1.252 people were the next in order of population. The number of TB patients in Semarang City, the provincial capital of Central Java, increased from 2.968 cases in 2015 to 3.256 cases in 2016. Furthermore, the 2016 treatment success rate was just 83%, falling short of the 90% national objective, while in 2017 the number of TB patients reached 3.333 patients (Profil Kesehatan Kota Semarang, 2016).

Pulmonary tuberculosis will cause respiratory disorders. Respiration is a condition in which air containing O2 enters the body and
discharges CO2 out of the body as a residue of oxidation. If there is a problem with the respiratory system it will result in ventilation dysfunction or the oxygen to carbon dioxide exchange process in the lungs and will cause shortness of breath or dyspnea (Sulistyo Andarmoyo, 2012).

Sleeping shortness of breath causes the Reticular Activation System (SAR) to rise and release catecholamines like norepinephrine that cause the individual wake up and result in sleep disturbances (Yatun et al., 2016). Sleep disorders in TB patients can be caused by the occurrence of hypoxia and hypercapnia during sleep. Some of this conditions can be influenced by several factors such as respiratory obstruction, hyperinflation, respiratory muscle disfunction, and narrow ventilation response (McNicholas et al., 2013).

Based on sign and symptoms that appear in patients with TB is very disturbing shortness of breath in the patient. Shortness of breath can be observed by measuring respiratory rate (frequency of breathing) in 1 minute. Shortness of breath can interfere with the patient’s sleep quality so nurses should provide treatment to prevent sleep disturbances in the patients. The aimed of this study is to find out the relationship between respiratory rate with sleep quality of tuberculosis patients at RSI Sultan Agung Semarang.

METHOD
This study used the method of quantitative research with a cross-sectional design, which entails doing research using simultaneous methods, measurements, and observations, or concurrently determining the exposure status of illness (Hidayat, 2017). The variables were respiratory rate and sleep quality. The population in this study is the average number of tuberculosis patients in RSI Sultan Agung Semarang as many as 38 patients per month. The type of sampling in this study is non-probability sampling with the technique sampling used purposive sampling. The researchers used a minimum sample approach of 30 respondents. The measuring instrument used in this study was the observation sheet for respiratory rate and the Pittsburgh Sleep Quality Index (PSQI) for sleep quality. The PSQI has an internal consistency and alpha cronbach of 0.83, then the questionnaire is declared valid and reliable. This study declared to be ethically appropriate in accordance to 7 WHO 2011 standart witk number 52/KEPK-RSISA/V/2022 by KEPK RSI Sultan Agung. Data analysis in this study used fisher exact test to analyse variable independent respiratory rate with variable dependent sleep quality.

RESULTS
Respondent's characteristics in this study covered the distribution of respondent's frequency based on gender, age, education, employment, and length of suffering. Based on Table 1, most respondents were 16 male respondents (53,35) and 14 female respondents (46,65%). The majority of respondents aged were 56-65 years and > 65 years were 8 respondents (26.70%) and the minority of respondents aged 26-35 years were 2 respondents (6.70%). The majority of respondents had no school as many as 8 respondents (26.70%) and the minority of respondents with high school education was 1 respondent (3,30%). The majority respondent was entrepreneur, 16 respondents (53,30%) and the minority was employer, 1 respondents (3,40%). The majority respondents had length of suffering > 6 month, 14 respondents (46,70%) and the minority respondents had length of suffering 1-3 month, 4 respondents (13,30%).

Table 1 Frequency Distribution of Characteristics Tuberculosis Patients (n=30)

<table>
<thead>
<tr>
<th>Characteristics of respondents</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>53.35</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>46.65</td>
</tr>
<tr>
<td>Aged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 – 35 years</td>
<td>2</td>
<td>6.70</td>
</tr>
<tr>
<td>36 – 45 years</td>
<td>5</td>
<td>16.70</td>
</tr>
<tr>
<td>56 – 55 years</td>
<td>7</td>
<td>23.30</td>
</tr>
<tr>
<td>56 – 65 years</td>
<td>8</td>
<td>26.70</td>
</tr>
<tr>
<td>&gt;65 years</td>
<td>8</td>
<td>26.70</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No School</td>
<td>8</td>
<td>26.70</td>
</tr>
<tr>
<td>Elementary School</td>
<td>8</td>
<td>26.70</td>
</tr>
<tr>
<td>Junior High School</td>
<td>7</td>
<td>23.30</td>
</tr>
<tr>
<td>Senior High School</td>
<td>1</td>
<td>3.30</td>
</tr>
<tr>
<td>Diploma</td>
<td>2</td>
<td>6.70</td>
</tr>
<tr>
<td>Bachelor</td>
<td>4</td>
<td>13.30</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doesn't work</td>
<td>13</td>
<td>43.30</td>
</tr>
</tbody>
</table>
Characteristics of respondents | n | %
---|---|---
Employers | 1 | 3.40
Entrepreneur | 16 | 53.30

Length of Suffering

| Duration | n | % |
---|---|---|
<1 month | 6 | 20.00
1 – 3 month | 4 | 13.30
4 – 6 month | 6 | 20.00
>6 month | 14 | 46.70
Total | 30 | 100

Frequency distribution of respiratory rate tuberculosis patients based on table 2 show that the majority had an abnormal respiratory rate of 25 respondents (83.35%), while the minority of respondents had a normal respiratory rate of 5 respondents (16.7%).

Table 2 Frequency Distribution Respiratory rate of Tuberculosis Patients (n=30)

| Respiratory Rate | n | % |
---|---|---|
Normal | 5 | 16.70
Abnormal | 25 | 83.35
Total | 30 | 100

Frequency distribution of sleep quality tuberculosis patients based on table 3 show that the majority of respondents with poor sleep quality were 27 respondents (90.0%), while the minority of respondents had a well sleep quality were 3 respondents (10.0%).

Table 3 Frequency Distribution Sleep Quality of Tuberculosis Patients (n=30)

| Sleep Quality | n | % |
---|---|---|
Well | 3 | 10.00
Poor | 27 | 90.00
Total | 30 | 100

Based on table 4 shows that p-value 0.002 (<0.05), there is a relationship between respiratory rate and sleep quality. It can be seen that there were 2 respondents have normal respiratory rate with poor sleep quality and 25 respondents have abnormal respiratory rate with poor sleep quality.

Table 4 Relationship Respiratory Rate with Sleep Quality of Tuberculosis Patients (n=30)

| Respiratory Rate | Sleep Quality | p-value |
---|---|---|
Normal | 3 | 2 | 0.002
Abnormal | 0 | 25 | 
Total | 3 | 27 | 

DISCUSSION
From the research results, data was obtained that the majority of respondents had abnormal respiratory rates (RR <12 or >20 x/minute) as many as 25 respondents (83.3%). This was confirmed by Aini’s research, which showed that of the 22 respondents, the majority of respondents with tachypnea breathing >24 x/minute were 17 respondents (77.3%) (Aini et al., 2017).

Sleep quality is each person’s ability to maintain a state of sleep and to obtain appropriate REM and NREM sleep stages (Khasanah & Handayani, 2012). From the research results, data was obtained that the majority of respondents had poor sleep quality (score > 5) as many as 27 respondents (90.0%). The sleep disturbances experienced by many lung disease patients in this study were due to waking up at night due to coughing and not being able to breathe comfortably. Discomfort from illness causes poor sleep quality in patients while in hospital. The cause of discomfort is complaints of pain, fever, shortness of breath and other complaints. Poor quality sleep can cause daytime fatigue, difficulty concentrating and irritability. This is confirmed by Purwati’s research, where the majority of tuberculosis respondents had poor sleep quality, 70% of respondents. Many respondents said they were lethargic, had difficulty sleeping, often woke up at night thinking about the illness they were currently suffering from and complained that it was difficult to adapt to hospital conditions which made it increasingly difficult to sleep (Purwati et al., 2016).

The percentage of poor sleep quality was higher in respondents with abnormal respiratory rate compared to respondents with normal respiratory rates who were more likely to have good sleep quality. Breathing or respiration is the process of breathing in free air containing oxygen and expelling air containing carbon dioxide as oxidation residue out of the body (Fibrianto et al., 2018). Meanwhile, sleep quality is a state of sleep.
experienced by an individual which results in freshness and fitness when awakened. Sleep quality includes quantitative aspects of sleep, for example sleep duration, sleep latency and subjective aspects of sleep (Khasanah & Handayani, 2012).

Sleep quality based on research (Kustriyanti & Indra, 2020) showed that the mean PSQI score was 5.79, where the majority experienced problems with the components of sleep disturbance (1.19) and use of sleeping medication (1.07). There was a relationship between the quality of sleep to changes in blood pressure.

Respiratory disorders in pulmonary TB are caused by an inflammatory reaction that damages the alveolar-capillary membrane which causes disruption of lung expansion due to fluid accumulation, which can lead to ineffective breathing patterns. Signs and symptoms experienced include increased respiration rate, use of breathing muscles, nostril breathing, chest pain, tightness, and body feeling tired (Indonesian Ministry of Health, 2015). Tuberculosis patients experience a high respiratory rate, because these patients tend to experience shortness of breath. This is because the fully developed lungs are attacked by viruses or bacteria which cause the lungs to not contain air or collapse (Potter & Perry, 2017).

A common symptom of pulmonary TB is coughing up phlegm for 2-3 weeks or more. Coughing is usually followed by additional symptoms, namely phlegm mixed with blood, shortness of breath, weakness, decreased appetite, decreased body weight, malaise, sweating at night without physical activity, fever for more than 1 month (Indonesian Ministry of Health, 2014).

Shortness of breath during sleep causes the Reticular Activation System (SAR) to increase and release catecholamines such as norepinephrine which causes the individual to wake up and results in sleep disorders (Yatun et al., 2016). Sleep disorders in TB patients can be caused by hypoxia and hypercapnia during sleep. Some of these conditions can be influenced by several factors, namely airway obstruction, hyperinflation, respiratory muscle dysfunction, and blunted ventilation response (McNicholas et al., 2013).

According to (Hasanah et al., 2016) research results, it shows that the relationship between complaints of shortness of breath and sleep quality shows a strong relationship and has a positive pattern, meaning that the higher the degree of shortness of breath, the worse the quality of sleep. There is a significant relationship between complaints of shortness of breath and the patient's sleep quality. Lung disease.

CONCLUSION
The conclusion of this study is a relationship between respiratory rate with sleep quality in tuberculosis patients. Recommendations for further research should examine the factors causing poor sleep quality in tuberculosis patients. The recommendations of this study can be a reference for nurses at RSI Sultan Agung to assess the sleep quality of tuberculosis patients so the nurses can give implementation for sleep disorders.

REFERENCE


