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Associations between Depression and Anxiety with Sleep Quality in Post Stroke Patients

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ABSTRACT

Introduction: Sleep disorders are common in stroke patients and can affect 20% - 78% of patients. Stroke patients also often experience depression and anxiety associated with a decrease in the patient's sleep quality. The purpose of this study was to determine the relationship between depression and anxiety with sleep quality in post-stroke patients.

Method: This study used a cross-sectional design. The research subjects were post-stroke patients at the neuro polyclinic at H. Adam Malik General Hospital Medan and Satellite Hospital during July - December 2022 who met the inclusion criteria. Assessment of depression, anxiety and sleep quality used Hamilton Depression Rating Scale (HDRS), Hamilton Anxiety Rating Scale (HARS), and Pittsburgh Sleep Quality Index (PSQI) Questionnaires, respectively. Data were analyzed using Spearman's correlation test.

Results: Bivariate analysis found that there was a strong relationship between the HDRS score and the PSQI score ($r = 0.708$; $p < 0.001$), and the HARS score and PSQI ($r = 0.650$; $p < 0.001$).

Conclusion: There was strong correlation between depression and anxiety with sleep quality in post-stroke patients.

Keywords

Anxiety, Depression, Sleep Quality

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INTRODUCTION

Stroke is the most frequent cause of long-term neurological disability in the world. Half of stroke survivors have a disability, with a third requiring assistance from others in their daily activities. Duncan et al. reported that 40% of stroke survivors have moderate disability and 15-30% suffer from severe disability. Disability affects an individual's activity daily living (ADL) abilities and can lead to decreased patient quality of life [1]. Disability affects an individual's ADL abilities and can lead to a decrease in the quality of life of stroke patients [2].

Sleep disturbances are common in stroke patients, and can affect 20% to 78% of patients. Symptoms of sleep disturbances can include sleep-disordered breathing, insomnia, hypersomnia, parasomnias, and circadian rhythms. In stroke patients, sleep disturbances were found to be related to physical disability, anxiety, depression, fatigue, location of lesions, and others [3]. According to Khot et al., sleep disturbances are very common in patients with a previous history of stroke compared to healthy patients. Although the prevalence of stroke patients with sleep disturbances is 50%, only 6% of stroke patients receive a formal sleep disorder examination, and only 2% of patients complete the test within 3 months after stroke. One of the possible causes of the lack of examination is the lack of knowledge about sleep disorders among health workers who treat stroke [4].

Mental health is also often disturbed in stroke patients. Research results suggest that stroke increases the risk of developing depression and anxiety. Post-stroke Depression (PSD) is one of the most common complications of stroke and is reported to affect 30% of patients within 5 years after stroke. Schottke et al. also reported a similar PSD prevalence of 32.2% in the acute phase after stroke [5]. Symptoms of post-stroke depression in addition to a depressive mood include decreased appetite, a feeling of hopelessness, irritability, and sleep disturbances [6]. Post-stroke depression (PSD) is a common thing, almost one-third of stroke patients experience post-stroke depression, compared to 5-13% of adult patients without stroke, with a cumulative incidence of 55%. The highest frequency is one year after stroke in one in three stroke survivors, and the incidence decreases the following year [7]. Post-Stroke Depression was found to be associated with reduced quality of life and higher mortality [8]. Post-stroke depression causes greater disability complications in stroke patients. The double burden of stroke and depression is considered as a cause of loss of productive age due to disability based on the "Global Burden of Disease" report [9]. Psychological status affects sleep quality and vice versa. Worse sleep quality can lead to more severe depression and worsening depression will lead to worsening sleep quality. This cycle needs to be stopped so that the patient's quality of life can be improved [10].

Depression is the factor that most affects the quality of sleep. There are several hypotheses that explain the relationship between depression and sleep quality. This relationship is thought to be due to the similarity in the location of the lesions that play a role in depression and sleep. However, this hypothesis has not been supported by definite evidence because the location of the lesions is often reported to be different even though the difference is not significantly significant. Another hypothesis is that there is a positive relationship between social support and depression and sleep quality. Poor social support is known to be significantly correlated with depression and poor sleep quality. However, depression was reported to be independently related to sleep quality so that the effect of social support may not play a major role [11].

The prevalence of post-stroke anxiety was found to be different in various studies, with a prevalence range of 9.4% - 36.7%. A study by Cumming, et al., who conducted a cohort study of 243 stroke patients, stated that the prevalence of anxiety is higher compared to other psychiatric disorders, such as phobic disorders and obsessive-compulsive disorder [12]. Almhdawi et al. reported that decreased sleep hours during the day and night were significantly associated with post-stroke anxiety symptoms. It is suspected that there is a two-way relationship between the ability to regulate emotions and sleep. The main symptoms of post-stroke anxiety include excessive worry or anxiety, and difficulty controlling anxiety. Post-stroke anxiety is associated with higher dependency in activity daily living, higher mortality and poorer quality of life. Systematic reviews and previous epidemiological studies have reported that anxiety and sleep quality also have a bidirectional relationship. Sleep disturbance is one of the main manifestations of anxiety. Insomnia and poor sleep quality have also been reported as important precursors and indicators of anxiety [13].

The purpose of this study was to determine the relationship between depression and anxiety with sleep quality in post-stroke patients.

METHOD

This study used a cross sectional design. The research subjects were post-stroke patients who came to Neurology Outpatients Clinic Haji Adam Malik General Hospital Medan and Satellite Hospital from July to December 2022. This study had an approval from the Health Research Ethics Committee, Faculty of Medicine, Universitas Sumatera Utara, with the ethical number: 1132/KEPK/USU/2022. In this study, several questionnaires were used to assess depression, anxiety and sleep quality in post-stroke patients. Assessment of depression, anxiety and sleep quality used Hamilton Depression Rating Scale (HDRS), Hamilton Anxiety Rating Scale (HARS), and Pittsburgh Sleep Quality Index (PSQI) Questionnaires, respectively. The HDRS is an instrument to measure the degree of depression by containing 17 question items. The HDRS score has a value range of 0-55. HARS is an instrument for assessing anxiety through 14 question items. The HARS score

has a value range of 0-56. The PSQI is an instrument for assessing sleep quality disturbances in patients. The PSQI consists of 24 questions. The PSQI score has a value range of 0-21.

Clinical Protocol and Participant

The subjects were recruited using the consecutive non-random sampling method. There were 47 post-stroke patients aged 18 years old and over who were at least 3 months after attack onset and willing to give informed consent to participate in the study. Exclusion criteria in this study were post-stroke patients with aphasia, patients with impaired cognitive function, patients with psychosis disorders, patients with previous depression and anxiety disorders, patients with previous sleep disorders, patients who used drugs that could affect sleep quality such as anti-inflammatory drugs. anti-depressants, anti-psychotics, phenobarbital and benzodiazepines.

Statistical Analysis

Bivariate analysis in this study was conducted to analyze the relationship between research variables. To determine the relationship between depression and anxiety on sleep quality in post-stroke patients using the Spearman correlation test. Descriptive analysis was used to determine the demographic characteristics of stroke patients at Adam Malik General Hospital in Medan and Satellite Hospital.

RESULTS

There was a total of 47 post-stroke patient subjects. There were 23 female participants (48.9%) and 24 male participants (51.1%). The subjects in this study had a mean age of 58 ±10.9 years. Bataknese were the most numerous ethnic groups, accounting for 20 people (42.6%). The majority of the subject education was high school, which consisted of 21 people (44.7%). The majority of the subjects, a total of 15 (31.9%), were housewives. The complete demographic characteristics of the subjects are shown in table 1.

Table 1. Demographic Data

Characteristics of Subjects	n = 47
Age (year), Mean (SD)	58(10.9)
Gender	
Male	24(51.1)
Female	23(48.9)
Ethnic group	
Acehnese	2(4.3)
Bataknese	20(42.6)
Javanese	8(17)
Karonese	12(25.5)
Malay	2(4.3)
Minangnese	3(6.4)
Education	
Bachelors	16(34)
Senior High School	21(44.7)
Middle school	6(12.8)
Elementary School	4(8.5)
Occupation	
Civil servants	10(21.3)
Private employee	5(10.6)
Self employee	5(10.6)
Housewife	15(31.9)
Farmer	1(21)
Retired	11(23.4)

SD, standard deviation; n, number of subjects.

The HDRS examination results indicated a range of scores from 2 to 25, with 11 leading as the median. The HARS median value was 16, and the range from 1 to 30. The PSQI median value was 7 with the lowest score is 2 and the highest score is 10. Table 2 shows the examination results of the HDRS, HARS and PSQI.

Table 2. The Results of Barthel Index, HDRS, HARS, and PSQI Examination

Variable	Mean(SD)	Median (Min - Max)	P[a]
HDRS	12.02(6.27)	11(2–25)	0,008
HARS	15.83(8.13)	16(1–30)	0,008
PSQI	6.34(2.23)	7(2–10)	0,021

[a] Shapiro Wlk; significant p <0.05; SD, standard deviation

Table 3. Correlation between Anxiety, Depression and Sleep Quality in Post Stroke Patients

Variables	PSQI	
	p	r[a]
HDRS	<0,001	0,708
HARS	<0,001	0,650

a Spearman test; significant p <0.05

The results of this study indicate that there is a positive linear relationship between Depression and Anxiety with Sleep Quality as shown in Figure 1 and 2 respectively.

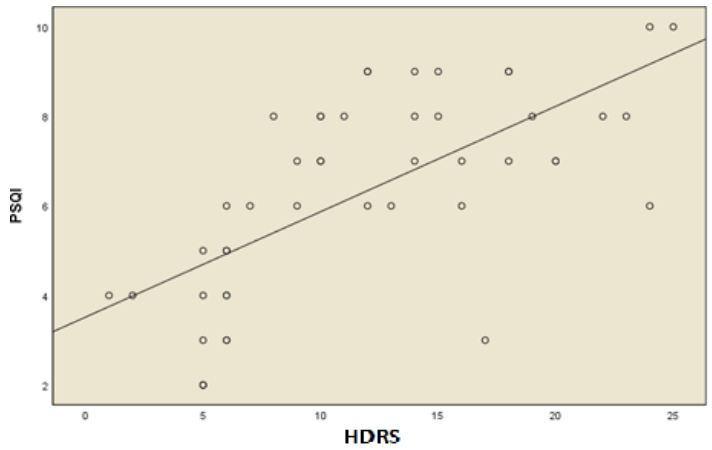

Figure 1. Correlation between HDRS and PSQI scores in a scatterplot graph.

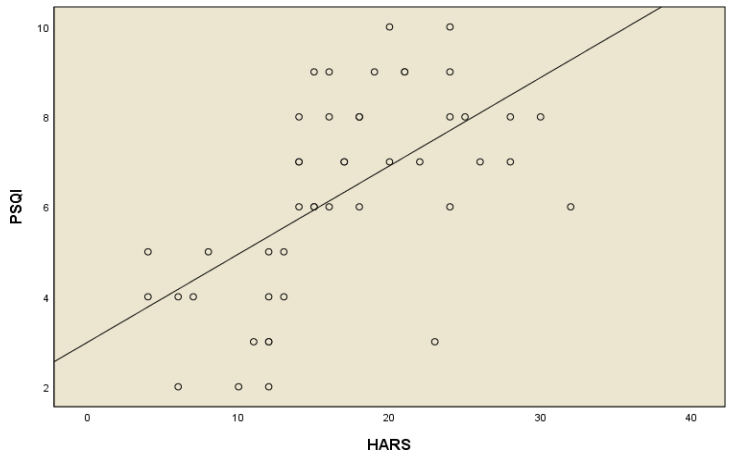

Figure 2. Correlation between HARS and PSQI scores in a scatterplot graph.

The results of the analysis using the Spearman correlation test showed that there was a significant correlation between the HDRS and PSQI scores (r=0,708; p<0.001). The HARS score and the PSQI score were shown to be significantly correlated. (r = 0.650; p<0.001). Relationship between Depression, Anxiety and Sleep Quality are presented in Table 3.

DISCUSSION

This study was attended by 47 post ischemic and hemorrhagic stroke patients who were treated at the Neurology polyclinic or inpatients at H. Adam Malik General Hospital Medan and Satelite Hospital. All subjects involved in this study met the inclusion criteria. There were 24 male subjects (51.1%). This is also in accordance with a study conducted by Sari et al., which stated that stroke patients were dominated by male patients as much as 64.7% compared to 35.3% female [14]. Gender is a risk factor non-modifiable stroke. Men have a risk of stroke 1.25 times that of women. This is because at a young age women are protected by the hormone estrogen. In men factors such as coronary heart disease, peripheral arterial disease, diabetes mellitus, alcohol use and smoking are associated with an increased incidence of stroke. Whereas in women several risk factors such as the use of oral contraceptives, menopause and the use of hormone replacement therapy are associated with the risk of stroke [15].

The mean age in this study was 58 years, with the youngest being 38 years old and the oldest being 79 years old. This is in accordance with the research of Maryanti et al. which stated that the average age of stroke patients in the age range of 51-65 years was 52%. According to Fuadi et al., an increase in the prevalence of stroke is found with increasing age. Age is a risk factor for stroke that cannot be modified. This risk doubles in every decade after the age of 55 years and rarely occurs under the age of 35 years [16]. This is because during the aging process advanced glycation end products (AGEs) accumulate in various tissues high collagen content causes connective tissue to become less elastic and more rigid, thereby affecting the elasticity of blood vessels [15].

The most ethnic group was Batak with 20 people (42.6%). According to Tambunan et al., the Batak people have several risk factors that cause high stroke rates, where there is a significant difference in stroke risk factors for stroke incidence between Batak and non-Batak stroke patients is alcoholic beverages where Batak stroke patients have a risk factor for alcoholic beverages 7.77 times greater than non-Batak ethnic use of alcoholic beverages and others etc [17]. Subjects with ischemic stroke were 40 people (85%) and hemorrhagic strokes were 7 people (15%). In the study by Rambe et al., also showed similar results, namely ischemic stroke 57.7 %, 27% hemorrhagic stroke, 2.1% hemorrhagic infarction and 17.1% no head CT scan [18].

In this study, based on Spearman's correlation test analysis, it was found that there was a significant correlation between depression and sleep quality (r = 0.706). This is consistent with a study conducted by Huzmeli et al., where post-stroke depression was significantly related to the PSQI score (r = 0.543, p <0.002) [19]. Patients with depression have a vulnerability to initiate, maintain sleep, often wake up in the middle of the night, hypersomnia, and decreased sleep duration. In post-stroke depression, it was found that many patients had sleep duration < 6 hours. The mechanisms for linking depression to sleep quality are complex. Depression and sleep quality are related to neurotransmitters such as dopamine, noradrenaline, and serotonin. Decreased sleep duration may impact mood regulation by impairing the function of the prefrontal cortex, anterior cingulate cortex, amygdala, and striatum. Sleep duration can also affect the reward system in the brain, increasing cortisol levels, disrupting the balance of the hypothalamus-pituitary-adrenal axis (HPA axis). In addition, another proposed mechanism is an increase in the inflammatory reaction with an increase in TNF-α, IL-6, and CRP. Availability of D2/D3 dopamine receptors in the striatum also decreases in stroke patients with poor sleep quality, causing disturbances in the reward system and "pleasure experience". All of these changes occur because of a decrease in sleep duration and will exacerbate depressive symptoms [20].

From the Spearman correlation test results, it was also found that there was a significant correlation between anxiety and sleep quality (r = 0.650). This is in accordance with research conducted by Khairunnisa

et al., where 81.3%. Post-stroke patients experience poor sleep quality with severe levels of anxiety [21]. Anxiety pervades multiple brain circuits including parts of the subcortical white matter and the limbic system. Based on a systematic review conducted, the relationship between insomnia and anxiety is bidirectional. Sleep disturbance is a precursor and indicator of anxiety. Sleep disturbances are also a vital manifestation of anxiety and depression. Disorders of the HPA axis are associated with anxiety disorders. Poor sleep quality increases the secretion of cortisol in the human body. Decreased sleep duration is associated with a gradual decrease in cortisol and an increase in cortisol secretion during the night. Sleep disturbances have also been proposed to have a relationship with monoamine and cholinergic systems, as well as the involvement of GABA inhibition mechanisms in sleep regulation. Because dysfunction of this neurotransmitter system is associated with anxiety, changes in GABA caused by sleep disturbances may mediate the occurrence of anxiety disorders [22]. Anxiety disorders can cause a person to take a long time to start sleeping, have a little slow wave sleep and increase NREM activation [23].

CONCLUSION

One of the many issues that might develop in post-stroke patients is emotional state, such as depression and anxiety. According to this study, depression and anxiety were strongly correlated with post-stroke patient's sleep quality. In order to ensure that the rehabilitation for post-stroke patients is as effective as possible, it is crucial to pay attention to the patient's emotional status.

DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara and H. Adam Malik General Hospital.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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COMPETING INTERESTS

None.

AUTHORS' CONTRIBUTIONS

All authors significantly contribute to the work reported, whether in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas. Contribute to drafting, revising, or critically reviewing the article. Approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

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