INDONESIAN JOURNAL OF NURSING PRACTICES OPEN ACCESS

Volume 7, Issue 2, December 2023, p. 67-75

Factors Associated with Post-Non Hemorrhagic Stroke Depression: a cross-sectional study

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Article Info
Online : http://journal.umy.ac.id/index.php/ijnp
ISSN : 2548 4249 (Print)
: 2548 592X (Online)
DOI :10.18196/ijnp.v7i2.17945

Article History
Received : 17 February 2023
Revised : 25 July 2023
Accepted : 31 July 2023

Abstract

Background: Post-stroke patient depression can result in delays in stroke recovery and healing. The degree of severity of stroke will cause neurological deficits which can become stressors that will affect individual coping mechanisms.
Objective: This research aims to analyze factors associated with non-hemorrhagic post-stroke depression.
Methods: Analytical observational with a cross-sectional approach. The research was conducted at the Neurology Clinic of RSUD dr. R. Goeteng Taroenadibrata Purbalingga. The population is 435 post-stroke non-hemorrhagic patients. The sample is 104 respondents with the sampling technique used consecutive sampling. The instruments used were the Brief COPE, NIHSS, and PHQ-9. Bivariate analysis used the Kendall-Tau correlation test.
Results: The majority of respondents were elderly, male, primary school education level/equivalent, married, live with husband/wife and children, left hemisphere lesion location, had stroke duration >2 years, did not experience recurrent strokes, hypertension, had problem-focused coping and mild stroke severity with varying degrees of depression. Age, gender, marital status, living together, location of the lesion, duration of stroke, stroke frequency, comorbidities and coping mechanisms were not significantly related ($p>0.05$) while education level and stroke severity was significantly associated with post-stroke depression ($p<0,05$).
Conclusions: There is a significant relationship between education level and severity of stroke with post-stroke depression. Nurses can also motivate patients to always take medication regularly, increase patient knowledge about stroke and depression, or implement non-pharmacological therapy such as Range of Motion (ROM) so that they can help reduce the severity of a stroke and prevent or reduce the occurrence of depression after non-hemorrhagic stroke.

Keywords: coping mechanism; non hemorragic; post-stroke depression; stroke; stroke severity

INTRODUCTION

Stroke is a cerebrovascular disease which is the second cause of death and the third cause of disability in the world. Stroke occurs when blood vessels that carry oxygen and nutrients to the brain are blocked or ruptured so that brain cells die (American Stroke Assosiation, 2022). According to the World Stroke Organization (2019), there are more than 13.700.000 new stroke cases in the world each year. The prevalence of stroke in Indonesia reaches 51.6 per 100,000 people with around 4.3% of cases of disability and about 15-27% of deaths (Tanto et al., 2014).

Stroke causes various physiological and psychological impacts on sufferers. The impact of a stroke on a person's physiology includes loss of movement, thinking, memory, and ability to speak, as well as temporary or permanent loss of sensation (Smeltzer, 2013). Stroke can have a psychological impact in the form of anxiety, changes in self-concept, and depression. The most common psychological impact is depression or which can be called post-stroke depression (Biantoro et al., 2015 in Purba & Utama, 2019).

Globally, post-stroke depression can affect a quarter to a third of stroke patients at anytime (Wubshet et al., 2022). The prevalence of post-stroke depression

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is around 25-79% depending on the patient selection criteria in the research conducted (Llorcaa et al., 2015). Patients with post-stroke depression generally have more disability, poor rehabilitation outcomes, and increased morbidity and mortality in the first year after stroke onset. Therefore, it is important to know the various factors associated with the occurrence of post-stroke depression (Ibrahimagic et al., 2019).

There are several related factors that have been studied before such as age, gender, neuroticism, family history, level of disability, degree of stroke severity, social support, and history of mental disorders (Shi et al., 2017). According to Reni, Suryani, and Sasmita (2020), factors such as education level, comorbidities, duration of a stroke, and motor disorders are associated with post-stroke depression. In addition, self-management is also related to post-stroke depression (Putri et al., 2018). However, according to (Basit & Mahmudah, 2019), the degree of stroke severity is not significantly related to post-stroke depression. In addition, there have been no other studies that have examined the relationship between stroke severity and post-stroke depression in Indonesia. The degree of stroke severity may be one of the most important risk factors for post-stroke depression. The higher the degree of stroke severity, the greater the movement disorders and life barriers which are considered to be negative events in post-stroke patients can increase the occurrence of depression (Shi et al., 2017).

Post-stroke patients generally experience a loss of body function and health which causes a feeling of helplessness which is usually accompanied by depression. Feelings of helplessness arise based on considering individual responses, coping patterns, and patient characteristics (Nuraliyah & Burmanajaya, 2019). Coping patterns or mechanisms are ways of responding to environmental changes or certain problems (Kozier et al., 2011). According to Carver, coping mechanisms are divided into problem-focused coping, emotion-focused coping, and less useful coping. Problem-focused coping is an effort to deal with problems by focusing on solving problems. Emotional-focused coping is emotion-focused coping aimed at minimizing the pressure caused by stressors. Less useful coping is in the form of reducing efforts to overcome problems and diversion to other activities (Garcia et al., 2018). Based on these coping mechanisms, stroke patients can have various coping mechanisms which are thought to affect post-stroke depression. Research shows interesting things related to post stroke coping mechanism in other country. The result showed that problem-focused coping were found to be significantly higher in patients treated with best medical treatment. Other result showed that coping mechanism was related with post-sroke depression (Rohmah et al., 2023).

There is no research related to the relationship between coping mechanisms and post-stroke depression in Indonesia and there are still differences of opinion regarding the relationship between several respondent characteristics and the degree of severity of stroke on post-stroke depression, so the authors investigated the factors associated (age, gender, education level, marital status, living together, lesion location, duration of stroke, stroke frequency, comorbidities) with non-hemorrhagic post-stroke depression.

METHOD

Design

This research is a quantitative study with a correlational analysis design with a cross-sectional approach. The report has followed The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Population and Sample

The population in this study were non-hemorrhagic post-stroke patients who visited the Neurology Clinic at RSUD dr. R. Goeteng Taroenadibrata Purbalingga in November 2022, namely 435 people. Inclusion criteria in this study included non-hemorrhagic post-stroke patients aged 45-74 years, and willing to be respondents. Exclusion criteria in this study were patients with aphasia, impaired cognitive function, visual impairment, hearing loss, or incomplete data. Sampling in this study uses a consecutive sampling technique. Determining the number of samples was calculated using statistical analysis software G*Power with an effect size of 0.3, a significance level of 0.05, and statistical power of

0.85 which resulted in a total sample in this study of 96 respondents assuming a drop out of 10%, the results the sample calculation is 106 respondents (Faul, et al., 2009). After carrying out the data collection process, of the 106 patients encountered, 2 of them did not meet the predetermined inclusion and exclusion criteria with details 1 person with aphasia and 1 had impaired cognitive function. Based on this, the final sample in this study amounted to 104 respondents.

Instruments

The characteristics of the respondents were measured using a questionnaire on the characteristics of the respondents. Coping mechanisms are measured using the COPE Brief compiled by Carver in 1997 based on the development of Lazarus & Folkman's theory. This COPE brief consists of 14 subscales and each subscale has two items and two questions so there are 28 question items that have been adapted from the COPE questionnaire. The COPE brief has been tested for validity by Yussof, Low, & Yip (2010) with a Cronbach's alpha value of 0.50-0.80 and a reliability test has been carried out by Arvina with a Cronbach's alpha value of 0.799 (Arvina, 2017).

The degree of stroke severity was measured using the National Institutes of Health Stroke Scale (NIHSS), which consists of 11 examination items. Assessment can be categorized with a score of <5 (low), a score of 5-14 (moderate), a score of 15-24 (severe), and a score of ≥25 (very severe) (Jojang et al., 2016). The NIHSS instrument is a standard instrument so researchers do not test its validity and reliability.

The instrument used as a measure of depression is The Patient Health Questionnaire (PHQ-9). This questionnaire was developed by Dr. Kurt Kroenke et. al. From Columbia University in 1999 with a Grant from Pfizer. This measure describes the level of depression in the last two weeks. The PHQ-9 instrument has been tested for validity and reliability with a Cronbach's alpha value of 0.885.

Collecting Data

The data collection process took place from 28 December 2022-16 January 2023. In this study, researchers were assisted by 6 enumerators. Researchers looked at medical record data assisted by nurses on duty at the clinic for the initial screening of respondents. including name and age according to predetermined inclusion and exclusion criteria. After that, the researcher gave data on prospective respondents to the enumerator whose job was to collect primary data from these respondents according to the research questionnaire. Next, the researcher and enumerator approached the respondent, introduced themselves, read the informed consent, and asked whether they were willing to become research respondents. Respondents who are willing to be given a consent form become respondents to be signed. Then the researcher read the questionnaire to the respondent to be answered by the respondent. If there are incomplete answers, the researcher will check medical and radiological record data (specifically the location of the lesion).

Ethics

This research has received ethical approval by the health research ethics committee of the faculty of health sciences of Jenderal Soedirman University with number 942/EC/KEPK/XII/2022. Research ethics involving humans as respondents has 4 principles that must be applied including respect for the respondent (respect for person), benefit (beneficence), not harming the respondent (nonmaleficence) and the principle of justice (Masturoh & Temesvari, 2018).

Data Analysis

The data analysis used was the frequency distribution for univariate analysis and the Kendall Tau correlation test for bivariate analysis. Variables that were used for univariate and bivariate analysis in this study included age, gender, education level, marital status, living together, lesion location, stroke length, stroke frequency, comorbidities, coping mechanisms, stroke severity, and post-stroke depression. The variables in this study have nominal and ordinal data scales, so the statistical test used is the Kendall Tau Correlation Test with a significance level of 0.05, which is to assess the significance of the relationship between the two variables (Saryono, 2011).

RESULT

Relationship Characteristics of Respondets

The relationship between respondent characteristics and non-hemorrhagic post-stroke depression is presented in the following table 1.

Table 1. Characteristics of Respondets

Variable	Depression										*r*	*p*
	Minimal		Mild		Moderate		Moderately severe		Severe			
	n	%	n	%	n	%	n	%	n	%		
Age												
Middle age	20	19.2	12	11.5	3	2.9	0	0.0	0	0.0	0.010	0.910
Elderly	27	26.0	11	10.6	7	6.7	0	0.0	0	0.0		
Young old	14	13.5	7	6.7	1	1.0	1	1.0	1	1.0		
Gender												
Male	34	32.7	10	9.6	8	7.7	1	1.0	1	1.0	0.023	0.807
Female	27	26.0	20	19.2	3	2.9	0	0.0	0	0.0		
Education level												
No school	6	5.8	9	8.7	0	0.0	1	1.0	0	0.0	-	0.024
Elementary school equivalent	24	23.1	13	12.5	7	6.7	0	0.0	0	0.0	0.194	
Middle school equivalent	6	5.8	4	3.8	1	1.0	0	0.0	0	0.0		
High school equivalent	12	11.5	4	3.8	2	1.9	0	0.0	0	0.0		
College	13	12.5	0	0.0	1	1.0	0	0.0	1	1.0		
Marital status												
Married	54	51.9	21	20.2	11	10.6	1	1.0	0	0.0	0.115	0.216
Divorced	2	1.9	1	1.0	0	0.0	0	0.0	0	0.0		
Death divorced	5	4.8	8	7.7	0	0.0	0	0.0	1	1.0		
Living together												
Alone	1	1.0	1	1.0	0	0.0	0	0.0	0	0.0	0.026	0.763
Their children	6	5.8	6	5.8	0	0.0	0	0.0	1	1.0		
Husband and wife	9	8.7	0	0.0	2	1.9	0	0.0	0	0.0		
Husband/Wife and Children	30	28.8	17	16.3	5	4.8	0	0.0	0	0.0		
Sister/brother (extended family)	15	14.4	6	5.8	4	3.8	1	1.0	0	0.0		
Lesion Location												
Right Hemisphere	27	26.0	13	12.5	6	5.8	1	1.0	1	1.0	-	0.330
Left Hemisphere	31	29.8	17	16.3	5	4.8	0	0.0	0	0.0	0.091	
Right-Left Hemisphere	3	2.9	0	0.0	0	0.0	0	0.0	0	0.0		
Duration of Stroke												
<1 year	18	17.3	15	14.4	4	3.8	0	0.0	0	0.0	-	0.245
1-2 years	7	6.7	4	3.8	1	1.0	0	0.0	0	0.0	0.106	
>2 years	36	34.6	11	10.6	6	5.8	1	1.0	1	1.0		
Stroke Frequency												
First Stroke	48	46.2	22	21.7	9	8.7	0	0.0	0	0.0	0.085	0.371
Recurrent Strokes	13	12.5	8	7.7	2	1.9	1	1.0	1	1.0		
Comorbidities												
Nothing	13	12.5	3	2.9	3	2.9	0	0.0	0	0.0	0.075	0.392
Diabetes mellitus	2	1.9	2	1.9	0	0.0	0	0.0	0	0.0		
Hypertension	25	24.0	16	15.4	2	1.9	0	0.0	0	0.0		
Heart disease	0	0.0	0	0.0	2	1.9	0	0.0	0	0.0		
>1 comorbidities (for example : diabetes and hypertension, hypertension and heart disease, or all)	21	20.2	9	8.7	4	3.8	1	1.0	1	1.0		

Based on table 1, it is known that of the 104 respondents, the majority were elderly (43.3%) and male (51.9%). The majority of respondents have the last education level elementary school equivalent (42.3%), are married (83.7%), and live with their husband/wife and their children (50.0%). Most of

the respondents had a stroke lesion location in the left hemisphere (51.0%) with a stroke duration of more than two years (52.9%) and a first attack stroke (76.0%). The majority of respondents in this study had comorbidities, namely hypertension (41.3%).

The results of bivariate analysis on the variables age, sex, marital status, living together, lesion location, stroke duration, stroke frequency, and comorbidities obtained p>0.05 indicating that there was no significant relationship between these variables and depression. While the variable level of education has a value of p = 0.024 which indicates a significant relationship with post-stroke depression. The value of r or correlation coefficient of education level with depression in stroke patients is -0.194. This shows that there is a negative direction of the relationship and the strength of the relationship is "very weak".

Correlation between Coping Mechanisms and Stroke Severity Degree with Non-Hemorrhagic Post-Stroke Depression

The relationship between coping mechanisms and stroke severity with non-hemorrhagic post-stroke depression is described in table 2.

Table 2. Coping Mechanisms and Stroke Severity Degree

Variable	Depression										*r*	*p*
	Minimal		Mild		Moderate		Moderately severe		Severe			
	n	%	n	%	n	%	n	%	n	%		
Coping mechanism												
Problem Focused Coping (PFC)	34	32.7	16	15.4	6	5.8	0	0.0	1	1.0	0.013	0.891
Emotion Focused Coping (EFC)	26	25.0	14	13.5	5	4.8	1	1.0	0	0.0		
PFC=EFC	1	1.0	0	0.0	0	0.0	0	0.0	0	0.0		
Stroke severity degree												
Mild	54	51.9	25	24.0	5	4.8	1	1.0	0	0.0	0.260	0.006
Moderately severe	7	6.7	5	4.8	6	5.8	0	0.0	1	1.0		

Based on table 2 it is known that the majority of respondents have a coping mechanism, namely problem focused coping as many as 56 respondents (54.8%). Most of the respondents had mild stroke severity, 85 respondents (81.7%) and the majority of respondents had minimal or no depression, 61 respondents (58.7%). The results of the Kendall tau test on coping mechanism variables have a value of p=0891 (p<0.05) which means there is no significant relationship between coping mechanism variables and post-stroke depression. The stroke severity variable has a value of p=0.006 (p<0.05) which indicates a significant relationship between stroke severity and depression in post-stroke patients. The value of r or the correlation coefficient of the severity of stroke with depression in stroke patients is 0.260. This shows that there is a positive relationship direction with a "sufficient" relationship strength.

DISCUSSION

The results of the analysis of the relationship between the characteristics of respondents with non-hemorrhagic post-stroke depression showed mixed results. Age is not associated with post-stroke depression. This is possible due to other factors such as living with family. Depression in the elderly is caused by the loneliness felt by the elderly who live alone, without children, low health conditions, low education levels and low self-confidence (Herawati & Deharnita, 2019). In line with the research of Khedr et.al (2020), age does not show a significant relationship with post-stroke depression because there are other factors such as family support and coping mechanisms. Gender was not associated with post-stroke depression. Gender is not a risk factor for post-stroke depression. Post-stroke depression occurs more frequently in women, whereas in this study the majority of respondents were male (Khedr et al., 2020). This might be one of the reasons for the absence of a relationship

between gender and post-stroke depression in this study.

Respondents' level of education is related to post-stroke depression with a negative direction and weak relationship strength. This shows that the higher the level of education of the respondents, the lower the level of depression. Someone with a high level of education will find it easier to overcome depression. This is because education is the main provision for cognitive development which will become a mediator when facing a certain incident (Setiawati & Ismahmudi, 2020). Education can influence a person's behavior regarding lifestyle, motivation, and attitudes that play a role in building health. The higher a person's education, the easier it is to receive information and the more knowledge one has (Herawati & Deharnita, 2019). Someone with minimal knowledge will hinder the development of one's attitude towards acceptance, information, and values so that it is prone to depression (Nilamsari & Handayani, 2014). In line with the research of Khedr et al. (2020) that the majority of respondents who experience depression have a low educational level.

Marital status and living together were not associated with post-stroke depression. The majority of respondents are married and live with their families, so it is possible to get family information support. Family information support influences the healing and recovery of post-stroke patients (Kurniawan & Wibowo, 2020). In line with the results of the study (Purba & Utama, 2019) which showed that there was no significant relationship between marital status and post-stroke depression.

The location of the lesion has no significant relationship with post-stroke depression. In this study, it was also found that respondents had lesions located on the right and left hemispheres. Although some suggest that the location of the lesion in the left hemisphere is associated with post-stroke depression, this is still being debated. This is associated with emotion and language functions dominated by the left hemisphere of the brain. The parts of the brain that regulate emotions, namely the frontal lobe and basal ganglia, tend to experience changes that lead to depressive symptoms (Shi et al., 2017). In line with research Pongsilurang, Pieter, Wungouw, Setiono, & Kupang (2020) which states that there is no relationship between the location of stroke lesions and depression.

Stroke duration and stroke frequency did not have a significant relationship with post-stroke depression. According to (Hayulita & Sari, 2014) long-suffering strokes and the frequency of strokes will make patients more hopeless about their illness, feel helpless even though they have different defense mechanisms, they will still find it difficult to deal with the stressor. The majority of respondents had coping mechanisms as a defense that varied and the majority were not depressed while the majority had suffered a stroke for more than 2 years. This is the reason for the absence of a significant relationship between the two variables in this study.

Comorbidities are not associated with post-stroke depression. According to Hayulita & Sari (2014), co-morbidities can be the etiology or complication of stroke patients, but the coping mechanisms for each patient are different, causing depression. Comorbidities are include three major that cause stroke is hypertension, diabetes, and heart and blood vessel diseases (NIH, 2022). Therefore, both depressed and non-depressed patients experienced one or more of these comorbidities.

Coping mechanisms are not associated with post-stroke depression. Coping mechanisms will play a role in dealing with the stressors caused by the stroke. Everyone has their own coping mechanism and will be adapted to their individual circumstances (Loupatty et al., 2019). Rutter (1981) states that the most effective coping of stress is according to the type of stress and situation. Thus, the coping mechanism owned by the respondent is not absolute in just one type of coping mechanism and can change at any time depending on the stressor being faced. Research conducted by Supriyati, Noerhidajati, & Julianti (2020) explains that problem focused coping mechanisms tend to be used if respondents think problems can be controlled so that to deal with stressors that cause depression they try to change or overcome the problems they face. This research was conducted in a clinic and patients who visited had the goal of

curing their illness. This is one of the signs that patients use problem focused coping. Emotion focused coping mechanisms are used by respondents who perceive a problem as difficult to control, so that in dealing with stressors that cause depression, they regulate their emotional responses to adjust to stressful situations. This type of coping may be used more by patients who do not visit treatment or rehabilitation because they feel they can adapt to their condition. In this study, the coping mechanisms owned by the respondents were not categorized into adaptive and maladaptive, so that all of the coping mechanisms they had could play a role in dealing with the stressors they encountered. The degree of severity of stroke with post-stroke depression shows a significant relationship with the direction of a positive relationship and the strength of the relationship is sufficient. This shows that the higher the degree of stroke severity, the higher the level of depression. The degree of stroke severity indicates how severe the neurologic deficit is experienced by the patient. The higher the neurological deficit, the more disorders the patient will experience which can then affect the patient's quality of life (Maharani et al., 2021). The degree of stroke severity affects the level of disability and independence, which are factors that need to be considered with the occurrence of post-stroke depression (Shi et al., 2017). Impaired motor function in the form of limb weakness can lead to an inability to self-care and reduce mobility which can hinder the fulfillment of daily life activities. Thus, in meeting their basic needs, stroke patients need help from a caregiver (Sonatha, 2012). Stroke patients who have a low level of independence will have a significant relationship with emotional distress. One sign of emotional distress that often occurs in stroke patients is depression (Thomas & Lincoln, 2008).

Dependence in stroke patients is also associated with patient self-esteem. The higher the level of dependency caused by the high degree of stroke severity, the higher the patient's self-esteem, and vice versa (Fadlulloh et al., 2014). Physical limitations, reduced activities of daily living, and inability to work arise because of a stroke which affects a person and makes him sad (Suharsono, 2022). Stroke patients rate themselves as low, feel tired, are physically disabled, and have a low quality of life that will support the occurrence of post-stroke depression (Sibbritt et al., 2022). The prevalence of post-stroke depression is higher in patients with reduced mobility, high functional dependence, and more severe functional disabilities (Kumar et al., 2020). In this study, the majority of post-stroke depression was either minimally depressed or not depressed. This is because the degree of severity of stroke in the respondents in this study was the majority of the degree of severity of mild stroke.

CONCLUSION

Based on this study, it can be seen that the level of education and stroke severity are associated with non-hemorrhagic post-stroke depression. The higher the degree of stroke severity, the higher the level of depression and indicates how severe the neurologic deficit which can then affect the patient's quality of life. Nurses are expected to provide health education related to how to prevent or reduce depression to increase knowledge due to low education levels in post-stroke patients. In addition, nurses can also motivate patients to always take medication regularly, increase patient knowledge about stroke and depression or implement non-pharmacological therapy such as Range of Motion (ROM) so that they can help reduce the severity of a stroke and prevent or reduce the occurrence of depression after non-hemorrhagic stroke.

ACKNOWLEDGEMENT

In the process of this research, the authors received assistance from various parties involved. Therefore, the authors would like to thank the Dean of the Faculty of Health Sciences and all Lecturers in the Department of Nursing, Jenderal Soedirman University, Director of RSUD dr. R. Goeteng Taroenadibrata Purbalingga and his staff and staff, all enumerators, respondents, and other parties that cannot be mentioned one by one.

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