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Jurnal : Nursing and Midwifery Studies

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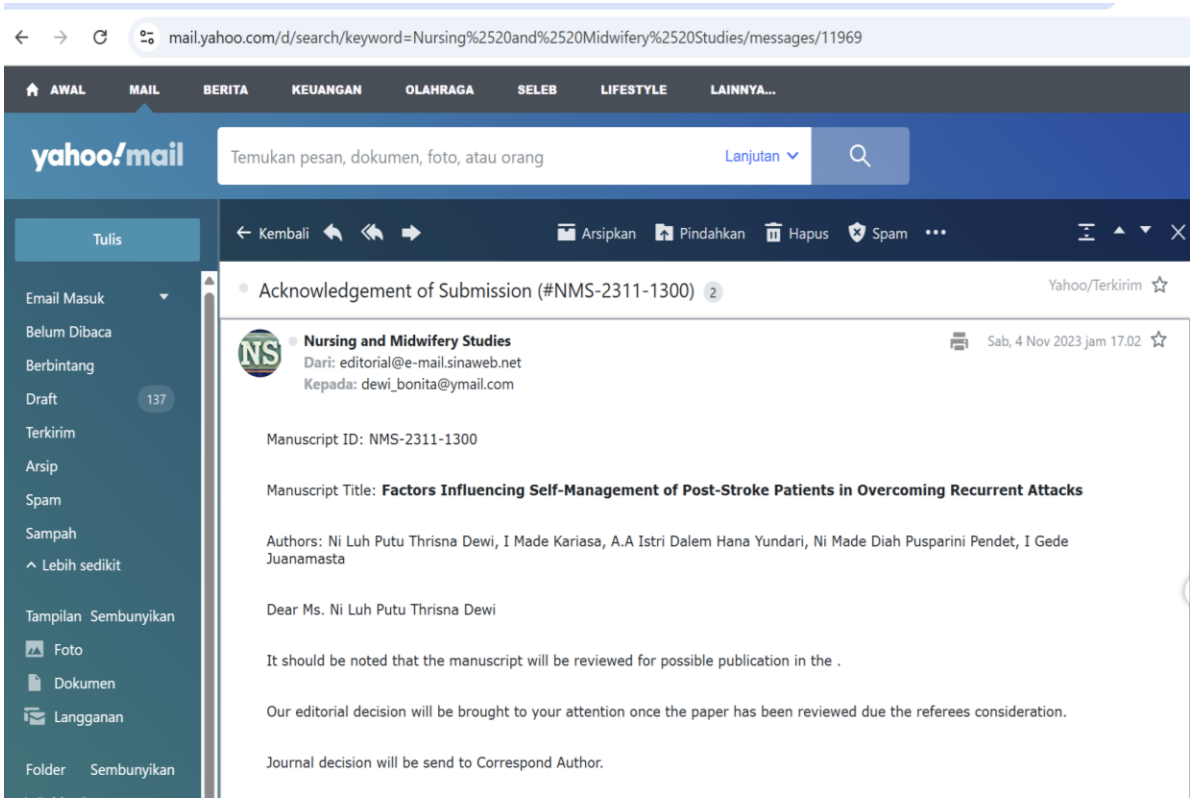
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Authors: Ni Luh Putu Thrisna Dewi, I Made Kariasa, A.A Istri Dalem Hana Yundari, Ni Made Diah Pusparini Pendet, I Gede Juanamasta
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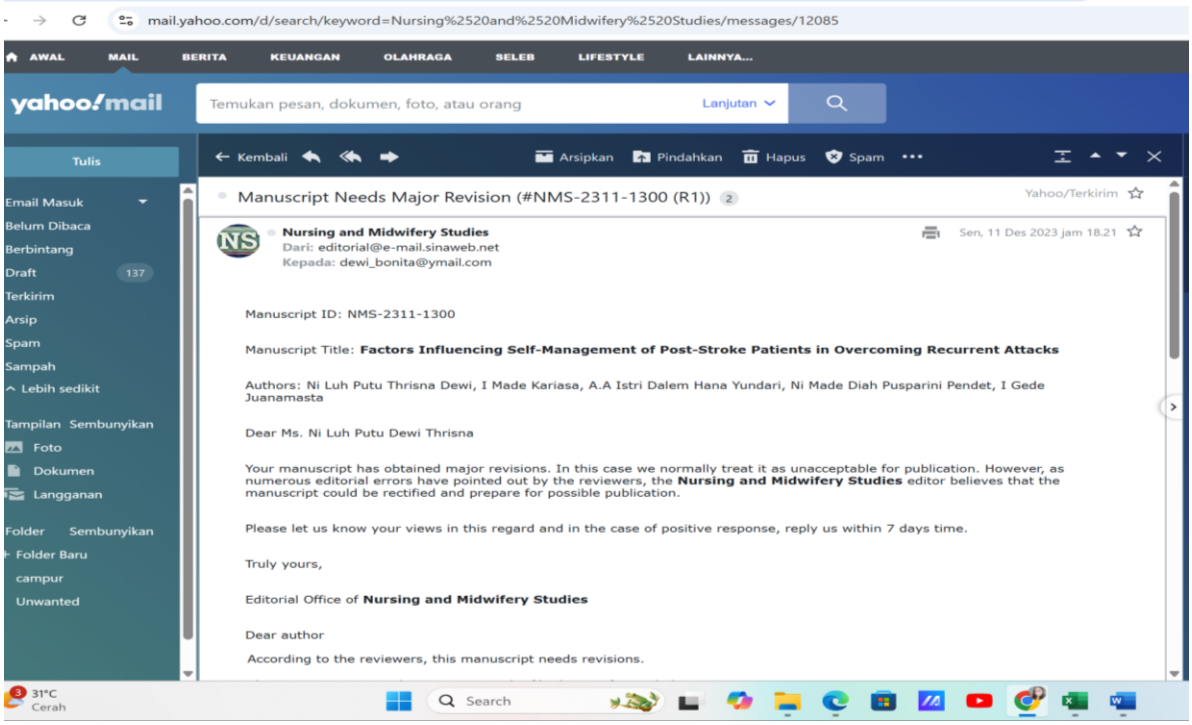
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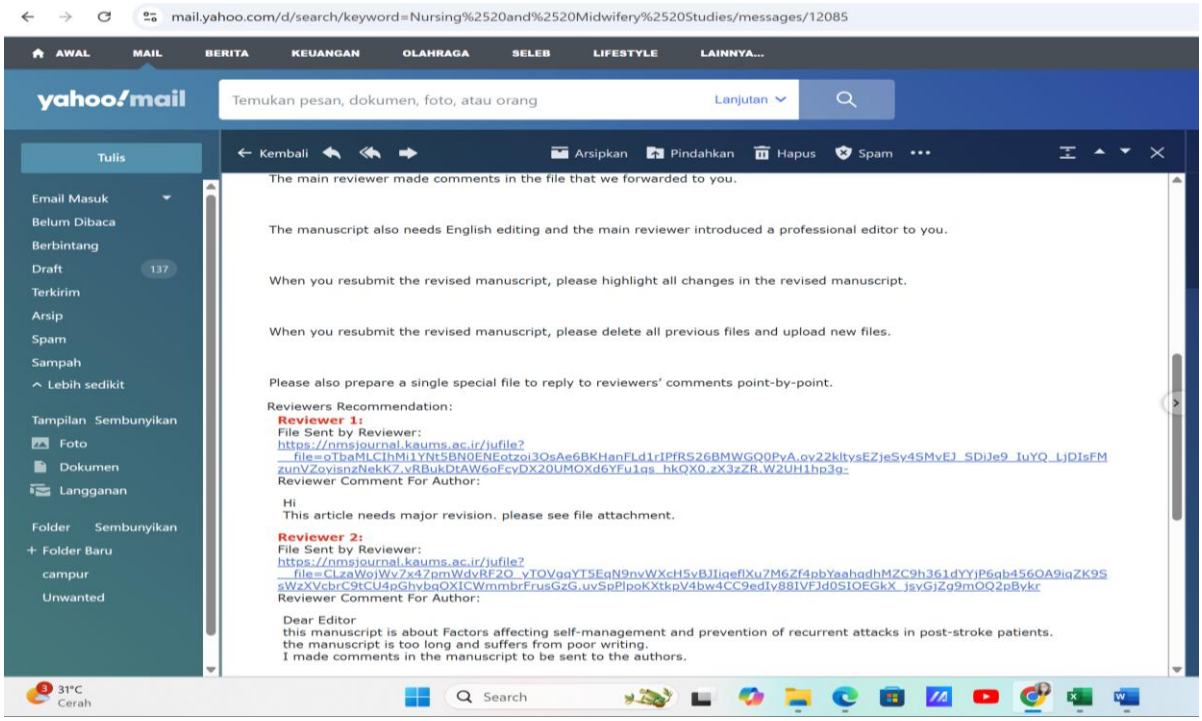
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Factors Influencing Self-Management of Post-Stroke Patients in Overcoming Recurrent Attacks

Abstract

Background: Stroke survivors who experience an attack for the first time have a higher risk of having a stroke for the second time and even repeat it. An effective way to reduce mortality and complications due to recurrent stroke attacks and improve the quality of life of stroke patients is to improve the patient's level of self-management. The complexity of stroke patients' problems can be handled with *self-management*. The implementation of *self-management* plays an important role in daily activities, coping management, and stabilizing conditions caused by chronic pain such as stroke.

Purpose: To know the factors affecting *self-management* of stroke survivors to prevent and reduce the risk of recurring attacks that will synergize with improving their quality of life.

Methods: This study used a descriptive-analytic design with a non-probability *consecutive* sampling technique involving 116 post-stroke respondents with a logistic regression test at one of the stroke foundations in Bali.

Results: Factors that influence self-management are education (p=0.002), stroke attack (0.001), and medical history (0.011) with the strongest factor being the medical history (OR=7.807) and the smallest is the education factor (OR=2.136) with the probability that a patient has good self-management of 93.57%.

Conclusions A history of the disease can affect self-management because stroke survivors who already have risk factors can stimulate an attack if this is not properly controlled; it cannot be denied that a stroke can recur.

Keywords: quality of life, risk factors, self-management, stroke, survivors

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Background

Stroke is a neurological disorder that interrupts blood flow to the brain. Stroke-related neurological disorders can lead to a range of clinical symptoms that quickly progress to localized or widespread neurological damage. If these symptoms persist for more than 24 hours, they can be fatal (Ferawati, Rita, E., Amira, S., & Ida, 2020). Stroke is the second most common cause of death worldwide, resulting in 6.3 million fatalities.

Globally, approximately 15 million individuals experience a stroke annually. Among these cases, one-third result in death, one-third lead to permanent disability, and 795,000 individuals experience either a first-time stroke or recurring attacks each year. The initial attack is estimated at approximately 610,000, with approximately 185,000 being subsequent attacks (Benjamin et al., 2017). This highlights the significant global burden of stroke, including in ASEAN countries, where it contributes to mortality among affected individuals. According to data from the Southeast Asian Medical Information Centre (SEAMIC), Indonesia has the highest prevalence of stroke-related mortality, followed by the Philippines, Singapore, Brunei, Malaysia, and Thailand. Asia has the second highest number of stroke survivors aged 60 years or older, and the fifth highest number of stroke survivors aged 15-59 years (Venketasubramanian et al., 2017).

The incidence of stroke in Indonesia has shown a positive correlation with age, with the highest prevalence observed among individuals aged 75 years and older (50.2%), while the lowest prevalence was found among those aged 15-24 years (0.6%). The prevalence of stroke, as diagnosed by healthcare professionals and based on the most commonly detected symptoms, was observed to be highest in East Kalimantan (14.7%), followed by Bali (10.7%) and Papua (4.1%) (Riskesdas, 2018). According to the Riskesdas (2018) data, the prevalence of stroke among residents under 15 years old, as diagnosed by doctors, was 50.2% for individuals under 75 years old. Additionally, the prevalence of stroke incidence in men was 11.0% higher than

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in women, specifically 10.9%.

First-time stroke survivors have an increased risk of recurrent stroke (Go et al., 2014). Recurrent attacks may result from the patient's failure to maintain regular self-monitoring. Research findings have demonstrated that approximately 25% of stroke patients suffer from recurrent episodes, with subsequent attacks carrying a higher risk of mortality compared to the initial occurrence (Kernan et al., 2014). Post-stroke patients commonly experience a decrease in arm and leg movements (80%), cognitive impairments (80-90%), and memory issues (70%) (Hatem et al., 2016). Patients who experience recurrent strokes often exhibit more severe consequences compared to those who experience a first stroke. These consequences may include mental disorders, reduced physical activity, and even mortality[8]. This increased severity is attributed to the progressive nature of brain damage [9].

Literature review

In a study assessing risk factor awareness among high-risk patients, it was found that merely 42% of individuals with a prior stroke were aware of their elevated risk for recurrent stroke. Furthermore, only 27% of these individuals disclosed this information to their healthcare provider. Another findings in this study showed 41% of people with high stroke risk factors are unaware. (Slark & Sharma, 2014). Society's response to the potential occurrence of strokes, particularly among individuals at elevated risk, lacks seriousness. The lack of public compliance with the secondary prevention program may be the reason for the high incidence of recurrent attacks in stroke patients. Public awareness of early signs and symptoms of stroke has increased from 45% to 85%. However, stroke patients exhibit slower behavioral changes compared to heart patients in seeking hospital treatment or health services. This delay in seeking medical attention negatively impacts the quality of life, as it leads to repeated attacks. (Kariasa et al., 2019) .

Fugazzaro et al. (2021) suggest that enhancing stroke patients' self-management can

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effectively reduce mortality, complications, and recurrent stroke episodes, while also enhancing their quality of life. The unmet needs in stroke patients encompass physical impairments, limited mobility, depression, anxiety, aphasia, and challenges related to defecation and urination. Unfulfilled needs contribute to the complexity of the patient's issues. Self-management can effectively address the multifaceted challenges faced by stroke patients. Self-management practices are crucial for effectively managing chronic diseases, coping with them, and addressing conditions resulting from chronic pain. Individuals with chronic diseases are responsible for self-management in their daily lives (KT Kim et al., 2021). This task involves the patient's ability to manage their medical, role, and emotional aspects of their condition. Self-management indices include disease knowledge, collaboration with healthcare professionals, active involvement in decision-making, symptom monitoring and treatment, management of the impact on physical, social, and emotional well-being, and adoption of a health-improving lifestyle (Dineen-Griffin et al., 2019) .

Objectives

Optimizing health levels has a significant impact on improving quality of life. This can be achieved through effective management and recognizing self-management as a key aspect of personal transformation. Identifying factors influencing self-management in stroke patients is crucial for early detection of potential triggers for recurrent stroke episodes. Given the variability in trigger factors among stroke survivors, it is important to recognize the individualized nature of these factors in relation to their specific episodes. Moreover, stroke survivors can utilize health services to identify the primary factor influencing self-management. This knowledge enables them to implement suitable interventions aimed at preventing recurrent strokes and enhancing their overall quality of life.

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Methods

Study design and participants

This research used a descriptive analytic design with a *cross-sectional design* where the researcher only measures the research subjects once. The sampling technique used was non-probability (non-random sampling) *consecutive sampling* involving 116 post-stroke respondents with a logistic regression test at one of the stroke foundations in Bali. The inclusion criteria in this study were stroke survivors with awareness of compos mentis and stroke survivors who could read and write and did not have visual impairments. Meanwhile, the exclusion criteria were stroke patients who experienced verbal communication disorders and hearing loss.

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Data collection instruments

The self-management questionnaire comprises 31 statement items pertaining to various daily activities aimed at mitigating the risk of recurrent stroke and facilitating the reduction of both specific and general risks [15]. The dimensions employed encompass stroke risk factors, the ramifications of stroke-related disability, and the provision of rehabilitation services within the healthcare sector.

Stroke risk factors encompass several key elements, namely elevated blood pressure, elevated blood glucose levels, elevated cholesterol levels, tobacco use, alcohol consumption, physical inactivity, and psychological stress. Stroke can lead to various disabilities, including aphasia (inability to speak), paralysis, dysphagia (swallowing disorders), and cognitive impairments. Rehabilitation entails the oversight and guidance of skilled healthcare practitioners, such as physicians, nurses, and physiotherapists.

The survey instrument employs a Likert scale ranging from 1 to 4, where respondents indicate their level of agreement with statements that pertain to their present circumstances by selecting the most appropriate option, which includes strongly disagree, disagree, agree, and strongly

agree. The scoring system involves a range of values, with the lowest score being 31 and the highest score being 124. These values are divided into two categories: poor, which includes scores ranging from 31 to 93, and good, which includes scores ranging from 94 to 124. The self-management questionnaire demonstrates a validity range of 0.482 to 0.961. The Cronbach's alpha reliability coefficient was found to be 0.909 [15].

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Procedure

Following the acquisition of the official authorization letter from the foundation director, we proceeded to establish communication with either the director of stroke foundation The manager provided a comprehensive explanation of the research to all attendees. The staff distributed questionnaires to the patient that was accompanied by family. After receiving a detailed explanation of the study from a member of the research team, all participants were immediately instructed to fill out a questionnaire. The participants collected and stored the completed questionnaires in a secure container located at receptionist. The aforementioned container was exclusively accessible to the individuals responsible for overseeing the administration of the research investigation.

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Ethical considerations

Throughout the course of this investigation, we maintained our commitment to upholding the ethical standards outlined in the Declaration of Helsinki. Ethical clearance reviewed and approved by the [blinded for review] Ethics Review Board [blinded for review]. Before enrolling in the research study, each participant provided their written informed consent. Participants were free to be denied or withdraw from this research during data collection.

Data analysis

The data obtained were tabulated and edited. The data was then analyzed univariate and bivariate. The univariate analysis aimed to describe the characteristics of the respondents (age, gender, education, job), brain attack, medical history, and self-management were

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presented in the form of a percentage distribution. Meanwhile, the multivariate analysis was aimed at identifying the factors influencing self-management using binomial logistic regression because the data in this study were in the form of two categories.

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Results

Table 1. Frequency distribution of respondents

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Based on the results in Table 1, the results showed that most of the samples were male, 75 people (64.7%), belonging to the middle age category, 81 people (69.8%), most of them worked, that is, 83 people (71, 6%), and have secondary school education up to 79 people (68.1%). Most of the samples had their first stroke, up to 62 people (53.4%), medical history of most of the patients had a history of hypertension, up to 72 people (62.1%). The results of the self-management showed that most of the samples had good self-management, namely 95 people (81.9%) and 21 people (18.1%) had poor self-management.

Table 2. Cross-table and Chi-square test

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Based on Table 2, it was found that in the gender characteristics of the sample, 61 men (52.6%) who had good self-management and 14 (12.1%) had poor self-management, while women with self-management had up to 34 people (29.3%) and 7 people (6.0%) had poor self-management. The variable age category with good self-management in the middle age category is up to 66 people (56.9%) and 29 people with elderly (25%), while the middle age category with bad self-management is 15 people (12.9%) and 6 people with elderly (5.2%). The profession variable that has good self-management is mostly working, namely 70 people (39.7%) and those who do not work are 25 people (42.2%) while those who have bad self-management in the working sample are as many as 13 people (23.8%) and not working 5 people (4.3%). Regarding the characteristics of the type of education level, the sample had good self-management in the category of non-school / elementary education, 53 people (45.7%) and 42

people (36.2%) at the secondary school level, while 5 people (4.3%) had poor self-management. %) in basic education and 16 people (13.8%) in continuing education. The samples that had good self-management with having had a stroke for the first time were 58 people (50%) and 37 people (31.9%) had more than 1 stroke attack, while poor self-management was 4 people (3.4%) in the attack category first stroke and 17 people (14.7%) had more than 1 stroke. In the characteristics of the sample, a history of disease with good self-management was 41 people (35.2%) in the sample who had a history of disease and 54 people (46.6%) did not have a history of disease, while samples with poor management who did not have a history of disease were 3 people (2.6%) and had a history of disease in 18 people (15.5%).

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Table 3. Logistic regression table of factors that affect self-management.

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Based on Table 3, the results showed that the factors that influence self-management are Education (p=0.002), Stroke (0.001), and medical history (0.011) with the strongest relationship is the medical history (OR=7.807) and the smallest is the education factor (OR = 2.136) with the probability that patients have good self-management of 93.57%.

Discussion

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This study investigated factors affecting self-management of stroke survivors to prevent and reduce the risk of recurring attacks. The findings showed the medical history, education and stroke attack influencing stroke survivors' self-management to prevent and reduce the risk recurrent attacks.

The most influential self-management of stroke survivors is the history of the disease. The medical history of the respondents was dominated by a history of hypertension. The results of this study are in line with Kim's research, which states that hypertension is a condition when

blood pressure in the arteries increases chronically. High blood pressure can damage blood vessels throughout the body, including blood vessels in the brain. If hypertension is not well controlled through proper self-management, such as following prescribed medications, living a healthy lifestyle, and managing stress, then the risk of having a recurrent stroke will increase.[16] Unhealthy eating patterns and lifestyles, such as the habit of consuming foods high in salt and saturated fat, lack of physical activity, smoking habits, and excessive alcohol consumption, can exacerbate hypertension and increase the risk of recurrent stroke.[15] This is the reason why medical history has the highest contribution to self-management in dealing with recurrent attacks. Having a history of the disease means that stroke survivors must control more strictly and consistently related to the risk factors they have. Having a risk factor means that you are already susceptible to the stimulus of having a stroke, so if this is not managed properly, it will be very difficult to avoid recurring attacks.

Stroke survivors who had their first stroke showed good self-management in the results of this study, while poor self-management was described in stroke survivors who had more than one stroke. Conceptually, recurrent stroke increases the risk of more serious physical complications and recurrence of more frequent sequelae, such as muscle weakness, impaired coordination, impaired speech, and sensory disturbances. These physical complications limit a person's ability to manage themselves effectively. Therefore, stroke survivors need external assistance or special equipment to be able to help carry out daily activities that have an impact on decreasing self-management.[17] In addition, recurrent stroke attacks can occur in different areas of the brain, so that the damage that occurs can spread widely and involve more brain functions related to self-management. This can lead to greater difficulties in planning, decision making, problem solving, emotional regulation, and impulse control in stroke survivors that will later have an impact on poor self-management.[18] A good self-management occurs mainly in stroke survivors who have no history of disease, and poor management is experienced by

stroke survivors who have a history of disease. A history of stroke survivors such as hypertension, diabetes mellitus, and high cholesterol (hyperlipidaemia) is a chronic disease with long-term complications in the body of a person. As with hypertension, it can damage blood vessels, including the arteries of the brain, which can be regarded a stimulus for a stroke. Meanwhile, if seen from a history of diabetes mellitus, it can cause damage to blood vessels and nerves, which in turn has an impact on the formation of blood clots. And high cholesterol is one of the main factors in the blockage of blood vessels associated with the stimulus of a stroke. Therefore, if someone has the disease, it means that they have the possibility of experiencing damage to blood vessels or other organs before a stroke occurs. This, of course, can also affect cognitive function and the ability to self-manage and poor self-management so that you can have a stroke or experience repeated attacks.[15]

A person's life balance is also usually inseparable from the level of education possessed; in this study, the educational level of respondents who had good self-management was in the category of not going to school/Education, while poor self-management was even in further education [11]. This research may illustrate that people with higher education may have high expectations of their cognitive abilities and may have difficulty adjusting to the changes that occur after a stroke. This creates frustration or difficulty accepting the change, which can have a negative impact on self-management. Klockar's research also states that stroke survivors who have advanced education are more unprepared to accept changes in their condition. This can be related to the fact that people who have education tend to have high pressure or expectations of themselves, and if they have a stroke and face difficulties in recovery, they will be prone to depression and anxiety. This emotional disturbance can also affect their motivation and ability to perform effective self-management.[19]

Self-management of post-stroke patients can be influenced by several things that can lead to good or poor self-management. Based on the results of statistical tests, it can be

described that men tend to have a higher percentage of poor self-management than women when they have a stroke. This can happen due to two aspects, namely psychologically or physically. Psychologically, men feel they have greater responsibility than women as the head of the family, the backbone, and the breadwinner, so they feel worse and more stressed when experiencing changes that make them feel limited in carrying out their responsibilities. The existence of uncertainty about life insurance for a man for his family makes men have little motivation to undergo the rehabilitation process. This is also reinforced by research conducted by Cheong, who states that men who have had a stroke have a higher rate of depression than men who have had a stroke. women because it is related to their self-esteem in carrying out their duties in the family; only if this continues to happen it does not deny that the patient's self-management is getting worse in coping with stroke.[20] Meanwhile, from the physical aspect, men have a higher level of disability so that in carrying out post-stroke activities they are slower than women. The same thing was also proven by the research conducted by Sulistyanto in his research, it was found that disability in stroke patients was higher in men, it was also associated with smoking and drinking alcohol habits that could worsen the condition when they had a stroke, such as organ dysfunction, namely hemiparesis, aphasia, and dysarthria, as well as cognitive impairment related to reduced motor control, so that it greatly interferes with the activities of patients in rehabilitation. Reluctance to do rehabilitation and regulate eating patterns can certainly stimulate repeated attacks.[21] Meanwhile, when viewed from an age perspective, poor self-management tends to be experienced by stroke survivors in the middle age range of 40-59, which is an age that is still productive and not yet retired. Disrupted productivity at this age will certainly greatly affect the stability of life in the family related to the existence of moral or material responsibility compared to stroke survivors in old age, who are more able to accept their condition because they are no longer bound by family responsibilities and interpret these attacks as a degenerative process in their old age. This

reason is reinforced by Satink's research, in which productive age has a longer adaptation time to accept changes within it, or there is a reason that the partner they have can leave them when diagnosed with a stroke, making self-management worse.[22] But the results of a different study revealed by Kuo that people of productive age actually have good self-management because they are motivated to recover soon and can continue working to fulfil their obligations.[23] This proves that self-management of stroke patients is not only related to self-adaptation but can also be influenced by the surrounding environment.

The environment in question is not only the home environment, but also the social environment and the work environment. Good self-management can also arise from a good work environment, but in this study, poor self-management was dominant among stroke survivors. Of course, this can happen because a worker has a stressor level and greater demands from the work environment; the changes that occur after a stroke make stroke survivors have a higher sense of stress to be able to return to their place of work, especially if they have limitations from the sequelae that sufferers have. Fear of decreased performance also greatly influences stroke survivor self-management to be able to return to normal. The analysis results from La Torre's research also reinforce the fact that a worker has more responsibility not only related to the economic needs of his family but also to the leadership and the agency where he works.[24] High-stress and high-stress jobs can increase a person's risk of having a stroke. Chronic stress can lead to increased blood pressure, inflammation, and disruption of the cardiovascular system, which are major risk factors for stroke. In a busy working environment, it is often difficult for workers to take the time to take care of themselves. This includes neglecting visits to the doctor for routine check-ups, ignoring symptoms that may be red flags, and a lack of awareness of the importance of personal health, which, of course, stimulates repeated attacks which can be perceived as poor self-management. Poor self-management in this context refers to a lack of concern for health and balance of life.[8]

Recurrent stroke attacks are, of course, currently a special concern not only for stroke survivors and their families, but also for health services, especially nurses. In this study, factors that influence self-management and have an impact on the occurrence of repeated attacks were found. These factors include education, stroke, and a history of disease, the greatest strength of the relationship is stroke survivors who have a history of disease, and the smallest is the education factor. Education in this case has the least influence on poor self-management which can lead to repeated attacks, because good understanding can actually make a person do good self-management, too, although in this study it was shown that stroke survivors who had advanced education had poor self-management. However, it cannot be denied that someone who has a good education and a good understanding understands the conditions they are experiencing and has a higher awareness of the importance of managing themselves and taking the necessary steps for good self-management to reduce the risk of attacks repeated.[25] It is possible that this is why the education factor has the least influence on self-management in preventing recurrent strokes. Then when viewed from a stroke, stroke survivors who have attacks for the first time and for the second time can also have good management or bad management, this can be due to the amount of brain damage that occurs in the first or second stroke, which can vary between individuals, one to another, it is the percentage of brain damage that actually affects their ability to live life regardless of the first or second attack, but conceptually, the second attack can cause more severe damage and affect the patient's self-management in self-management and if not treated better an attack can occur repeated. [18]

Conclusions

Regarding factors that affect self-management of stroke survivors in coping with strokes, the three most influential factors are education, the number of brain attacks, and medical history, where among the three factors, the history of disease has the strongest influence on a person's

self-management in overcoming attacks. recurrent strokes. A history of the disease can affect self-management because stroke survivors who already have risk factors can stimulate an attack if this is not controlled properly; of course, it cannot be denied that a stroke can occur again. However, it is also important to consider that other factors can also affect self-management of post-stroke patients, such as social support, health education, access to medical care, and psychological factors.

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Competing interests

The authors have declared no conflict of interest.

Authors' contributions

The final manuscript was read and approved by all authors. All authors are accountable for the data's integrity and the accuracy of the data analysis.

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Availability of data and materials

The datasets are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

Throughout the course of this investigation, we maintained our commitment to upholding the ethical standards outlined in the Declaration of Helsinki. Ethical clearance reviewed and approved by the [blinded for review] Ethics Review Board [blinded for review]. Before

enrolling in the research study, each participant provided their written informed consent. Participants were free to be denied or withdraw from this research during data collection.

Consent for publication

The authors affirm their consent for the final accepted version of the manuscript to be considered for publication by submitting this document.

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Table 1. Frequency distribution of respondents

Items	n	%
Gender		
Man	75	64.7
Woman	41	35.3
Age		
Middle-aged	81	69.8
Elderly	35	30.2
Job		
Unemployment	33	28.4
Employment	83	71.6
Education		
No school / elementary school	37	31.9
High school	79	68.1
Stroke attack		
First time	62	53.4
>1 times	54	46.6
Medical history		
No history	44	37.9
Hypertension	72	62.1
Self-management		
Good	95	81.9
Poor	21	18.1

Table 2. Cross-table and Chi-square test

	Self-Management				**P Value**
	Good		**Poor**		
	n	**%**	**n**	**%**	
Gender					
Man	61	52.6	14	12.1	0.834
Woman	34	29.3	7	6.0	
Age					
Middle-aged	66	56.9	15	12.9	0.862
Elderly	29	25.0	6	5.2	
Job					
Unemployment	25	42.2	5	4.3	0.021
Employment	70	39.7	13	13.8	
Education					
No school /elementary school	53	45.7	5	4.3	0.008
High school	42	36.2	16	13.8	
Stroke attack					
First time	58	50.0	4	3.4	0.000
>1 times	37	31.9	17	14.7	
Medical history					

No history	41	35.3	3	2.6	0.014
There is a history of disease	54	46.6	18	15.5	

Table 3. Logistic regression table of factors that affect self-management.

	Variable	Coefficient	p.s	OR (95% CI)	
Step 1	Job	1,886	0.202	2,412	0.106-6.329
	Education	1,579	0.026	2,206	0.051-7.221
	Stroke attack	2,056	0.002	4,128	1035-7,899
	Medical history	2.014	0.007	6,133	1.031-9.676
	Constant	-2,756	0.000	0.004	
Step 2	Education	1,993	0.002	2,136	0.039-8.334
	Stroke attack	2.107	0.001	4,122	1.034-10.776
	Medical history	2,890	0.011	7,151	1.035-9.707
	Constant	-2,571	0.000	0.002	

Factors Influencing Self-Management in ~~of~~ Post-Stroke Patients in Overcoming Recurrent Attacks

Abstract

Background: People who survive a first stroke are at higher risk of having a second stroke. Self-care can significantly prevent the recurrence of a stroke, prevent complications and improve the quality of life after a stroke. At the same time, many different factors can influence self-care and need to be studied in different societies.~~Stroke survivors who experience an attack for the first time have a higher risk of having a stroke for the second time and even repeat it. An effective way to reduce mortality and complications due to recurrent stroke attacks and improve the quality of life of stroke patients is to improve the patient's level of self-management. The complexity of stroke patients' problems can be handled with *self-management*. The implementation of *self-management* plays an important role in daily activities, coping management, and stabilizing conditions caused by chronic pain such as stroke.~~

Objectives~~Purpose~~: To know the factors affecting *self-management* of stroke survivors to prevent and reduce the risk of recurring attacks that will synergize with improving their quality of life.

Methods: This study used a descriptive-analytic design with a non-probability *consecutive* sampling technique involving 116 post-stroke respondents with a logistic regression test at one of the stroke foundations in Bali.

Results: Factors that influence self-management are education (p=0.002), stroke attack (0.001), and medical history (0.011) with the strongest factor being the medical history (OR=7.807) and the smallest is the education factor (OR=2.136) with the probability that a patient has good self-management of 93.57%.

Conclusions A history of the disease can affect self-management because stroke survivors who already have risk factors can stimulate an attack if this is not properly controlled; it cannot be denied that a stroke can recur.

Keywords: quality of life, risk factors, self-management, stroke, survivors

Background

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amir.vira@yahoo.com

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Stroke is a neurological disorder that interrupts blood flow to the brain. Stroke-related neurological disorders can lead to a range of clinical symptoms that quickly progress to localized or widespread neurological damage. If these symptoms persist for more than 24 hours, they can be fatal (Ferawati, Rita, E., Amira, S., & Ida, 2020). Stroke is the second most common cause of death worldwide, resulting in 6.3 million fatalities.

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Globally, approximately 15 million individuals experience a stroke annually. Among these cases, one-third result in death, one-third lead to permanent disability, and 795,000 individuals experience either a first-time stroke or recurring attacks each year. The initial attack is estimated at approximately 610,000, with approximately 185,000 being subsequent attacks (Benjamin et al., 2017). This highlights the significant global burden of stroke, including in ASEAN countries, where it contributes to mortality among affected individuals. According to data from the Southeast Asian Medical Information Centre (SEAMIC), Indonesia has the highest prevalence of stroke-related mortality, followed by the Philippines, Singapore, Brunei, Malaysia, and Thailand. Asia has the second highest number of stroke survivors aged 60 years or older, and the fifth highest number of stroke survivors aged 15-59 years (Venketasubramanian et al., 2017).

The incidence of stroke in Indonesia has shown a positive correlation with age, with the highest prevalence observed among individuals aged 75 years and older (50.2%), while the lowest prevalence was found among those aged 15-24 years (0.6%). The prevalence of stroke, as diagnosed by healthcare professionals and based on the most commonly detected symptoms, was observed to be highest in East Kalimantan (14.7%), followed by Bali (10.7%) and Papua (4.1%) (Riskesdas, 2018). According to the Riskesdas (2018) data, the prevalence of stroke among residents under 15 years old, as diagnosed by doctors, was 50.2% for individuals under 75 years old. Additionally, the prevalence of stroke incidence in men was 11.0% higher than in women, specifically 10.9%.

First-time stroke survivors have an increased risk of recurrent stroke (Go et al., 2014). Recurrent attacks may result from the patient's failure to maintain regular self-monitoring. Research findings have demonstrated that approximately 25% of stroke patients suffer from recurrent episodes, with subsequent attacks carrying a higher risk of mortality compared to the initial occurrence (Kernan et al., 2014). Post-stroke patients commonly experience a decrease in arm and leg movements (80%), cognitive impairments (80-90%), and memory issues (70%) (Hatem et al., 2016). Patients who experience recurrent strokes often exhibit more severe consequences compared to those who experience a first stroke. These consequences may include mental disorders, reduced physical activity, and even mortality[8]. This increased severity is attributed to the progressive nature of brain damage [9].

~~Literature review~~

In a study assessing risk factor awareness among high-risk patients, it was found that merely 42% of individuals with a prior stroke were aware of their elevated risk for recurrent stroke. Furthermore, only 27% of these individuals disclosed this information to their healthcare provider. Another findings in this study showed 41% of people with high stroke risk factors are unaware. (Slark & Sharma, 2014). Society's response to the potential occurrence of strokes, particularly among individuals at elevated risk, lacks seriousness. The lack of public compliance with the secondary prevention program may be the reason for the high incidence of recurrent attacks in stroke patients. Public awareness of early signs and symptoms of stroke has increased from 45% to 85%. However, stroke patients exhibit slower behavioral changes compared to heart patients in seeking hospital treatment or health services. This delay in seeking medical attention negatively impacts the quality of life, as it leads to repeated attacks. (Kariasa et al., 2019) .

Fugazzaro et al. (2021) suggest that enhancing stroke patients' self-management can effectively reduce mortality, complications, and recurrent stroke episodes, while also

enhancing their quality of life. The unmet needs in stroke patients encompass physical impairments, limited mobility, depression, anxiety, aphasia, and challenges related to defecation and urination. Unfulfilled needs contribute to the complexity of the patient's issues. Self-management can effectively address the multifaceted challenges faced by stroke patients. Self-management practices are crucial for effectively managing chronic diseases, coping with them, and addressing conditions resulting from chronic pain. Individuals with chronic diseases are responsible for self-management in their daily lives (KT Kim et al., 2021). This task involves the patient's ability to manage their medical, role, and emotional aspects of their condition. Self-management indices include disease knowledge, collaboration with healthcare professionals, active involvement in decision-making, symptom monitoring and treatment, management of the impact on physical, social, and emotional well-being, and adoption of a health-improving lifestyle (Dineen-Griffin et al., 2019) .

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After a brief overview of the statistics related to the prevalence of strokes and its consequences, the possibility of their recurrence in these patients should be considered, and after a brief explanation about this, the importance of self-care and its role in preventing the recurrence of strokes should be discussed. Focus on improving patients' self-management and quality of life, and review relevant studies to show that various factors affect patients' self-management. A review of studies should show that there are differences between studies in this field (factors affecting self-management). Then you should write your research question focusing on the gap and contradictions between studies and then, present the objective of the present study.

Objectives

Optimizing health levels has a significant impact on improving quality of life. This can be achieved through effective management and recognizing self-management as a key aspect of personal transformation. Identifying factors influencing self-management in stroke patients is crucial for early detection of potential triggers for recurrent stroke episodes. Given the variability in trigger factors among stroke survivors, it is important to recognize the individualized nature of these factors in relation to their specific episodes. Moreover, stroke survivors can utilize health services to identify the primary factor influencing self-management. This knowledge enables them to implement suitable interventions aimed at preventing recurrent strokes and enhancing their overall quality of life.

Methods

Study design and participants

This research used a ~~descriptive analytic design with a~~ *cross-sectional design* ~~where the researcher only measures the research subjects once~~. A ~~The sampling technique used was non-probability (non-random sampling)~~ *consecutive sampling was conducted to recruit* ~~involving~~ 116 post-stroke patients~~respondents with a logistic regression test~~ at one of the stroke foundations in Bali. The inclusion criteria in this study were stroke survivors with awareness of compos mentis and stroke survivors who could read and write and did not have visual impairments. Meanwhile, the exclusion criteria were stroke patients who experienced verbal communication disorders and hearing loss.

Data collection instruments

The self-management questionnaire comprises 31 statement items pertaining to various daily activities aimed at mitigating the risk of recurrent stroke and facilitating the reduction of both specific and general risks [15]. The dimensions employed encompass stroke risk factors, the ramifications of stroke-related disability, and the provision of rehabilitation services within the healthcare sector.

Stroke risk factors encompass several key elements, namely elevated blood pressure, elevated blood glucose levels, elevated cholesterol levels, tobacco use, alcohol consumption, physical inactivity, and psychological stress. Stroke can lead to various disabilities, including aphasia (inability to speak), paralysis, dysphagia (swallowing disorders), and cognitive impairments. Rehabilitation entails the oversight and guidance of skilled healthcare practitioners, such as physicians, nurses, and physiotherapists.

The survey instrument employs a Likert scale ranging from 1 to 4, where respondents indicate their level of agreement with statements that pertain to their present circumstances by selecting the most appropriate option, which includes strongly disagree, disagree, agree, and strongly agree. The scoring system involves a range of values, with the lowest score being 31 and the highest score being 124. These values are divided into two categories: poor, which includes

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scores ranging from 31 to 93, and good, which includes scores ranging from 94 to 124. The self-management questionnaire demonstrates a validity range of 0.482 to 0.961. The Cronbach's alpha reliability coefficient was found to be 0.909 [15].

Procedure

Following the acquisition of the official authorization letter from the foundation director, we proceeded to establish communication with either the director of stroke foundation The manager provided a comprehensive explanation of the research to all attendees. The staff distributed questionnaires to the patient that was accompanied by family. After receiving a detailed explanation of the study from a member of the research team, all participants were immediately instructed to fill out a questionnaire. The participants collected and stored the completed questionnaires in a secure container located at receptionist. The aforementioned container was exclusively accessible to the individuals responsible for overseeing the administration of the research investigation.

Ethical considerations

Throughout the course of this investigation, we maintained our commitment to upholding the ethical standards outlined in the Declaration of Helsinki. Ethical clearance reviewed and approved by the [blinded for review] Ethics Review Board [blinded for review]. Before enrolling in the research study, each participant provided their written informed consent. Participants were free to be denied or withdraw from this research during data collection.

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Data analysis

The data obtained were tabulated and edited. The data was then analyzed univariate and bivariate. The univariate analysis aimed to describe the characteristics of the respondents (age, gender, education, job), brain attack, medical history, and self-management were presented in the form of a percentage distribution. Meanwhile, the multivariate analysis was

aimed at identifying the factors influencing self-management using binomial logistic regression because the data in this study were in the form of two categories.

Results

~~**Table 1. Frequency distribution of respondents**~~

Based on the results in Table 1, the results showed that most of the samples were male, 75 people (64.7%), belonging to the middle age category, 81 people (69.8%), most of them worked, that is, 83 people (71, 6%), and have secondary school education up to 79 people (68.1%). Most of the samples had their first stroke, up to 62 people (53.4%), medical history of most of the patients had a history of hypertension, up to 72 people (62.1%). The results of the self-management showed that most of the samples had good self-management, namely 95 people (81.9%) and 21 people (18.1%) had poor self-management.

~~**Table 2. Cross-table and Chi-square test**~~

Based on Table 2, it was found that in the gender characteristics of the sample, 61 men (52.6%) who had good self-management and 14 (12.1%) had poor self-management, while women with self-management had up to 34 people (29.3%) and 7 people (6.0%) had poor self-management. The variable age category with good self-management in the middle age category is up to 66 people (56.9%) and 29 people with elderly (25%), while the middle age category with bad self-management is 15 people (12.9%) and 6 people with elderly (5.2%). The profession variable that has good self-management is mostly working, namely 70 people (39.7%) and those who do not work are 25 people (42.2%) while those who have bad self-management in the working sample are as many as 13 people (23.8%) and not working 5 people (4.3%). Regarding the characteristics of the type of education level, the sample had good self-management in the category of non-school / elementary education, 53 people (45.7%) and 42 people (36.2%) at the secondary school level, while 5 people (4.3%) had poor self-

management. %) in basic education and 16 people (13.8%) in continuing education. The samples that had good self-management with having had a stroke for the first time were 58 people (50%) and 37 people (31.9%) had more than 1 stroke attack, while poor self-management was 4 people (3.4%) in the attack category first stroke and 17 people (14.7%) had more than 1 stroke. In the characteristics of the sample, a history of disease with good self-management was 41 people (35.2%) in the sample who had a history of disease and 54 people (46.6%) did not have a history of disease, while samples with poor management who did not have a history of disease were 3 people (2.6%) and had a history of disease in 18 people (15.5%).

~~**Table 3. Logistic regression table of factors that affect self-management.**~~

Based on Table 3, the results showed that the factors that influence self-management are Education (p=0.002), Stroke (0.001), and medical history (0.011) with the strongest relationship is the medical history (OR=7.807) and the smallest is the education factor (OR = 2.136) with the probability that patients have good self-management of 93.57%.

Discussion

~~This study investigated factors affecting self-management of stroke survivors to prevent and reduce the risk of recurring attacks.~~ The findings showed the medical history, education and stroke attack influencing stroke survivors' self-management to prevent and reduce the risk recurrent attacks.

The most influential self-management of stroke survivors is the history of the disease. The medical history of the respondents was dominated by a history of hypertension. The results of this study are in line with Kim's research, which states that hypertension is a condition when blood pressure in the arteries increases chronically. High blood pressure can damage blood

vessels throughout the body, including blood vessels in the brain. If hypertension is not well controlled through proper self-management, such as following prescribed medications, living a healthy lifestyle, and managing stress, then the risk of having a recurrent stroke will increase.[16] Unhealthy eating patterns and lifestyles, such as the habit of consuming foods high in salt and saturated fat, lack of physical activity, smoking habits, and excessive alcohol consumption, can exacerbate hypertension and increase the risk of recurrent stroke.[15] This is the reason why medical history has the highest contribution to self-management in dealing with recurrent attacks. Having a history of the disease means that stroke survivors must control more strictly and consistently related to the risk factors they have. Having a risk factor means that you are already susceptible to the stimulus of having a stroke, so if this is not managed properly, it will be very difficult to avoid recurring attacks.

Stroke survivors who had their first stroke showed good self-management in the results of this study, while poor self-management was described in stroke survivors who had more than one stroke. Conceptually, recurrent stroke increases the risk of more serious physical complications and recurrence of more frequent sequelae, such as muscle weakness, impaired coordination, impaired speech, and sensory disturbances. These physical complications limit a person's ability to manage themselves effectively. Therefore, stroke survivors need external assistance or special equipment to be able to help carry out daily activities that have an impact on decreasing self-management.[17] In addition, recurrent stroke attacks can occur in different areas of the brain, so that the damage that occurs can spread widely and involve more brain functions related to self-management. This can lead to greater difficulties in planning, decision making, problem solving, emotional regulation, and impulse control in stroke survivors that will later have an impact on poor self-management.[18] A good self-management occurs mainly in stroke survivors who have no history of disease, and poor management is experienced by stroke survivors who have a history of disease. A history of stroke survivors such as

hypertension, diabetes mellitus, and high cholesterol (hyperlipidaemia) is a chronic disease with long-term complications in the body of a person. As with hypertension, it can damage blood vessels, including the arteries of the brain, which can be regarded a stimulus for a stroke. Meanwhile, if seen from a history of diabetes mellitus, it can cause damage to blood vessels and nerves, which in turn has an impact on the formation of blood clots. And high cholesterol is one of the main factors in the blockage of blood vessels associated with the stimulus of a stroke. Therefore, if someone has the disease, it means that they have the possibility of experiencing damage to blood vessels or other organs before a stroke occurs. This, of course, can also affect cognitive function and the ability to self-manage and poor self-management so that you can have a stroke or experience repeated attacks.[15]

A person's life balance is also usually inseparable from the level of education possessed; in this study, the educational level of respondents who had good self-management was in the category of not going to school/Education, while poor self-management was even in further education [11]. This research may illustrate that people with higher education may have high expectations of their cognitive abilities and may have difficulty adjusting to the changes that occur after a stroke. This creates frustration or difficulty accepting the change, which can have a negative impact on self-management. Klockar's research also states that stroke survivors who have advanced education are more unprepared to accept changes in their condition. This can be related to the fact that people who have education tend to have high pressure or expectations of themselves, and if they have a stroke and face difficulties in recovery, they will be prone to depression and anxiety. This emotional disturbance can also affect their motivation and ability to perform effective self-management.[19]

Self-management of post-stroke patients can be influenced by several things that can lead to good or poor self-management. Based on the results of statistical tests, it can be described that men tend to have a higher percentage of poor self-management than women

when they have a stroke. This can happen due to two aspects, namely psychologically or physically. Psychologically, men feel they have greater responsibility than women as the head of the family, the backbone, and the breadwinner, so they feel worse and more stressed when experiencing changes that make them feel limited in carrying out their responsibilities. The existence of uncertainty about life insurance for a man for his family makes men have little motivation to undergo the rehabilitation process. This is also reinforced by research conducted by Cheong, who states that men who have had a stroke have a higher rate of depression than men who have had a stroke. women because it is related to their self-esteem in carrying out their duties in the family; only if this continues to happen it does not deny that the patient's self-management is getting worse in coping with stroke.[20] Meanwhile, from the physical aspect, men have a higher level of disability so that in carrying out post-stroke activities they are slower than women. The same thing was also proven by the research conducted by Sulistyanto in his research, it was found that disability in stroke patients was higher in men, it was also associated with smoking and drinking alcohol habits that could worsen the condition when they had a stroke, such as organ dysfunction, namely hemiparesis, aphasia, and dysarthria, as well as cognitive impairment related to reduced motor control, so that it greatly interferes with the activities of patients in rehabilitation. Reluctance to do rehabilitation and regulate eating patterns can certainly stimulate repeated attacks.[21] Meanwhile, when viewed from an age perspective, poor self-management tends to be experienced by stroke survivors in the middle age range of 40-59, which is an age that is still productive and not yet retired. Disrupted productivity at this age will certainly greatly affect the stability of life in the family related to the existence of moral or material responsibility compared to stroke survivors in old age, who are more able to accept their condition because they are no longer bound by family responsibilities and interpret these attacks as a degenerative process in their old age. This reason is reinforced by Satink's research, in which productive age has a longer adaptation time

to accept changes within it, or there is a reason that the partner they have can leave them when diagnosed with a stroke, making self-management worse.[22] But the results of a different study revealed by Kuo that people of productive age actually have good self-management because they are motivated to recover soon and can continue working to fulfil their obligations.[23] This proves that self-management of stroke patients is not only related to self-adaptation but can also be influenced by the surrounding environment.

The environment in question is not only the home environment, but also the social environment and the work environment. Good self-management can also arise from a good work environment, but in this study, poor self-management was dominant among stroke survivors. Of course, this can happen because a worker has a stressor level and greater demands from the work environment; the changes that occur after a stroke make stroke survivors have a higher sense of stress to be able to return to their place of work, especially if they have limitations from the sequelae that sufferers have. Fear of decreased performance also greatly influences stroke survivor self-management to be able to return to normal. The analysis results from La Torre's research also reinforce the fact that a worker has more responsibility not only related to the economic needs of his family but also to the leadership and the agency where he works.[24] High-stress and high-stress jobs can increase a person's risk of having a stroke. Chronic stress can lead to increased blood pressure, inflammation, and disruption of the cardiovascular system, which are major risk factors for stroke. In a busy working environment, it is often difficult for workers to take the time to take care of themselves. This includes neglecting visits to the doctor for routine check-ups, ignoring symptoms that may be red flags, and a lack of awareness of the importance of personal health, which, of course, stimulates repeated attacks which can be perceived as poor self-management. Poor self-management in this context refers to a lack of concern for health and balance of life.[8]

Recurrent stroke attacks are, of course, currently a special concern not only for stroke survivors and their families, but also for health services, especially nurses. In this study, factors that influence self-management and have an impact on the occurrence of repeated attacks were found. These factors include education, stroke, and a history of disease, the greatest strength of the relationship is stroke survivors who have a history of disease, and the smallest is the education factor. Education in this case has the least influence on poor self-management which can lead to repeated attacks, because good understanding can actually make a person do good self-management, too, although in this study it was shown that stroke survivors who had advanced education had poor self-management. However, it cannot be denied that someone who has a good education and a good understanding understands the conditions they are experiencing and has a higher awareness of the importance of managing themselves and taking the necessary steps for good self-management to reduce the risk of attacks repeated.[25] It is possible that this is why the education factor has the least influence on self-management in preventing recurrent strokes. Then when viewed from a stroke, stroke survivors who have attacks for the first time and for the second time can also have good management or bad management, this can be due to the amount of brain damage that occurs in the first or second stroke, which can vary between individuals, one to another, it is the percentage of brain damage that actually affects their ability to live life regardless of the first or second attack, but conceptually, the second attack can cause more severe damage and affect the patient's self-management in self-management and if not treated better an attack can occur repeated. [18]

Study limitations:

??????????

Conclusions

Regarding factors that affect self-management of stroke survivors in coping with strokes, the three most influential factors are education, the number of brain attacks, and medical history,

where among the three factors, the history of disease has the strongest influence on a person's self-management in overcoming attacks. recurrent strokes. A history of the disease can affect self-management because stroke survivors who already have risk factors can stimulate an attack if this is not controlled properly; of course, it cannot be denied that a stroke can occur again. However, it is also important to consider that other factors can also affect self-management of post-stroke patients, such as social support, health education, access to medical care, and psychological factors.

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Competing interests

The authors have declared no conflict of interest.

Authors' contributions

The final manuscript was read and approved by all authors. All authors are accountable for the data's integrity and the accuracy of the data analysis.

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Availability of data and materials

The datasets are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

Throughout the course of this investigation, we maintained our commitment to upholding the ethical standards outlined in the Declaration of Helsinki. Ethical clearance reviewed and approved by the [blinded for review] Ethics Review Board [blinded for review]. Before

enrolling in the research study, each participant provided their written informed consent. Participants were free to be denied or withdraw from this research during data collection.

Consent for publication

The authors affirm their consent for the final accepted version of the manuscript to be considered for publication by submitting this document.

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Table 1. Frequency distribution of respondents

Items	n	%
Gender		
Man	75	64.7
Woman	41	35.3
Age		
Middle-aged	81	69.8
Elderly	35	30.2
Job		
Unemployment	33	28.4
Employment	83	71.6
Education		
No school / elementary school	37	31.9
High school	79	68.1
Stroke attack		
First time	62	53.4
>1 times	54	46.6
Medical history		
No history	44	37.9
Hypertension	72	62.1
Self-management		
Good	95	81.9
Poor	21	18.1

Table 2. Cross-table and Chi-square test

	Self-Management				**P Value**
	Good		**Poor**		
	n	**%**	**n**	**%**	
Gender					
Man	61	52.6	14	12.1	0.834
Woman	34	29.3	7	6.0	
Age					
Middle-aged	66	56.9	15	12.9	0.862
Elderly	29	25.0	6	5.2	
Job					
Unemployment	25	42.2	5	4.3	0.021
Employment	70	39.7	13	13.8	
Education					
No school /elementary school	53	45.7	5	4.3	0.008
High school	42	36.2	16	13.8	
Stroke attack					
First time	58	50.0	4	3.4	0.000
>1 times	37	31.9	17	14.7	
Medical history					

No history	41	35.3	3	2.6	0.014
There is a history of disease	54	46.6	18	15.5	

Table 3. Logistic regression table of factors that affect self-management.

	Variable	Coefficient	p.s	OR (95% CI)	
Step 1	Job	1,886	0.202	2,412	0.106-6.329
	Education	1,579	0.026	2,206	0.051-7.221
	Stroke attack	2,056	0.002	4,128	1035-7,899
	Medical history	2.014	0.007	6,133	1.031-9.676
	Constant	-2,756	0.000	0.004	
Step 2	Education	1,993	0.002	2,136	0.039-8.334
	Stroke attack	2.107	0.001	4,122	1.034-10.776
	Medical history	2,890	0.011	7,151	1.035-9.707
	Constant	-2,571	0.000	0.002	

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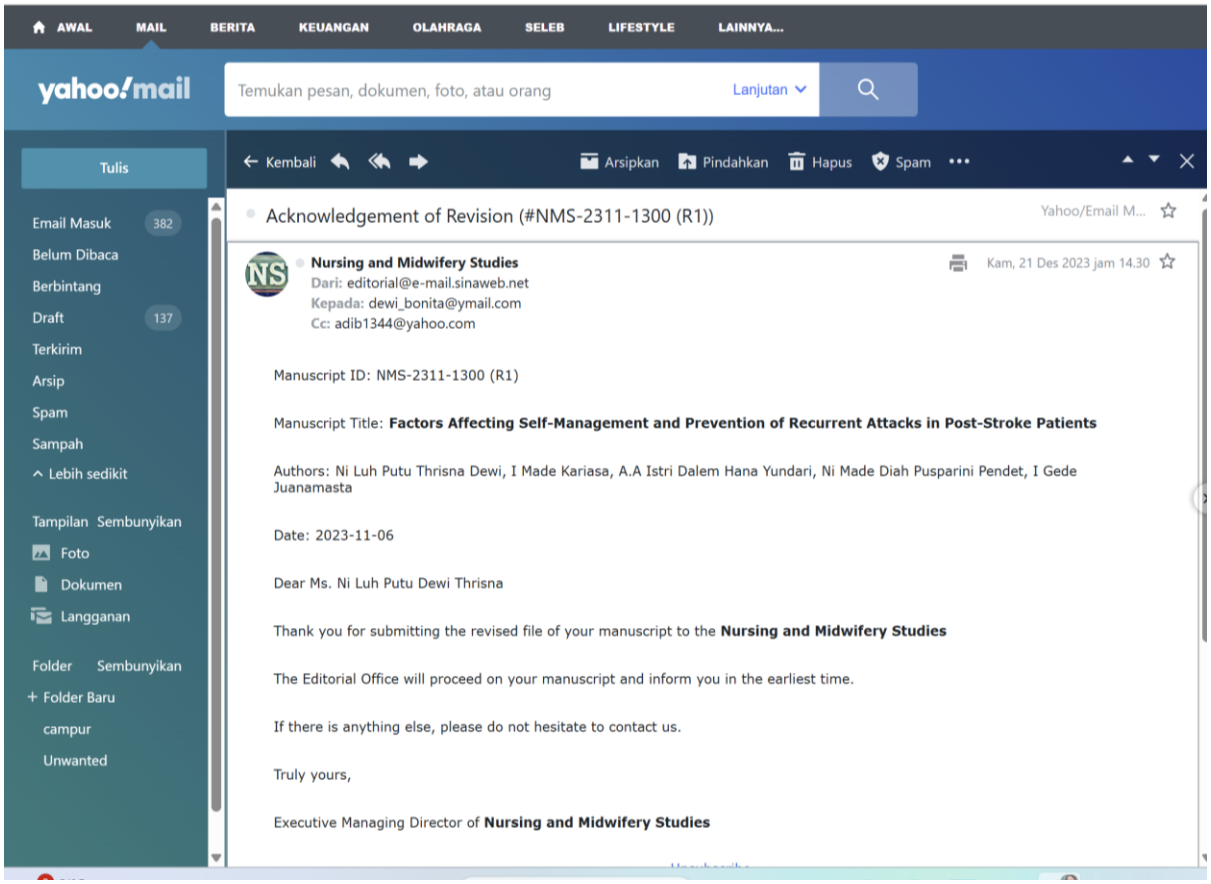
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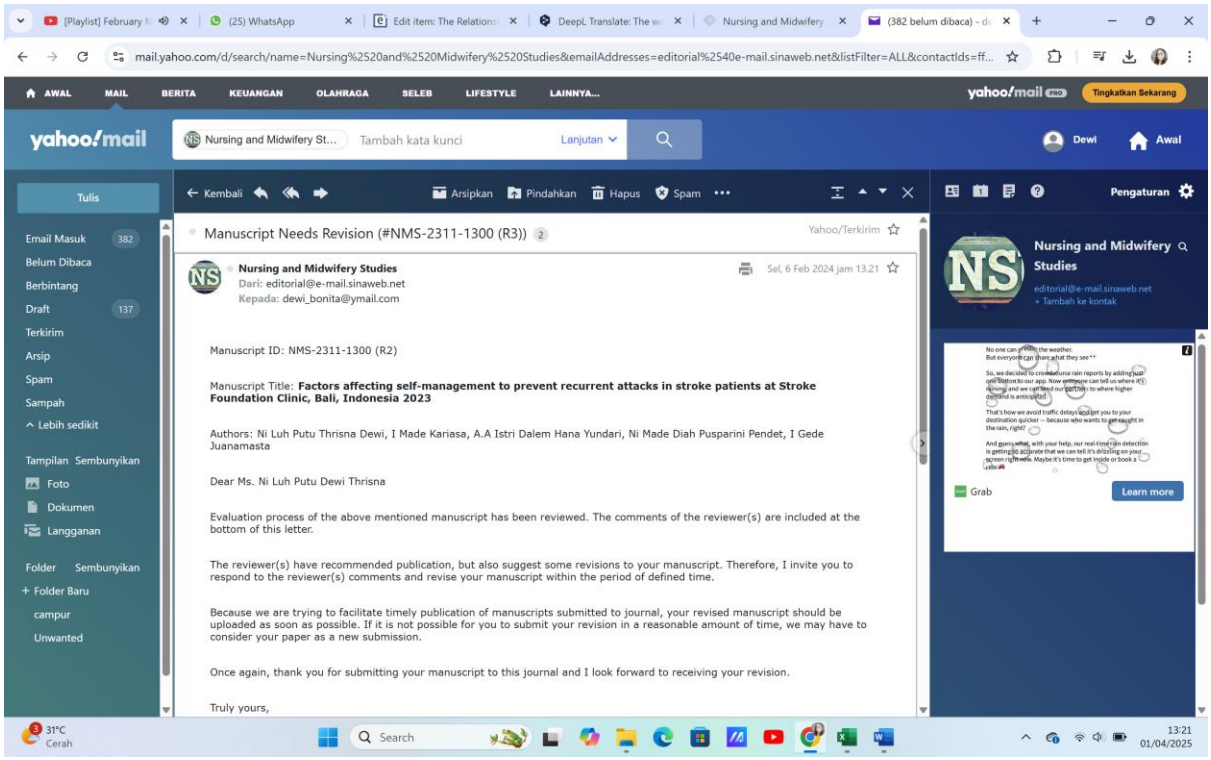

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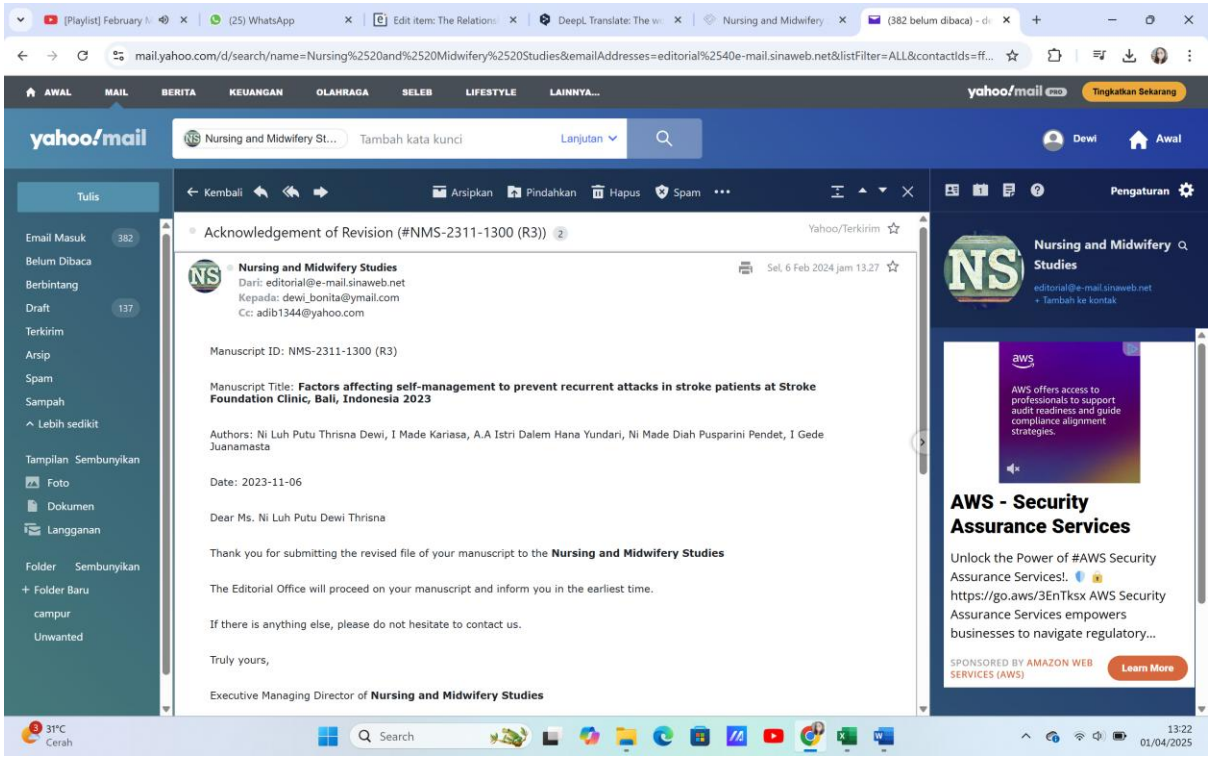

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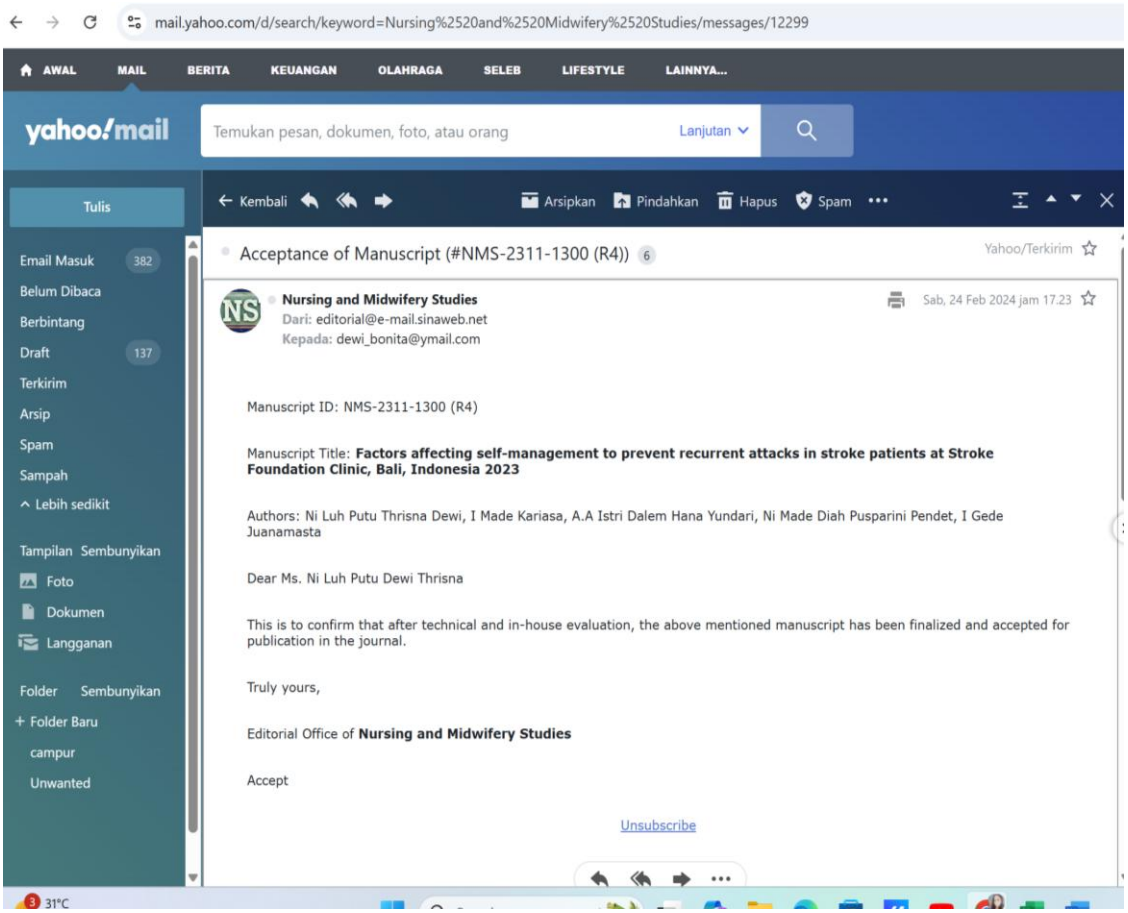

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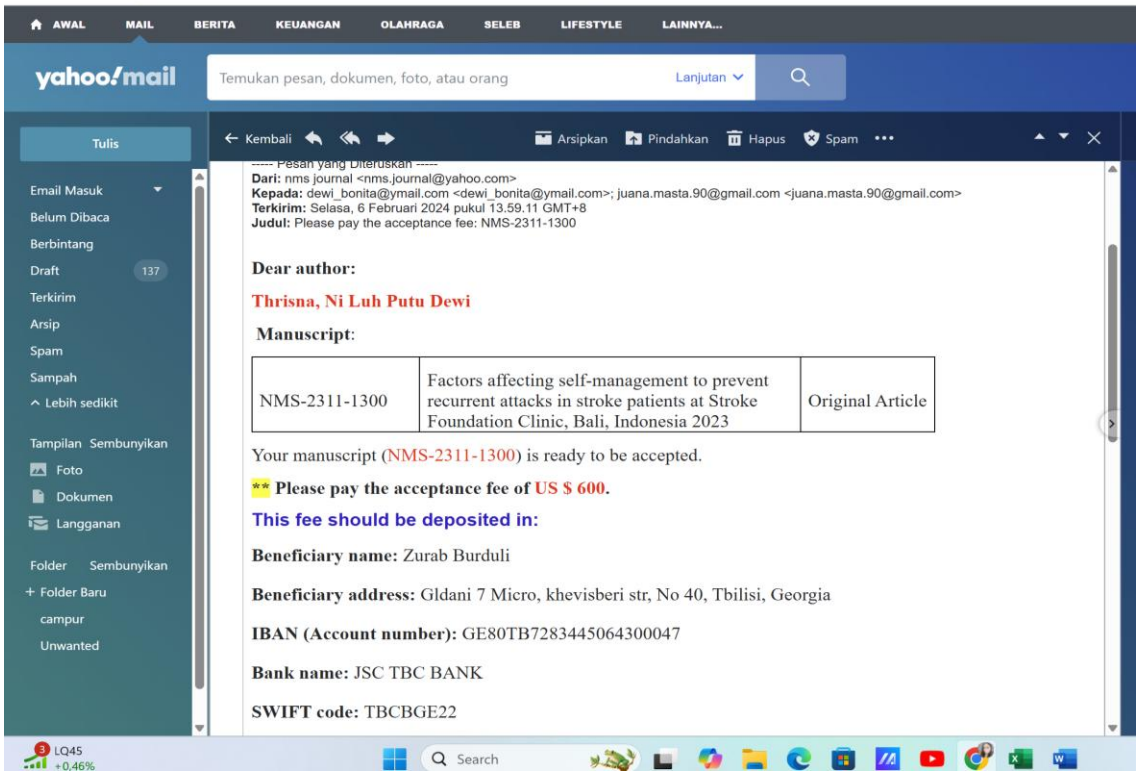

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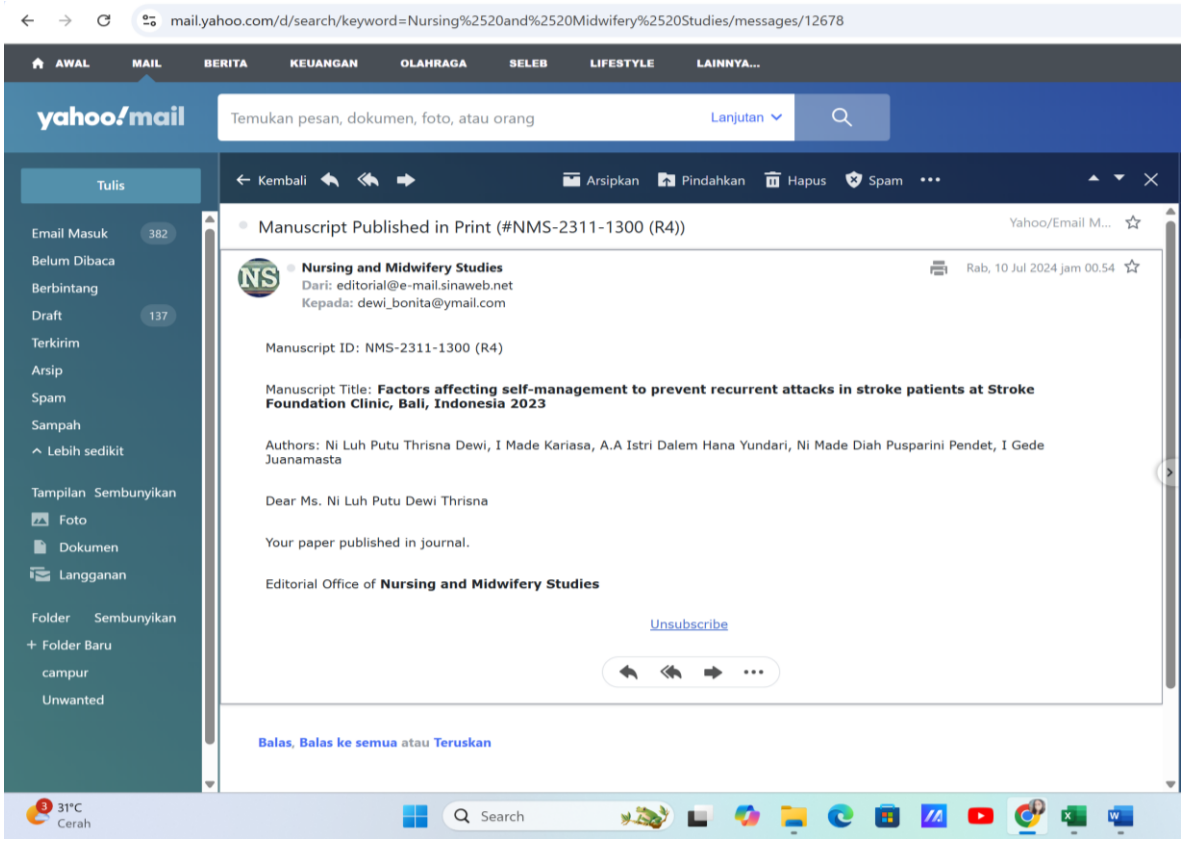

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Factors influencing self-management for preventing recurrent stroke attacks among patients at the stroke foundation clinic in Bali, Indonesia, 2023

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Abstract

Background: Effective self-management practices post-stroke have been shown to decrease mortality rates and enhance the quality of life for patients. While existing studies have explored various factors impacting self-management, further investigation is necessary to identify key determinants that influence self-management and aid in preventing recurrent strokes.

Objectives: This study aims to identify the factors that influence self-management among stroke survivors to prevent recurrent attacks.

Methods: A cross-sectional study was conducted in April 2023 a stroke foundation in Bali, Indonesia, involving 116 post-stroke patients recruited through non-probability consecutive sampling. Data collection utilized the Stroke Self-Management Questionnaire, with analysis performed using chi-square and logistic regression methods.

Results: Gender and age did not exhibit significant associations with self-management. However, regression analysis revealed that education (P=0.002, OR=2.136), previous stroke history (P<0.001, OR=4.122), and pre-existing medical conditions (P=0.011, OR=7.151) were significantly correlated with self-management.

Conclusion: The study highlights the significance of education level, prior stroke experience, and comorbid conditions as influential factors affecting self-management and the likelihood of recurrent stroke attacks. Understanding these determinants is crucial for designing tailored interventions and support systems to enhance self-management practices in stroke patients.

Keywords: Risk Factors, Self-Management, Stroke, Survivors.

Introduction

Stroke is a prevalent cause of disability and mortality on a global scale, with approximately 85% of all strokes being ischemic strokes attributed to atherosclerosis.[1] Data from the World Stroke Organization in 2022 revealed that there are over 12.2 million new stroke cases annually, affecting one in four individuals over the age of 25 during their lifetime.[2] Tragically, one-third of stroke cases result in death, while another third lead to permanent disabilities. Projections indicate that stroke rates in the United States are expected to rise by 3.4 million by 2030.[3] Recurrent strokes accounted for more than 30% of all stroke incidents worldwide in 2019, underscoring the persistent threat of stroke recurrence.[4] Indonesia reported an incidence rate of 2,097.22 strokes per 100,000 individuals in the same year, with the country exhibiting the highest stroke-related mortality rate in Asia, followed by several other nations.[5,6]

Survivors of initial strokes face an increased risk of recurrent strokes, potentially stemming from inadequate self-monitoring practices. Studies have shown that approximately 25% of stroke survivors experience recurrent attacks, which carry a higher mortality risk compared to the initial event.[7] The prevalence of recurrent strokes is anticipated to rise, particularly in developing nations, posing a significant public health

challenge.[8] Post-stroke complications such as reduced limb mobility, cognitive impairments, dementia, memory deficits, and mortality underscore the critical need for effective self-management strategies to prevent stroke recurrence.[8,9] Self-management efforts involve vigilant monitoring and control of risk factors like hypertension, diabetes, and dyslipidemia, along with lifestyle modifications encompassing healthy dietary choices, regular physical activity, and avoidance of harmful habits like smoking and excessive alcohol consumption.[10,11]

Effective self-management also entails adherence to healthcare professionals' recommendations and treatment regimens. However, not all stroke patients exhibit optimal self-management behaviors, rendering them vulnerable to recurrent strokes.[12] Various complex factors influence stroke patients' self-management capabilities, including their health status, stroke severity, physical and cognitive impairments post-stroke, social support networks, emotional well-being, knowledge about stroke, self-management skills, motivation levels, attitude towards health, confidence levels, access to resources and information, age, gender, personality traits, educational background, socioeconomic status, and availability of educational programs for patients and families.[13-15] While existing research has suggested that demographic factors like age may impact stroke patients' self-management practices, further exploration is warranted to comprehensively understand the determinants influencing patient engagement in post-stroke self-management and its implications for health outcomes.[15]

Furthermore, research indicates that understanding the disease and necessary self-management measures is crucial for optimizing post-stroke self-management. However, physical limitations and accessibility barriers may impede patients' ability to implement these measures, even with adequate knowledge.[16] Therefore, further investigation is warranted to explore the predominant factors influencing self-management and the prevention of recurrent strokes in post-stroke patients. Hence, the essential question that remains is: what factors influence self-management and the prevention of recurrent strokes in post-stroke patients?

Objectives

The primary objective is to identify the factors impacting the self-management practices of stroke survivors.

Methods

Study Design and Participants

In this cross-sectional study, the sample size was determined using Slovin's formula (n=N/(1+ Ne2), where N represents the population and e denotes the error margin (0.05). In April 2023, there were 153 post-stroke patients at a stroke foundation in Bali, Indonesia, from whom we obtained responses from 116 participants.[17] The inclusion criteria required participants to be aware of their stroke diagnosis, possess reading and writing abilities, and not have visual, verbal, or hearing impairments that would hinder questionnaire completion.

Data collection instruments

The data collection instruments included a demographic questionnaire and the Stroke Self-Management Questionnaire (SSMQ). Demographic information collected encompassed gender, age, occupation, number of strokes, and medical history. The SSMQ comprises 31 items related to daily activities aimed at reducing the risk of stroke recurrence and addressing specific and general risk factors.[14] These items cover three dimensions: stroke risk factors, consequences of stroke-related disability, and access to rehabilitation services within the healthcare system. Participants rated their agreement with each item on a 4-point Likert scale ranging from "1 = strongly disagree" to "4 = strongly agree," indicating their level of agreement with statements relevant to their current situation. The total score ranges from 31 to 124, with scores between 31 and 93 indicating poor self-management and scores between 94 and 124 indicating good self-management. The SSMQ demonstrated good validity and internal consistency reliability (Cronbach's alpha of 0.91).[14]

Procedures

The clinic manager at the stroke foundation clinic provided a detailed explanation of the research to all stroke patients. Subsequently, clinic staff distributed questionnaires to patients in the presence of a family member. Participants were instructed to complete the questionnaire after signing an informed consent form. Completed questionnaires were deposited in a secure container located at the reception desk, accessible only to designated personnel overseeing the research.

Data analysis

The data analysis was done using SPSS 24 software (IBM Corp., Armonk, NY, USA). Subsequently, both univariate and multiple logistic regression analysis were conducted. Univariate analysis aimed to assess the effect of each respondents' characteristics, including age, gender, education, occupation, frequency of stroke attacks, medical history, and self-management status. Data were presented as frequencies and percentages. Multiple logistic regression analysis aimed to identify factors influencing self-management using binomial logistic regression, with

a significance level set at < 0.05.

Ethical Considerations

Throughout this study, we adhered to ethical standards outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Wira Medika Bali Ethic Commission (Number 117/E1.STIKES WIKA/EC/IV/2023) on April 23, 2023. Prior to participation, all individuals provided written informed consent.

Results

Among the subjects, 64.7% were male, and 69.8% were in the middle age category. The majority of participants were employed (71.6%) and had completed secondary school education (68.1%). Over half of the participants had experienced their first stroke (53.4%), and a majority had a history of hypertension (62.1%). Most participants demonstrated good self-management (81.9%), while 18.1% exhibited poor self-management [Table 1].

Table 1. Frequency distribution of the participants' characteristics

Items		n (%)
Gender		
	Male	75 (64.7)
	Female	41 (35.3)
Age		
	Middle-aged	81 (69.8)
	Elderly	35 (30.2)
Job		
	Unemployed	33 (28.4)
	Employed	83 (71.6)
Education		
	No school/elementary school	37 (31.9)
	High school	79 (68.1)
Stroke attack		
	First time	62 (53.4)
	>1 time	54 (46.6)
Medical history		
	No history	44 (37.9)
	Hypertension	72 (62.1)
Self-management		
	Good	95 (81.9)
	Poor	21 (18.1)

Self-management showed no significant correlation with gender or age. However, employment status, level of education, history of previous stroke, and pre-existing medical conditions were significantly associated with self-management [Table 2]. Regression analysis revealed that education (P=0.002, OR=2.136), previous stroke (P<0.001, OR=4.122), and pre-existing medical conditions (P=0.011, OR=7.151) were significantly associated with self-management [Table 3].

Table 2. Distribution of good and poor self-management based on the participants' characteristics

Variables	Self-management		P value [a]
	Good, n (%)	Poor, n (%)	
Gender			0.834
Male	61 (82.4)	14 (17.6)	
Female	34 (82.9)	7 (17.1)	
Age			0.862
Middle-aged	66 (81.5)	15 (18.5)	
Elderly	29 (82.9)	6 (17.1)	
Job			0.021
Unemployed	25 (83.3)	5 (16.7)	
Employed	70 (67.9)	13 (32.1)	
Education			0.008
No school /elementary school	53 (91.4)	5 (8.6)	
High school	42 (72.4)	16 (27.6)	
Stroke attack			0.000
First time	58 (93.5)	4 (6.5)	
>1 times	37 (67.3)	17 (32.7)	
Medical history			0.014
No history	41 (93.2)	3 (6.8)	
Having a comorbidity	54 (75)	18 (25)	

[a] Chi-square test or Fisher's exact test

Discussion

The study indicated that self-management among stroke survivors was influenced by factors such as education, pre-existing medical conditions, and history of previous strokes. Notably, pre-existing medical conditions emerged as the most influential factor affecting self-management. Conditions like hypertension, diabetes mellitus, and high cholesterol levels can have long-term repercussions for stroke patients. Hypertension, being the most prevalent pre-existing medical issue among our participants, can inflict damage on blood vessels, including those in the brain, thereby escalating the risk of stroke.[18] Proper self-management practices, such as adopting a healthy lifestyle, managing stress, and adhering to prescribed medications, are essential in controlling hypertension and mitigating the risk of recurrent strokes.[19] Hence, it is imperative to educate stroke survivors with pre-existing medical conditions, like hypertension, on stringent and consistent risk factor management.[18]

Table 3. Logistic regression results of factors that affect self-management

Variable	Coefficient	P-value	OR	95% CI
Step 1				
Job	1,886	0.202	2,412	0.106-6.329
Education	1,579	0.026	2,206	1.051-7.221
Previous stroke	2,056	0.002	4,128	1035-7,899
Pre-existing medical problems	2.014	0.007	6,133	1.031-9.676
Constant	-2,756	<0.001	0.004	
Step 2				
Education	1,993	0.002	2.136	1.039-8.334
Previous Stroke	2.107	<0.001	4.122	1.034-10.776
Pre-existing medical problems	2,890	0.011	7.151	1.035-9.707
Constant	-2,571	<0.001	0.002	

Moreover, our study found that stroke survivors experiencing their first stroke demonstrated good self-management, while those with recurrent strokes exhibited poorer self-management. Recurrent strokes heighten the likelihood of sequelae and severe physical complications, including muscle weakness, balance and sensory impairments, and speech difficulties. These physical limitations can impede an individual's ability to effectively self-manage.[20] Additionally, good post-stroke self-management is often associated with the absence of comorbidities, whereas individuals with comorbid conditions tend to exhibit poorer self-management.[21]

The study revealed that stroke survivors with lower education levels demonstrated good self-management, whereas those with higher levels of education were more likely to exhibit poor self-management. Education is typically associated with a better understanding of the situation and increased awareness of the importance of self-care, making it a positive factor for self-management.[22] However, in our study, stroke survivors with higher education levels showed poorer self-management. Individuals with higher education levels may experience frustration or difficulty in accepting changes, which can negatively impact their ability to self-manage.[23] Klockar et al. also noted that stroke survivors with higher education levels were less prepared to accept behavioral changes due to their higher expectations of themselves. Consequently, they may be more prone to depression and anxiety after experiencing a stroke, which can then hinder their motivation and ability to effectively self-manage.[24]

Furthermore, our study found that good self-management was associated with unemployment. Employed individuals often have increased responsibilities, both financially for their families and in the demands of their workplace, which can lead to higher stress levels and less time for self-care. High-stress jobs can also contribute to elevated blood pressure, increasing the risk of stroke.[25]

Several limitations should be considered in interpreting the findings of this study. Firstly, the research was conducted in a single healthcare facility, potentially limiting the generalizability of the results to other settings. Additionally, the cross-sectional design of the study restricts the ability to establish causality between the variables studied. Lastly, the accuracy of patient responses may have been influenced by physical or cognitive limitations.

Conclusions

Recurrent stroke attacks pose a significant concern for stroke survivors, their families, and healthcare providers, particularly nurses. This study identified education, previous stroke experience, and comorbid disorders as significant factors influencing self-management and the occurrence of recurrent attacks. Understanding and considering these factors are crucial for designing appropriate interventions and support to enhance stroke patients' self-management. Personalized approaches and tailored self-management strategies based on medical history, education level, and stroke experience may improve the effectiveness of recurrent attack risk prevention and management in post-stroke patients.

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Competing interests

The authors declare that they have no competing interests.

Abbreviations

Stroke Self-Management Questionnaire: SSMQ;

Authors' contributions

Study design: NLPTD, IMK, IGJ.

Data collection: AAIDHY, NMNW, NMDPP.

Data analysis: NLPTD, AAIDHY, NMDPP.

Study supervision: IMK.

Manuscript writing: IGJ.

Critical revisions for important intellectual content: NLPTD, IMK, IGJ, AAIDHY, NMNW, NMDPP.

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Role of the funding source

None.

Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

Throughout the entirety of this inquiry, we maintained our dedication to upholding the ethical standards outlined in the Declaration of Helsinki. Ethical clearance reviewed and approved by the STIKes Wira Medika Ethic Review Board (117/E1.STIKESWIKA/EC/IV/2023). Before enrolling in the research study, each participant provided their written informed consent. Participants was freely to denied or withdraw from this research during data collection

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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