



INC23-006

## Psychoeducation Of The Mobile-Stroke Risk Scale and Lifestyle Guidance (M-SRSguide) Application On Stroke Risk Factors

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### ARTICLE INFO

#### Article history:

DOI:

Submitted:

November 1, 2023

Accepted:

November 30, 2023

Published:

December 26, 2023

#### Keywords:

Mobile Health; Psychoeducation;  
Stroke

### ABSTRACT

**Introduction:** Stroke is the second cause of death and the third cause of disability worldwide with a faster increase in low and middle income countries. As a developing country, according to Riskesdas, the prevalence of stroke in Indonesia has increased by 56% and stroke control is an action plan for the Indonesian Ministry of Health for 2020-2024.

**Objective:** This study aims to determine the effect of using the M-SRSguide application on stroke risk factors. Method: This research is a quasy experiment pre-post test with control group design with 70 research samples and analyzed using mann whitney u tests.

**Results:** The research showed that there was a difference in the mean between before and after being given the psychoeducational treatment of the M-SRSguide Application in the intervention group with a p value of  $0.000 < 0.05$ , while for the control group it was concluded that there was no difference in the mean between before and after being given the treatment in the group. control with a p value of  $0.177 < 0.05$ .

**Conclusion:** there is an influence of psychoeducation on the m-srsguide application on stroke risk factors

**Keywords:** mobile health, psychoeducation, stroke

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## **Background.**

Stroke is the second leading cause of disability and death worldwide. Mortality and morbidity are rapidly increasing in low- and middle-income countries. Over the past three decades, the global incidence of stroke has increased by 70%, its prevalence by 85%, mortality by 43%, and the burden of stroke has increased by 32%, with a greater burden in low- and middle-income countries compared to high-income countries (Owolabi et al., 2022). According to the Central Java Health Office report, the prevalence of stroke in 2018 was 18,284 cases. One of the action plans of the Indonesian Ministry of Health for 2020-2024 is the improvement of disease control, with stroke being a particular focus (Ministry of Health RI, 2020).

Stroke patients experience social, physical, and psychological impacts, which increase mortality and morbidity rates (Wirastuti et al., 2023). Stroke prevention is crucial to reduce its incidence. One way to prevent stroke is by controlling its risk factors (Purqoti et al., 2020). Health services development in Indonesia currently focuses on preventive and promotive healthcare. Efforts for prevention, such as scoring stroke risk factors, will make people more aware of controlling existing stroke risk factors (Wirastuti et al., 2023). Educational intervention activities and screening of risk factors such as blood pressure, cholesterol levels, body mass index, smoking status, physical activity, blood sugar levels, and uric acid in the community are efforts to early recognize the extent of stroke risk scores (Alharbi et al., 2020).

The Mobile-Stroke Risk Scale and Lifestyle Guidance (M-SRSguide) is an open-source progressive web application that can be downloaded on smartphones or accessed via a website. This application, which can be used to determine stroke risk, aims to provide users with information to

increase their awareness of stroke risk, offer healthy lifestyle guidance, and provide information about nearby health facilities. Educating high-risk groups about healthy lifestyles is essential to reduce the number of stroke patients and prevent recurrences. One effort that can be made is to utilize information technology through the M-SRSguide (Dharma & Parellangi, 2020). This study aims to determine the effect of using the M-SRSguide application on stroke risk factors.

## **Methods.**

This research is a quantitative study using a quasi-experimental pre-post test with a control group design. The population in this study includes all residents of Dawunan, Madyocondro, Secang, Magelang who meet the inclusion criteria. The sample size was determined using the total sampling technique, resulting in a total of 70 samples, divided into two groups (control and intervention). The intervention group received stress management training using a prepared module, while the non-intervention group did not receive stress management training. Both groups, intervention and control, received psychoeducation related to stroke risk factors. Additionally, the intervention group received daily monitoring, while the control group did not receive monitoring. Data collection used an instrument prepared to measure stroke risk factors, utilizing data from the M-SRSguide application, which includes 8 items such as blood pressure, atrial fibrillation, smoking, cholesterol, diabetes, physical activity or exercise, body weight, and family history of stroke. The measurement results were obtained using an application previously used in the study by Kelana Kusuma in 2020. To determine the effect of using the M-SRSguide application on stroke risk factors, a normality test was conducted to

determine the data distribution, followed by the Mann-Whitney U test statistical analysis.

**Result.**

1. Characteristics of Research Respondents

Table 1. Characteristics Respondents

Characteristics	control group		Intervention group	
	%	N	%	N
<b>Gender</b>				
Female	19	54%	18	51%
Male	16	46%	17	49%
<b>Age</b>				
50-60	16	46%	15	42 %
60-70	16	46%	16	46 %
70-80	3	8%	4	12 %
<b>Education</b>				
SD	3	9%	3	9 %
SMP	5	14	8	23 %
SMA	18	51	14	40 %
Bachelor	9	26	10	28 %
<b>Physical Activity</b>				
Yes	13	37	15	43 %
No	22	63	20	57 %
<b>Smoking</b>				
Yes	15	43%	16	46%
No	20	57%	19	54 %
<b>Hypertension</b>				
Yes	28	80%	25	71%
No	7	20%	10	29%
<b>Hypercholesterolemia</b>				
Yes	31	89%	30	86 %
No	4	11%	5	14 %
<b>Obesity</b>				
Yes	9	24%	14	40 %
No	26	76%	21	60 %
<b>Diabetes</b>				
Yes	5	14%	6	17 %
No	30	86%	29	83 %
<b>Family History Of Stroke</b>				
Yes	6	17%	10	29%
No	29	83%	25	71 %

2. Psychoeducation Analysis

Table 2 Comparison Analysis

		Mean Ranks	N	Sig.(2-Tailed)
Control	Before	38.73	35	0.177
	After	32.27	35	

Intervention	Before	46.74	35	0.000
	After	24.26	35	

Mann-Whitney Statistical Test

After conducting a normality test, it was found that the data distribution is non-normal. Therefore, the analysis of differences was performed using the Mann-Whitney test, as shown in Table 11. In the intervention group, a significance value (one-tailed) or p-value of 0.000 was obtained, which is less than 0.05. This indicates that H1 is accepted, and it is concluded that there is a difference in means between before and after administering the psychoeducation M-SRS guide Application. Meanwhile, for the control group, a significance value (one-tailed) or p-value of 0.177 was obtained, which is greater than 0.05. This means that H1 is rejected, and it is concluded that there is no difference in means between before and after administering the treatment in the control group.

**Discussion**

1. Characteristics of Research Respondents

a. Gender

The research results showed that 52.8% of respondents were female, and 47.2% were male. These findings are not consistent with Natasia's 2019 study, where statistically insignificant differences were found, but males had a 1.38 times higher risk of stroke compared to females (Natasia, 2019). Another study by Putri in 2015 indicated a significant relationship between gender and stroke occurrence, with males having a 2.04 times greater chance of suffering from stroke compared to females (Utama & Nainggolan, 2022). The occurrence of stroke in males and females varies in risk depending on age. The risk of stroke in women increases after menopause. This is due to the reduction in estrogen hormone production, which has many health

- benefits for all organs including the heart and blood vessels after menopause. Therefore, women are more likely to suffer from stroke in old age. In men, the higher occurrence of stroke is attributed to testosterone hormone, which can increase blood LDL levels (Azzahra & Ronoatmodjo, 2023).
- b. Age  
The research results indicate that respondents aged 60-70 years significantly have a greater chance compared to individuals aged < 60 years. This finding aligns with theory, where the risk of stroke tends to increase with age, and the likelihood of stroke doubles after the age of 55. Stroke is also often referred to as an aging disease because it involves the deterioration of the structure and function of body organs, including blood vessels in the brain losing their elasticity (Masriana et al., 2021).
- c. Education  
In a study conducted with 30 respondents, the majority were found to have completed high school education, totaling 8 individuals (26.7%). Hasan (2009) defines education as stemming from the word "didik," meaning to nurture, which implies the act of building and training, teaching, and educating. Therefore, education involves development, training in teaching, and all efforts by humans to enhance intelligence and skills (Azzahra & Ronoatmodjo, 2023). According to Notoadmodjo (2010), the higher a person's education level, the greater their understanding of a subject. Thus, education level plays a crucial role in determining human quality or mindset; the higher one's educational attainment, the higher the quality or excellence of their life perspective (Pajri et al., 2018).
- d. Physical Activity  
The research findings indicate that respondents with insufficient physical activity significantly have a greater chance of experiencing stroke compared to those with sufficient physical activity. This aligns with Zhang et al. (2017), who also stated that insufficient physical activity is significantly associated with stroke occurrence and increases the chances of having a stroke by 1.47 times compared to individuals who are sufficiently physically active. Physical activity can improve heart health, lower cholesterol, reduce the risk of diabetes mellitus, aid in weight loss, increase HDL levels, and in the long term, enhance brain health (Azzahra & Ronoatmodjo, 2023).
- e. Smoking  
The research results showed that 55.8% of respondents did not smoke, while 44.2% smoked. According to a study by Aprilatutini in 2018, the chemicals in cigarettes can damage the inner layer of artery walls, making arteries more vulnerable to plaque buildup. Nicotine in tobacco can make the heart work harder due to temporary blood vessel narrowing. Additionally, nicotine can increase heart rate and blood pressure by triggering the production of hormones, including adrenaline (epinephrine). Meanwhile, carbon monoxide in cigarette smoke replaces oxygen in the blood, leading to increased blood pressure as the heart is forced to work harder to supply oxygen to all organs and tissues (Aprilatutini et al., 2018). These findings are inconsistent with Udani's 2013 study, which found a significant relationship between smoking and the incidence of stroke, with an odds ratio (OR) of 2.76. It is known that the chemical contents of nicotine and carbon monoxide in cigarettes can damage the endothelial layer of blood vessels,

- leading to atherosclerosis and hypertension, thereby increasing the risk of stroke (Masriana et al., 2021).
- f. Hypertension  
The research results indicate that respondents with hypertension significantly have a greater chance of experiencing stroke compared to those without hypertension. These findings are consistent with a study in DIY (Indonesia) where respondents with hypertension had a 1.88 times greater chance of suffering from stroke compared to those without hypertension (Azzahra & Ronoatmodjo, 2023). Hypertension can lead to both ischemic and hemorrhagic strokes. In ischemic stroke, hypertension damages cells in the inner layer of arteries, causing them to accumulate fats that enter the bloodstream. This makes the artery walls less elastic, restricting blood flow throughout the body, including to the brain. Hemorrhagic stroke occurs due to chronic high blood pressure or vessel aging, causing blood to continue pressing on the vessel until it bursts (Puspitasari, 2020).
- g. Hypercholesterolemia  
The research conducted with 30 respondents found that the majority had high cholesterol, totaling 20 individuals (66.7%). Both ischemic and hemorrhagic stroke patients commonly have high cholesterol levels. Cholesterol is necessary as an energy source, for forming cell walls in the body, and as a basic defense for steroid hormones. However, excessive cholesterol in the body can lead to atherosclerosis, which is the narrowing or hardening of blood vessels that can cause stroke (Pajri et al., 2018). The Multi Risk Factor Intervention Trial (MRFIT) studied 350,977 men and indicated that the risk of ischemic stroke increases in patients with cholesterol levels above 160 mg/dL. Total cholesterol levels >220 mg/dL increase the stroke risk between 1.31 to 2.9 times. The higher the cholesterol levels in the blood, the greater the risk of stroke. Cholesterol levels tend to increase in individuals who are overweight, less physically active, and under stress (Alhazzani et al., 2021). Elevated total cholesterol and Low Density Lipoprotein (LDL) levels are closely associated with the occurrence of atherosclerosis. High LDL cholesterol is a risk factor for ischemic stroke, and LDL cholesterol levels exceeding 150 mg/dL increase the risk of brain blood vessel blockage. These findings are consistent with a study by Cintya (2012) on risk factors and stroke types, where the majority of 96 respondents studied had elevated cholesterol levels, totaling 67 individuals (69.79%), making cholesterol levels a contributing factor to stroke (Utama & Nainggolan, 2022).
- h. Obesity  
In this study, no significant relationship was found; however, the analysis results showed that stroke tended to be higher in respondents with obesity (22.1%) compared to respondents without obesity (1.6%). In contrast, a case-control study in Saudi Arabia using a BMI threshold categorizing obesity as >30 kg/m<sup>2</sup> showed a significant relationship between obesity and stroke incidence, with an adjusted odds ratio of 1.95 (Utama & Nainggolan, 2022). According to theory, there are several explanations for the relationship between obesity and stroke incidence. First, excess weight and obesity are associated with low-grade systemic inflammation, resulting in increased concentrations of C-reactive protein. Second, obesity is a significant risk factor for obstructive sleep apnea, which potentially increases the risk of stroke. Lastly, obesity may



interact with other risk factors to further increase the risk of stroke (Puspitasari, 2020).

i. Diabetes

The research findings indicate that respondents with diabetes mellitus significantly have a greater chance of experiencing stroke compared to those without diabetes mellitus. These results are consistent with a study in India where diabetes mellitus increases the likelihood of stroke by 1.75 times compared to respondents without diabetes mellitus (Utama & Nainggolan, 2022). Diabetes can contribute to stroke through various mechanisms, including early arterial stiffness, vascular endothelial dysfunction, and thickening of capillary basement membranes. Additionally, diabetes increases the risk of recurrent stroke (Azzahra & Ronoatmodjo, 2023).

j. Family History Of Stroke

A family history of stroke can be a significant risk factor for an individual experiencing a stroke. Stroke can be caused by various factors, including genetic or hereditary factors. If there is a family history of stroke, this can increase the risk of a similar event occurring for an individual. However, it's important to note that having a family history that includes stroke does not guarantee that someone will definitely experience a stroke (Utama & Nainggolan, 2022). If there is a family history of stroke, it is crucial to undergo regular health check-ups, maintain a healthy lifestyle, and consult with a healthcare professional to discuss ways to manage and reduce the risk of stroke. Doctors may recommend lifestyle changes, medications, or other preventive measures tailored to individual needs. It's always important to speak with a doctor to get specific information and advice based on your or your family's health condition (Pajri et al., 2018).

2. The effect of Psychoeducation through M-SRSguide Application on Stroke Risk Factors

The intervention of providing the M-SRSguide application to respondents yielded results showing that in the intervention group, a significance value (one-tailed) or p-value of 0.000 was obtained, which is less than 0.05. This indicates there is a difference in means between before and after receiving the psychoeducation treatment with the M-SRSguide application. Meanwhile, for the control group, a significance value (one-tailed) or p-value of 0.177 was obtained, which is greater than 0.05. This means there is no difference in means between before and after receiving the treatment in the control group. These findings are consistent with the results of a study by Kelana Kusuma in 2020, which demonstrated that the use of M-SRSguide can improve healthy lifestyle behaviors and reduce stroke risk factors (Dharma & Parellangi, 2020).

The analysis of the influence of M-SRSguide on healthy lifestyle behaviors indicates that the application supports healthy eating habits, activity patterns, and stress management. The utilization of information technology has broad potential for development, especially when integrated into smartphones. Information technology can aid in efforts for disease prevention, health promotion, treatment, and rehabilitation (Dharma & Parellangi, 2020).

Providing education on healthy lifestyles, especially for at-risk groups, is crucial in reducing stroke incidence and preventing recurrence. One effective approach is utilizing information technology through M-SRSguide as a tool to measure stroke risk levels and provide information on healthy lifestyles. This approach has been

proven effective in reducing stroke risk factors, thereby potentially lowering stroke incidence rates (Marwanti & Masfuri, 2023).

### Conclusion and Suggestions.

Based on the research results, it can be concluded that there is a difference in means between before and after psychoeducation treatment using the M-SRSguide application in the intervention group, with a significance value (one-tailed) or p-value of  $0.000 < 0.05$ . Meanwhile, for the control group, it is concluded that there is no difference in means between before and after treatment, with a significance value (one-tailed) or p-value of  $0.177 < 0.05$ .

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