KONTAKT / Journal of nursing and social sciences related to health and illness

Original research article

Behavioral perception impacts daily activities in non-hemorrhagic stroke patients: a cross-sectional study

Aisyah Lahdji [1] * iD , Mega Pandu Arfiyanti [2], Lukman Faishal Fatharani [2] iD

[1] Universitas Muhammadiyah Semarang, Faculty of Medicine, Department of Public Health, Semarang, Indonesia
[2] Universitas Muhammadiyah Semarang, Faculty of Medicine, Semarang, Indonesia

Abstract

Introduction: Non-hemorrhagic stroke has a high mortality rate. It is important to prevent its impact and complications. Motor and sensory disturbances are among the common effects, and can influence various aspects, such as a patient's daily physical activities and psychological state. Preventive measures play a crucial role in reducing these issues, particularly by helping patients change how they see their own behavior.
Objective: This study aims to analyze behavioral factors and daily physical activities in non-hemorrhagic stroke patients.
Methods: Quantitative research was conducted on 80 non-hemorrhagic stroke patients at K.R.M.T Wongsonegoro Hospital, Semarang, who met the inclusion and exclusion criteria. Data were collected using a behavioral perception questionnaire that contains six dimensions of behavioral perception. Daily activities were assessed using the Barthel index. The results were analyzed using SPSS version 26 and GraphPad version 9.5.
Results: 40% of non-hemorrhagic stroke patients can perform daily activities independently, while 60% require assistance. The results of correlation and regression tests found a relationship between perceived severity (p = 0.003; R^2 = 0.23) and self-efficacy (p = <0.0001; R^2 = 0.84) with the ADL of stroke patients. The multivariate results also showed that both factors still had a relationship.
Conclusion: There is a relationship between perceived severity and self-efficacy with daily physical activities in non-hemorrhagic stroke patients.

Keywords: Behavioral perception; Daily activities; Non-hemorrhagic stroke patient

Introduction

Stroke is a disease with a high mortality rate. A 2016 World Health Organization report showed that 87% of stroke patients died, and that they were mostly found in lower–middle income countries (Johnson et al., 2016; Kim et al., 2020; Venketasubramanian et al., 2017). In 2018, the prevalence of stroke cases in Indonesia reached 10.9/1,000 population. The highest prevalence was found in East Kalimantan Province at 14.7/1,000 population, and the lowest prevalence was found in Papua Province at 4.1/1,000 population. The stroke prevalence in Central Java Province was 11.8/1,000 population (Kementerian Kesehatan RI Badan Penelitian dan Pengembangan, 2018; Lilipory et al., 2019).

The high stroke mortality rate is caused by various complications, including a second or recurrent stroke attack. A 2019 study conducted in China showed that the prevalence of recurrent stroke was 12%; 11.51% in the first year, 16.76% in the second year, and 20.07% in the third year (Zhang et al., 2019). In Indonesia, the prevalence of recurrent stroke was 62%, and

46.8% of these were recurrent non-hemorrhagic strokes (Trisetiawati et al., 2018).

Indonesia has made efforts to prevent stroke complications. One approach has been to increase the number of hospital services and facilities, but this has not yet been evenly distributed. A study shows that, out of all provinces in Indonesia, only a few hospitals have stroke units, and only 54 hospitals provide neurointervention services (Venketasubramanian et al., 2022). Based on this data, this remains a challenge and it shows that prevention has an important role in reducing the incidence of recurrent strokes. Although various efforts have been made, there are a range of problems that need to be resolved (Sinaga and Sembiring, 2019). One problem is the low level of patient awareness about the risk factors that can cause recurrent stroke. Especially the risk factors of each patient, such as hypertension, diabetes mellitus, dyslipidemia, and smoking habits. There are still many stroke patients who do not understand the impact of non-hemorrhagic stroke, such as motor and sensory disorders (Hachinski et al., 2018).

In addition, the lack of information about the benefits of prevention – such as checking patient health, controlling

blood pressure and blook sugar, and engaging in exercise – remains a significant obstacle in preventing stroke complications (Markus, 2021). The level of self-confidence also greatly affects stroke occurrence. Poor self-confidence will affect the patient's ability to carry out the necessary prevention, and low motivation to act will cause a lack of patient motivation to take preventive action (Taneo et al., 2024).

These issues are key areas within a prominent behavioral theory called the Health Belief Model, which consists of six dimensions: perceived susceptibility (the perception of risk factors), perceived severity (the perception of the severity of the disease), perceived benefits (the perception of the benefits of the disease), perceived barrier (the perception of the obstacles), self-efficacy (self-confidence), and cues to action (signals for the actions) (Berhimpong et al., 2020; Notoatmodjo, 2014). These six dimensions in the Health Belief Model are among the factors associated with the risk of recurrent stroke. Research indicates a relationship between behavioral factors and stroke patient recovery; however, other studies suggest that behavioral perceptions do not influence the quality of life for stroke patients. (Medea et al., 2021; Ytterberg et al., 2017). The behavioral perception of stroke patients is crucial in improving recovery. However, recent studies on this topic are lacking. Therefore, this study aims to assess the behavioral perceptions of stroke patients in relation to daily physical activity.

Materials and methods

This is a quantitative study with a cross-sectional design. It was conducted on 80 stroke patients (selected based on inclusion and exclusion criteria) using consecutive sampling in the Outpatient Neurology Polyclinic of K.R.M.T Wongsonegoro Semarang Hospital. The number of respondents is based on the calculation formula of the entire population. Inclusion criteria include stroke patients diagnosed at least three months after experiencing an attack, patients currently undergoing treatment after being hospitalized who are routinely checked at the outpatient polyclinic, and patients with an NIHSS score of 0–15 (minor to moderate stroke). Non-hemorrhagic stroke patients who were uncooperative and could not complete the questionnaire were excluded.

We used two questionnaires: one to assess behavioral perception and another about patients' daily physical activities. The behavioral perception assesses six dimensions according to Health Belief Model theories, namely: perceived susceptibility, perceived severity, perceived benefit, perceived barrier, self-efficacy, and cues to action. To assess perceived susceptibility, perceived severity, and perceived benefit, a questionnaire is used containing several questions, each with a Likert scale ranging from strongly disagree (score of 1) to strongly agree (score of 4). The assessment results are categorized into low (score of 7–13), medium (score of 14–20), and high (score of 21–28). The assessment of perceived barriers and cues to action use a questionnaire comprising 11 questions and a Likert scale. The assessment results are categorised into low category (score of 0–14), medium (score of 15–29), and high (score of 30–44). The Stroke Self Efficacy Questionnaire, comprising 13 questions, categorizes self-efficacy into low (0–43), medium (44–87), and high (88–130). All of the behavioral perception questionnaires have been tested for validity and reliability.

We used the Barthel Index questionnaire to assess daily activities, which comprises components evaluating feeding, bathing, grooming, dressing, bladder control, toilet use, transfer, and mobility. The scores obtained from this questionnaire

are interpreted to classify individuals into categories of functional independence, ranging from total dependence (score of 0–4), severe dependence (score of 5–8), moderate dependence (score of 9–11), mild dependence (score of 12–19), to full independence (score of 20). We also used the NIHSS questionnaire to determine stroke severity.

The obtained data is presented in numerical and categorical data. The numerical data is analyzed using the Pearson correlation test, while the categorical data is analyzed using the logistic regression test. We will strengthen this with a multivariate, multinominal regression test.

Results

62% of the non-hemorrhagic stroke patients were male and 87.5% were over 60 years old. 26% had only completed elementary school, while 27.5% had a high school education. Of the 80 respondents, 40% were able to perform physical activities independently without assistance. 28.7% showed mild dependency and required minimal support to carry out their daily physical tasks. The mean NIHSS score was 6.69 (±3.89). The overall characteristics of the respondents are shown in Table 1.

Table 1. Respondent characteristics

Respondent characteristics	N (%)
Gender	
Male	50 (62.5)
Female	30 (37.5)
Age	
40–50 years old	1 (1.3)
51–60 years old	9 (11.3)
>60 years old	70 (87.5)
Level of education	
No education	6 (7.5)
Elementary School	21 (26.3)
Junior High School	17 (21.3)
Senior High School	22 (27.5)
College	14 (17.5)
Job	
Not working	17 (21.3)
Working	63 (78.7)
Daily physical activities	
Independence	32 (40)
Mild dependence	23 (28.7)
Moderate dependence	8 (10)
Severe dependence	8 (10)
Total dependence	9 (11.3)

The correlation between behavioral perception dimensions and daily physical activity levels was analyzed using the Pearson correlation test. The results showed a correlation between perceived severity ($p = 0.003$; $R^2 = 0.23$) and self-efficacy ($p = $ <0.0001; $R^2 = 0.84$) with the level of daily physical activity. For bivariate analysis, we employed the logistic regression test, dividing the level of daily physical activity into two categories: independent and not independent. The non-independent category encompasses individuals ranging from those with mild dependency to those with total dependency. The analysis showed that an increase in perceived severity was associated with a 0.163 times decrease in the likelihood of maintaining independence in daily physical activities (OR = 0.163; $p = 0.007$). Meanwhile, high self-efficacy can reduce the level of daily physical activity by 0.006 times. The overall results of the analysis are shown in Table 2.

Table 2. Analysis of the relationship between behavioral perception and daily physical activity				
Dimension	Daily physical activity		p-value[#]	cOR (95%CI); p-value[$]
	Independent (%)	Not independent (%)		
Perceived susceptibility				
Low	0 (0)	1 (100)	0.841	0.65
Medium	6 (54.5)	5 (45.5)		
High	26 (38.2)	42 (61.8)		
Perceived severity				
Low	0 (0)	1 (100)	0.03*	6.1 (0.044; 0.603), 0.007*
Medium	3 (14.3)	18 (85.7)		
High	29 (50)	29 (50)		
Perceived benefit				
No benefit	2 (33.3)	4 (66.7)	0.14	1.000
Moderate benefit	16 (42.1)	22 (57.9)		
Some benefit	14 (38.9)	22 (61.1)		
Perceived barrier				
No barrier	2 (25)	6 (75)	0.296	1.000
Moderate barrier	26 (44.1)	33 (55.9)		
There are barriers	4 (30.8)	9 (69.2)		
Self-efficacy				
Low	0 (0)	11 (100)	<0.0001*	0.06 (0.008; 0.436), 0.005*
Medium	1 (7.7)	12 (92.3)		
High	31 (55.4)	25 (44.6)		
Cues to action				
Low	0 (0)	0 (0)	0.923	0.811
Medium	1 (33.3)	2 (66.7)		
High	31 (40.3)	46 (59.7)		

Note: * significant results; [#] Pearson correlation test; [$] logistic regression test

To determine the strength of the relationship between perceived severity and self-efficacy, the model was adjusted to assess the risk factors for ADL levels in stroke patients. It showed that perceived severity and self-efficacy have a strong relationship with the ADL levels of non-hemorrhagic stroke patients.

Table 3. Relationship between behavioral perception and ADL levels after adjustment	
Behavioral perception dimension	aOR (95%CI); p-value
Perceived severity	0.251 (0.063; 0.996), 0.049*
Self-efficacy	0.076 (0.011; 0.547), 0.01*

Note: * significant results

Discussion

This study demonstrated the correlation between behavioral perception factors, as defined by Health Belief Model theories, and daily physical activity in non-hemorrhagic stroke patients. Behavioural factors were assessed using a questionnaire that evaluated the dimensions of the theory. For ADL, the Barthel index was used. We found a positive correlation between perceived severity and self-efficacy with the level of ADL in non-hemorrhagic stroke patients. We analyzed the relationship between these two variables to determine their strength, discovering a significant correlation with the level of ADL. Perceived severity refers to the emotional reactions related to

the disease felt by the patient, and the difficulties believed or felt by the patient during the illness (Kwek and Lim, 2022). Our study shows that the higher the perceived severity felt by the patient, the lower the level of independence in daily activities. Studies indicate that perceiving the severity to be high can impact a patient's physical and mental health (Bergh et al., 2025). When patients have a high perception of the severity of the disease they are experiencing, they tend to be afraid and anxious about its impact. This can reduce the motivation to engage in physical activities that can aid their recovery. When patients perceive their condition as highly severe, it can undermine their self-confidence, leading to feelings of incapacity and anxiety about engaging in safe physical activities. This, in turn, may result in a reduction in their overall physical activity levels (Oyewole et al., 2020; Sturm et al., 2002). High perception of severity will also create excessive anxiety, causing stress and depression. This will worsen the physical and mental condition of the patient and lead to a decrease in the quality of life (Mavaddat et al., 2018).

A stroke patient's ability to perform daily physical activities independently is strongly linked to their self-efficacy. Our study shows that high self-efficacy has a higher level of independence. Self-efficacy is interpreted as the patient's confidence in their ability to solve the problems that they feel. This finding is consistent with Nahari and Alsaleh's (2024) research, which identified self-efficacy as the most significant predictor of activities of daily living (ADL) levels among post-stroke patients (Nahari and Alsaleh, 2024). This study differs from previous research hypotheses, which suggest no relationship between social support and ADL patients, as social support is linked to high self-efficacy (Elloker and Rhoda, 2018; Han et al., 2022). Self-efficacy plays a crucial role in influencing activities of daily living, and one of its key underlying mechanisms

is the individual's tendency to believe in their own ability to successfully perform tasks. This makes patients more motivated to engage independently (French et al., 2016). The second factor is that high self-confidence will improve self-control. Patients will be more proactive in planning and carrying out an activity, and will certainly be more disciplined and enthusiastic in participating in rehabilitation activities. Anxiety will naturally disappear as patients become braver about undergoing rehabilitation activities (Suzuki et al., 2023; Tariq et al., 2020).

The results of this study have important implications for public health. Self-efficacy is related to carrying out daily physical activities independently. There is a need for increased health education and psychological approaches to reduce excessive perceptions of severity. The results of this study show that self-efficacy is related to patients' independence when performing physical activity. Educational programs to increase self-confidence are very important to ensure the success of rehabilitation. Education also helps to prevent stroke complications, particularly recurrent strokes, serving as both a promotional tool for health and a preventative measure. Training health workers in providing education is also important to help increase patient motivation. The policies that have been created focus on the development of education, psychological support, and rehabilitation interventions, with the ultimate goal of improving the quality of life of patients.

Conclusion

Our study shows that perceived severity and self-efficacy correlate with ADL levels in non-hemorrhagic stroke patients (and multivariate test results confirm this). The research has implications that are beneficial to society, highlighting the importance of promotive and preventive measures.

Limitations
This study has several limitations. Firstly, it is a cross–sectional study, which is only measured once; in future research, further longitudinal study is needed. Secondly, the number of samples needs to be increased. Thirdly, ADL measurements are the primary data reflecting a patient's neurological disorders, so future research can use these measurements to comprehensively assess neurological conditions – further examination is needed to offer support for neurological disorders in patients. Finally, there is a need to assess social support to better illustrate its relationship with behavioural perceptions.

Ethical consideration
Ethical approval for this study was obtained from K.R.M.T Wongsonegoro Semarang Hospital with number B/10201/070/XII/2022.

Author contributions
AL, MPA – Concept design; MPA, LFF – Collection, analysis, and interpretation of data; AL, LFF – Preparing the draft of the study; AL, MPA, LFF – Review and final approval.

Conflict of interest
The authors have no actual or potential conflict of interest to declare.

References

1. Amila A, Sinaga J, Sembiring E (2018). Pencegahan Stroke Berulang Melalui Pemberdayaan Keluarga Dan Modifikasi Gaya Hidup. J Abdimas 22(2): 143–150.

2. Bergh E, Askim T, Rønning OM, Lydersen S, Thommessen B (2025). Impact of a stroke care pathway on self-perceived health 3 months. J Rehabil Med 57: jrm42443. DOI: 10.2340/jrm.v57.42443.

3. Berhimpong MJA, Rattu AJM, Pertiwi JM (2020). Analisis Implementasi Aktivitas Fisik Berdasarkan Health Belief Model oleh Tenaga Kesehatan di Puskesmas. Indonesian Journal of Public Health and Community Medicine 1(4): 54–62. DOI: 10.35801/ijphcm.1.4.2020.31453.

4. Elloker T, Rhoda AJ (2018). The relationship between social support and participation in stroke: A systematic review. Afr J Disabil 7: 357. DOI: 10.4102/ajod.v7i0.357.

5. French MA, Moore MF, Pohlig R, Reisman D (2016). Self-efficacy mediates the relationship between balance/walking performance, activity, and participation after stroke. Top Stroke Rehabil 23(2): 77–83. DOI: 10.1080/10749357.2015.1110306.

6. Hachinski V, Ganten D, Lackland D, Kreutz R, Tsioufis K, Hacke W (2018). Implementing the Proclamation of Stroke and Potentially Preventable Dementias. Int J Stroke 13(8): 780–786. DOI: 10.1177/1747493018799965.

7. Han SS, Li B, Wang GX, Ke YZ, Meng SQ, Li YX, et al. (2022). Physical Fitness, Exercise Behaviors, and Sense of Self-Efficacy Among College Students: A Descriptive Correlational Study. Front Psychol 15: 13:932014. DOI: 10.3389/fpsyg.2022.932014.

8. Johnson W, Onuma O, Owolabi M, Sachdev S (2016). Stroke: A global response is needed. Bull World Health Organ 94(9): 634–634A. DOI: 10.2471/BLT.16.181636.

9. Kementerian Kesehatan RI Badan Penelitian dan Pengembangan (2018). Hasil Utama Riset Kesehatan Dasar. Kementrian Kesehatan Republik Indonesia, pp. 1–100. [online] [cit. 2025-01-22]. Available from: http://www.depkes.go.id/resources/download/info-terkini/hasil-riskesdas-2018.pdf

10. Kim J, Thayabaranathan T, Donnan GA, Howard G, Howard VJ, Rothwell PM, et al. (2020). Global Stroke Statistics 2019. Int J Stroke 15(8): 819–838. DOI: 10.1177/1747493020909545.

11. Kwek VHM, Lim FYQ (2022). Exploring the relationship between perceived susceptibility and severity of falling among older adults in Singapore. Br J Occup Ther 85(9): 662–668. DOI: 10.1177/03080226211067428.

12. Lilipory M, Pattipelohy M, Tuarissa Y (2019). Motivasi dan Sumber Informasi Berhubungan dengan Pencegahan Stroke. Moluccas Health Journal 1: 74–81.

13. Markus HS (2021). International Journal of Stroke in 2021. Int J Stroke 16(1): 5–6. DOI: 10.1177/1747493020981348.

14. Mavaddat N, Sadler E, Lim L, Williams K, Warburton E, Kinmonth AL, et al. (2018). Perceptions of self-rated health among stroke survivors: A qualitative study in the United Kingdom. BMC Geriatr 18(1): 81. DOI: 10.1186/s12877-018-0765-8.

15. Medea GP, Nurachmah E, Adam M (2021). Post-Stroke Quality of Life Perceived By Patients and Caregivers. J Keperawatan Indones 24(3): 165–172. DOI: 10.7454/jki.v24i3.962.

16. Nahari A, Alsaleh AM (2024). Impact of Social Support and Self-Efficacy on Activity of Daily Living among Post-Stroke Patients in Saudi Arabia: A Cross-Sectional Study. Healthcare 12(16): 1564. DOI: 10.3390/healthcare12161564.

17. Notoatmodjo S (2014). Ilmu Perilaku Kesehatan. Salemba Medika.

18. Oyewole OO, Ogunlana MO, Gbiri CAO, Oritogun KS, Osalusi BS (2020). Impact of post-stroke disability and disability-perception on health-related quality of life of stroke survivors: the moderating effect of disability-severity. Neurol Res 42(10): 835–843. DOI: 10.1080/01616412.2020.1785744.

19. Sturm JW, Dewey HM, Donnan GA, Macdonell RA, McNeil JJ, Thrift AG (2002). Handicap after stroke: How does it relate

to disability, perception of recovery, and stroke subtype? The North East Melbourne Stroke Incidence Study (NEMESIS). Stroke 33(3): 762–768. DOI: 10.1161/hs0302.103815.

20. Suzuki M, Shigeta M, Kanamori T, Yokomichi M, Uchiyama M, Inagaki K, et al. (2023). Development of a Daily Living Self-Efficacy Scale for Older Adults in Japan. Int J Environ Res Public Health 20(4): 3292. DOI: 10.3390/ijerph20043292.

21. Taneo M, Widyantari PA, Huwae YC (2024). Efikasi Diri, Tingkat Kepercayaan Diri, Dan Interaksi Perawat-Pasien Dalam Merawat Pasien Stroke: Analisa Deskriptif [Self-Efficacy, Confidence Level, And Nurse-Patient Interactions In Stroke Care: A Descriptive Analysis]. Nursing Current: Jurnal Keperawaten 12(1): 146–157.

22. Tariq A, Beihai T, Abbas N, Ali S, Yao W, Imran M (2020). Role of perceived social support on the association between physical disability and symptoms of depression in senior citizens of Pakistan. Int J Environ Res Public Health 17(5): 1485. DOI: 10.3390/ijerph17051485.

23. Trisetiawati L, Yuniar P, Besral (2018). Recurrent Stroke among Patients at Indonesia's National Brain Center Hospital: Contributing Factors. KnE Life Sciences 4(4): 19–26. DOI: 10.18502/kls.v4i4.2259.

24. Venketasubramanian N, Yoon BW, Pandian J, Navarro JC (2017). Stroke epidemiology in south, east, and south-east asia: A review. J Stroke 19(3): 286–294. DOI: 10.5853/jos.2017.00234.

25. Venketasubramanian N, Yudiarto FL, Tugasworo D (2022). Stroke Burden and Stroke Services in Indonesia. Cerebrovasc Dis Extra 12(1): 53–57. DOI: 10.1159/000524161.

26. Ytterberg C, Dybäck M, Bergström A, Guidetti S, Eriksson G (2017). Perceived impact of stroke six years after onset, and changes in impact between one and six years. J Rehabil Med 49(8): 637–643. DOI: 10.2340/16501977-2258.

27. Zhang J, Zhu P, Liu B, Yao Q, Yan K, Zheng Q, et al. (2019). Time to recurrence after first-ever ischaemic stroke within 3 years and its risk factors in Chinese population: A prospective cohort study. BMJ Open 9(12): e032087. DOI: 10.1136/bmjopen-2019-032087.