RESEARCH ARTICLE

pISSN: 0126-074X | eISSN: 2338-6223
https://doi.org/10.15395/mkb.v58.4276
Majalah Kedokteran Bandung. 2026;58(1):32–38

Majalah Kedokteran Bandung (MKB)

Received: January 15, 2025
Accepted: February 9, 2026
Available online: March 31, 2026

Stroke Severity and Constipation in Ischemic Stroke Patient in Indonesian Regional Hospital

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Abstract

Ischemic stroke can lead to a range of complications, incluing constipation. This study aimed to evaluate the relationship between stroke severity history and constipation among ischemic stroke patients treated at the Outpatient Neurology Clinic of dr. Soebandi Jember Regional Hospital. This cross-sectional observational analytic study was conducted on 37 first-attack ischemic stroke patients who met the inclusion and exclusion criteria during the period of June to November 2024. Stroke severity data were obtained from medical records using the National Institutes of Health Stroke Scale (NIHSS) score. Meanwhile, constipation incidence data were obtained through interviews using the Constipation Scoring System (CSS) questionnaire. Data collected were then analyzed using the Spearman test. Most subjects were ≥60 years (39.5%), male (62.2%), and graduated from elementary school (45.9%). Most patients had moderate stroke severity (40.5%) and moderate constipation (40.5%). There was a significant relationship between stroke severity and constipation (p=0.001) with a strong correlation strength (r=0.524) and a positive correlation direction. In conclusion, stroke severity has a strong, directly proportional relationship with constipation in ischemic stroke patients.

Keywords: Constipation, ischemic stroke, national institutes of health stroke scale, stroke severity

Introduction

Stroke is a leading cause of disability and the second leading cause of death worldwide.[1] Ischemic stroke accounts for the majority of stroke cases, representing approximately 62.4% of all strokes globally in 2019.[2] In Indonesia, the prevalence of stroke has steadily increasing, reaching 10.9 cases per 1,000 population in 2018.[3] Ischemic stroke occurs due to the sudden obstruction of a cerebral blood vessel, resulting in reduced cerebral blood flow and subsequent neurological deficits.[4] These deficits may manifest as motor weakness, speech disturbances, cognitive impairment, and autonomic dysfunction, including bowel disorders.[5] Among the complications associated with ischemic stroke, constipation is a ommon but often underrecognized problem, affecting approximately 29–79% of patients.[6]

Neurological damage caused by stroke can disrupt neural pathways that regulate bowel movements, leading to decreased colonic motility and difficulty in defecation.[6] Central neural pathways, including cortical and subcortical regions, play a crucial role in coordinating colonic motility and voluntary defecation. Neuroimaging studies have demostrated that ischemic lesions involving the insula, precentral and postcentral gyri, and the inferior parietal lobule are associated with a higher risk of acute constipation. These lesions may impair autonomic and motor control of bowel function, thereby reducing colonic motility.[6,7] In addition to direct neural pathway disruption, influenced by multiple factors, including brain–gut axis dysfunction, reduced mobility, dietary changes, and medication use, highlighting the multifactorial nature of bowel dysfunction following ischemic stroke. Post-stroke constipation is also closely related to impaired mobility and functional dependence.

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Reduced mobility and prolonged bed rest may weaken abdominal muscles and slowed intestinal transit, further exacerbating bowel dysfunction. Neurological impairment such as hemiparesis, decreased postural control, motor and cognitive deficits, and dependency in daily activities limit patients' ability to sit, stand, or walk independently, thereby contributing to impaired bowel function.[9] Constipation in stroke patients not only causes physical discomfort but may also negatively affect quality of life. In severe cases, excessive straining during defecation may increase intracranial pressure and potentiallyworsen neurological outcome after stroke.[11] Preventive strategies for post-stroke constipation include early mobilization, adequate physical activity, appropriate use of laxatives and probiotics, and early enteral nutrition, all of which may help improve bowel function and overall recovery.[15] Dietary fiber intake also plays a crucial role in the prevention and managing constipation by increasing stool bulk, retaining water within the intestinal lumen, and stimulating colonic motility. Previous studies have shown that higher fiber intake is associated with improved constipation symptoms, particularly among older adults and individuals with sedentary lifestyles—characteristics frequently observed in stroke survivors.[6,8] Taken together, these findings indicate that higher stroke severity, as captured by the NIHSS, may serve not only as a marker of neurological injury but also as an indirect indicator of impaired mobility and functional status, which are key determinants of post-stroke constipation.[7,9]

The severity of neurological impairment after stroke, commonly measured using theNational Institutes of Health Stroke Scale (NIHSS), has been identified as an independent risk factor for constipation in stroke patients.[13] The NIHSS is a widely used and validated clinical tool that assesses multiple neurological domains, including level of consciousness, motor function, and sensory deficits.[14] Higher NIHSS score indicates greater stroke severity and are associated with an increased risk of complications, including constipation.[15] This relationship may reflect the extent of neurological damage affecting bowel control mechanisms as well as reduced mobility among patients with more severe strokes.Despite the clinical importance of constipation in stroke patients, it often receives limited attention in routine care. In addition, there is currently limited data on the prevalence of constipation among ischemic stroke patients in Indonesia, particularly in Jember Regency.

Therefore, this study aims to evaluate the relationship between stroke severity, measured by the NIHSS score, and constipation in ischemic stroke patients attending the Neurology Outpatient Clinic of Dr. Soebandi Regional Hospital, Jember. The findings of this study are expected to improve understanding of factors associated with post-stroke constipation and support the development of targeted interventions to improve bowel management and quality of life among stroke survivors..

Methods

This study employed an observational analytic design with a cross-sectional approach. The study population consisted of patients diagnosed with first-attack ischemic stroke who attended the Neurology Outpatient Clinic at dr. Soebandi Jember Regional Hospital, Jember.

Sample size was calculated using a formula for large population estimation, resulting in a minimum sample of 35 participants. A total of 37 participants were ultimately included in the study. The sampling technique used was accidental sampling, in which eligible patients who attended the clinic during the study period and met the inclusion and exclusion criteria were consecutively recruited. The inclusion criteria were: 1) patients with a first-time ischemic stroke who had previously been hospitalized, 2) age >18 years, and 3) a fully conscious state (compos mentis). The exclusion criteria included: 1) refusal to provide inform consent, 2) history of dementia, and 3) history of gastrointestinal diseases such as irritable bowel disease, or experiencing acute diarrhea during hospitalized in the ischemic stroke phase.

Data collection involved both primary and secondary data sources. Primary data were obtained through interviews using the constipation scoring system (CSS) questionare. The CSS consists of eight items assessing various aspects of constipation, including frequency of bowel movements, difficulty or pain during defecation, sensation of incomplete evacuation, abdominal pain, duration of defecation attempts, use of assistive measures (such as laxatives, enemas, or digitation), number of unsuccessful defecations attempts within 24 hours, and duration of constipation. Each item is scored on a Likert scale, with a total score ranging from 0 to 30. The questionare was translated into Indonesian and administered by the researcher to ensure clarity and consistency.

Constipation severity was categorized as mild (1–5), moderate (6–10), severe (11–15), and very severe (16–30). Secondary data were obtained from medical records and included patient demographics characteristics (age, sex, education level) as well as stroke severity data. Stroke severity was assessed using the national institutes of health stroke scale (NIHSS). NIHSS scores were classified into four categories: mild (≤5), moderate (6–14), severe (15–24), and very severe (≥25).

The CSS questionnaire was adapted from the original instrument and translated into Indonesian. Before its implementation, the researcher conducted a pilot test with a small number of patients to check for clarity and comprehension; however, the pilot data were not included in the final sample. The researcher was present during the questionnaire administration to clarify any ambiguities. All the participants gave consent for their medical data to be used, and they agreed to fill out the questionnaire. The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were used to characterize the sample demographics, stroke severity, and constipation severity. The Spearman rank correlation test, a non-parametric test, was employed to examine the relationship between the NIHSS and the CSS score due to the ordinal nature of the data and the directional hypothesis. A significance level of $p<0.05$ was considered statistically significant.

Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Jember (No. 3967/UN25.1.10.2/KE/2024). Research permission was also granted by the National Unity and Politics Agency (BAKESBANGPOL) (No. 1873/UN25.1.10/AL.04/2024) and dr. Soebandi Jember Regional Hospital (No. 423.4/3868/610/2024). The study was conducted from June to November 2024.

Results

This study was conducted at the Neurology Outpatient Clinic of dr. Soebandi Regional Hospital, Jember, and included 37 participants who met the inclusion and exclusion criteria. All participants were patients with first-ever ischemic stroke. The characteristics of the study participants are presented in Table 1.

Most participants were aged ≥60 years (39.5%), male (62.2%), had completed primary education (45.9%). Regarding stroke severity, most participants experienced moderate stroke (40.5%), followed by mild stroke (37.8%), severe stroke (21.6%), while no patients were classified as having very severe stroke. Assessment of constipation severity showed that most participants experienced moderate constipation (40.5%), followed by mild constipation (27.0%), severe constipation (27.0%), and very severe constipation (5.4%).

The primary objective of this study was to evaluate the relationship between stroke severity and constipation in ischemic stroke patients. A statistically significant positive correlation was found between stroke severity, measured using the NIHSS score, and constipation severity, measured using the CSS score ($r=0.524$, $p=0.001$). This finding indicates that patients with more severe stroke tended to experience more severe constipation. Furthermore, this study also examined the association between demographic characteristics (age, sex, and

Table 1 Characteristics of Study Participants

Characteristic	Frequency n (%)
Age	
<44	1 (2.7)
45–59	14 (37.8)
≥60	22 (59.5)
Sex	
Male	23 (62.2)
Female	14 (37.8)
Education	
Elementary School	17 (45.9)
Junior High School	4 (10.8)
Senior High School	6 (16.2)
University	10 (27.0)
Stroke Severity	
Mild (NIHSS ≤5)	14 (37.8)
Moderate (NIHSS 6–14)	15 (40.5)
Severe (NIHSS 15–24)	8 (21.6)
Very Severe (NIHSS ≥25)	0 (0.0)
Constipation Severity	
Mild (CSS 1–5)	10 (27.0)
Moderate (CSS 6–10)	15 (40.5)
Severe (CSS 11–15)	10 (27.0)
Very Severe (CSS 16–30)	2 (5.4)

All participants were first-ever ischemic stroke patients

Table 2 Relationship between Age, Sex, Education and Constipation

Variable	Constipation Severity (CSS)				p-value
	Mild (1–5)	Moderate (6–10)	Severe (11–15)	Very Severe (16–30)	
Age (years)					
<44	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.151
45-59	4 (28.6%)	6 (42.9%)	4 (28.6%)	0 (0.0%)	
≥60	5 (22.7%)	9 (40.9%)	6 (27.3%)	2 (9.1%)	
Sex					
Male	7 (30.4%)	7 (30.4%)	7 (30.4%)	2 (8.7%)	0.325
Female	3 (21.4%)	8 (57.1%)	3 (21.4%)	0 (0.0%)	
Education					
Elementary	4 (23.5%)	8 (47.1%)	4 (23.5%)	1 (5.9%)	0.387
Junior High	1 (25.0%)	2 (50.0%)	1 (25.0%)	0 (0.0%)	
Senior High	1 (16.7%)	2 (33.3%)	2 (33.3%)	1 (16.7%)	
University	4 (40.0%)	3 (30.0%)	3 (30.0%)	0 (0.0%)	

education level) and constipation severity. However, no statistically significant relationship were observed between age and constipation (p=0.151), sex and constipation (p=0.325), or education level and constipation (p=0.387), as presented in Table 2.

Among participants aged ≥60 years, the majority experienced moderate constipation (40.9%). In contrast, the only participant aged ≤44 years experienced mild constipation. Among male participants, mild, moderate, and severe constipation were each observed in 30.4% of cases. Among female participants, moderate constipation was the most common (57.1%). Among participants with elementary school education, moderate constipation was the most frequent finding (47.1%).

The distribution of constipation severity across different levels of stroke severity is shown in Table 3. Among patients with mild stroke, 50% had mild constipation, 35.7% had moderate constipation, and 14.3% had severe constipation. In the moderate stroke group, 20% experienced mild constipation, 53.8% had moderate constipation, 20% had severe constipation, and 6.7% had very severe constipation. Among patients with severe stroke, most experienced severe constipation (62.5%), followed by moderate constipation (25.0%) and very severe constipation (12.5%).

These results demonstrate that increasing stroke severity is associated with greater constipation severity among ischemic stroke patients.

Discussion

This study investigated the relationship between stroke severity and constipation among ischemic stroke patients attending the Neurology Outpatient Clinic of dr. Soebandi Regional

Table 3 Correlation Constipation Severity and Stroke Severity

Stroke Severity (NIHSS)	Constipation Severity (CSS)				p-value
	Mild (1–5)	Moderate (6–10)	Severe (11–15)	Very Severe (16–30)	
Mild (≤5)	7 (50.0%)	5 (35.7%)	2 (14.3%)	0 (0.0%)	0.001
Moderate (6–14)	3 (20.0%)	8 (53.8%)	3 (20.0%)	1 (6.7%)	
Severe (15–24)	0 (0.0%)	2 (25.0%)	5 (62.5%)	1 (12.5%)	
Very Severe (≥25)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Hospital, Jember. The results demonstrated a statistically significant positive correlation between stroke severity, measured using the NIHSS score, and constipation severity, assessed using the CSS score. These findings support the hypothesis that patients with greater stroke severity are more likely to experience more severe constipation. The observed association suggest that increase neurological damage and lesion burden may elevate the risk of bowel dysfunction.

The positive correlation between NIHSS and constipation severity may also reflect the influence impaired mobility and functional dependence on bowel function among stroke survivors. Patients with higher NIHSS scores typically exhibit more pronounced motor deficits, reduced postural control, and greater dependence in activities of daily living. These condition often lead to prolonged bed rest, decreased physical activity, and delayed colonic transit, all of which contribute to constipation. Previous studies in stroke populations similarly identified immobilization, motor and cognitive impairment, and functional dependency as key determinants of post-stroke bowel dysfunction, while early mobilization and targeted rehabilitation have been shown to improve bowel function and overall outcomes.

Neuroimaging studies have also demonstrated that acute constipation after ischemic stroke is associated with bilateral lesions affecting the motor and sensory cortices, including the precentral and postcentral gyri, as well as the insula and inferior parietal lobule. These regions play important roles in integrating somatic, autonomic, and visceral signal required for coordinated defecation.Damage to these areas may therefore impair colonic motility and disrupt bowel control mechanisms. Although lesion location was not systematically evaluated in this study, the observe correlation between stroke severity and constipation may partially reflect the cumulative effects of more extensive or strategically located brain lesions. Consequently, the NIHSS score mayserve not only as a measure of neurological impairment but also as an indirect indicator of functional limitations that contribute to bowel dysfunction.[6,7,9]

These findings of this study are consistent with previous research conducted by Sun et al. and Ozkan et al., which also reported a significant relationship between stroke severity and constipation among stroke patients.[15,16] Several mechanisms may explain this association. First, severe strokes can cause extensive neurological damage affecting neural pathways responsible for bowel function regulation, resulting in reduced colonic motility and delayed intestinal transit.[17] Second, patients with severe strokes often experience prolonged immobility and bed rest, which are well-known risk factors for constipation.[18] Third, medications frequently used in stroke management, such as opioids for pain control, may further contribute to constipation.[19]

This study also examined the relationship between demographic factors (age, sex, and education) and constipation severity. No significant associations were observed between these variables and constipation severity. Although previous studies have reported that older age is associated with an increased risk of constipation, this relationship was not observed in the present study.[16] The absence of a significant correlation may be explained by the relatively small sample size or the specific characteristics of the study population. In addition, the influence of stroke severity on bowel dysfunction may have overshadowed the effects of demographic factors within this cohort. Previous studies have reported inconsistent findings regarding the influence of demographic variables on constipation in stroke patients, suggesting that additional factors such as lifestyle, hormonal influences, dietary patterns, fluid intake, and medication use may play important roles.[15,19,20,22]

The finding that a considerable proportion of patients experienced moderate to very severe constipation highlights the clinical importance of this condition. Constipation can negatively affect quality of life by causing discomfort, pain, and psychological distress.[6] In addition, excessive straining during defecation may increase intracranial pressure, potentially worsening neurological outcomes after stroke.[6] The mechanism behind constipation in stroke patients often involves dysregulation of the gut microbiome.[17] Inflammatory cytokines released following stroke can alter intestinal permeability and disrupt the balance of gut microbiota, resulting in decreased intestinal motility and constipation.[23] This dysregulation may further exacerbate systemic inflammation and contribute to a cycle of worsening gastrointestinal dysfunction.

Although dietary intake was not systematically assessed in this study, insufficient fiber consumption may have contributed to the relatively high proportion of moderate to severe constipation observed in this cohort. Many stroke patients are older, less physically active,

and may experience reduced appetite or dietary intake during recovery. Previous studies have shown that increased dietary fiber intake can improves stool consistency, bowel frequency, and overall constipation symptoms, particularly in individuals with limited mobility. Therefore, optimizing dietary fiber intake should be considered an important non-pharmacological strategy for managinh post-stroke constipation, alongside adequate hydration, early mobilization, and careful review of medications that may contribute to bowel dysfunction.[6,8,10]

Several limitations that should be considered when interpreting the result of this study. First, the cross-sectional design does not allow causal relationship between stroke severity and constipation to be established. Second, the relatively small sample size may limit the generalizability of the findings. Third, constipation severity was assessed using patient-reported data, which may be subject to recall bias. Fourth, not all patient medical records contained complete NIHSS data. In addition, important clinical variable such as functional status (e.g., modified Rankin Scale) and objective measure of mobility were not collected, making it difficult to evaluate the direct impact of functional dependence on constipation. Dietary intake, particularly fiber consumption, was also not assessed using standardized methods such as dietary recall or food frequency questionnaires.

Another limitation of this study is the lack of detailed information on stroke lesion location based on neuroimaging findings. Consequently, the relationship between lesion topography and constipation risk could not be evaluated. Future prospective studies should incorporate systematic neuroimaging analysis to better understand how lesion location intercat with stroke severity, functional status, and other clinical factors in influencing post-strokr constipation.

In conclusion, constipation is a common complication among ischemic stroke patients and is significantly associated with stroke severity. In this study, stroke severity measured by the NIHSS score showed a positive correlation with constipation severity among first-ever ischemic stroke patients. These findings highlight the imprtance of early identification and management of bowel dysfunction in stroke patients. Early interventions including bowel training, dietary modification, adequate hydration early mobilization, and appropriate pharmacological treatment may help reduce constipation severity and improve the quality of life of life stroke survivors. Future studies should further explore the influence of lesion location, mobilitylevels, functional status, and dietary factors on the development and severity of post-stroke constipation.

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