



EFFECTIVENESS OF THE STROKE-EASE PROGRAM USING ABDOMINAL STIMULATION AND EXERCISE TO MANAGE CONSTIPATION IN POST-THROMBOLYSIS STROKE PATIENTS

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ABSTRACT

Constipation is a frequent complication among post stroke patients and is often worsened by immobility, medication effects, dietary limitations, and neurological impairments. Effective bowel management is essential to improve comfort, prevent additional complications, and support recovery. Aims to evaluate the effectiveness of the STROKE EASE intervention in reducing constipation severity among post stroke patients who received thrombolysis. A quasi experimental pretest posttest study was conducted involving thirty post stroke patients in a private hospital in East Jakarta. Demographic and clinical data were collected, including age, sex, functional independence, diet type, comorbidities, muscle strength, and National Institutes of Health Stroke Scale score. Constipation severity was measured using the Constipation Assessment Scale before and after the intervention. Changes in scores were analyzed using paired samples t tests. The mean age of participants was 64.03 years with almost equal distribution between men and women. Most patients required partial assistance with daily activities and consumed a soft diet. Nearly all had comorbid hypertension or diabetes. The mean National Institutes of Health Stroke Scale score was 6.50. Constipation Assessment Scale scores decreased significantly from 11.00 before the intervention to 2.53 after the intervention with p less than 0.001. STROKE EASE intervention significantly reduced constipation severity in post thrombolysis stroke patients. This evidence based nursing approach offers a practical method to improve bowel function and patient comfort. Further studies with larger samples are recommended.

Keywords: Stroke, Constipation, STROKE-EASE, Rehabilitation, Post-stroke care

INTRODUCTION

Stroke is a sudden neurological disorder caused by impaired cerebral circulation, either ischemic or hemorrhagic, which results in an acute loss of neurological function (Shahid et al., 2023; Heran et al., 2024; Bersano & Gatti, 2023; Ahmed et al., 2024). In Indonesia, ischemic stroke represents the majority of cases, and intravenous thrombolysis using recombinant tissue plasminogen activator is the recommended standard treatment when administered within 4.5 hours of symptom onset. The national use of thrombolytic therapy has increased over the past decade due to improved public awareness and broader access to health insurance coverage (Nugraha & Aditya, 2024).

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Although thrombolysis restores cerebral perfusion, post stroke patients remain at risk for several complications during hospitalization. Constipation is one of the most common yet frequently underrecognized complications, affecting approximately 30 to 60 percent of individuals who experience reduced mobility due to limb weakness (Zhang et al., 2021; Yong et al., 2023; Sun et al., 2022; Lin et al., 2013). Immobility decreases abdominal and pelvic muscle tone, making defecation more difficult (Zhang et al., 2021; Yong et al., 2023). Straining during defecation may increase intracranial pressure and pose additional risks in the acute stroke phase (Sun et al., 2022). Clinically, constipation is characterized by infrequent bowel movements, hard stool, or a sensation of incomplete evacuation (Lin et al., 2013). Constipation in post stroke patients may result from neurological deficits, the use of multiple medications that slow gastrointestinal transit, dehydration, and restricted dietary intake (Irawan et al., 2024; Irman et al., 2021; Sakai et al., 2024; Sasegbon et al., 2025). Its high prevalence requires early and comprehensive nursing management. Evidence indicates that up to 79.4 percent of patients experience constipation during rehabilitation, highlighting its clinical importance (Lin et al., 2013).

Several non pharmacological interventions have demonstrated effectiveness in improving bowel function, including patient education, mobilization, dietary optimization, abdominal massage, acupressure, and structured bowel monitoring (Yang et al., 2024; Kurnia et al., 2024; Suantika, 2025; Xu et al., 2024; Kessoku et al., 2024; Sharmila et al., 2024; Almahal et al., 2024). Early mobilization enhances colonic peristalsis, while adequate fiber and hydration promote stool softening (Zhang et al., 2021; Yong et al., 2023; Cui et al., 2024). Techniques such as abdominal stimulation and acupressure at therapeutic points, including ST25 and SP15, have also been shown to support bowel motility (Nieh et al., 2023; Jiao & Zhai, 2013; Wang et al., 2020). Routine monitoring of bowel patterns enables timely modification of care strategies (Kessoku et al., 2024).

To address the need for an integrated and feasible nursing intervention during the acute post thrombolysis period, the STROKE EASE program was developed. STROKE EASE, which stands for Enhancement through Abdominal Stimulation and Exercise, is a multimodal nursing intervention combining abdominal stimulation, early mobilization, patient education, dietary guidance, and structured bowel monitoring. The program is designed for implementation within the typical five to seven day inpatient period of acute stroke care. This study evaluates the effectiveness of the STROKE EASE program in managing constipation among post thrombolysis stroke patients. By integrating complementary non pharmacological approaches, STROKE EASE aims to reduce constipation severity, enhance comfort, prevent complications, and support better neurological and clinical outcomes (Yang et al., 2024; Kristiowati et al., 2024).

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METHODS

Methods

Study Design and Setting

A quasi-experimental one-group pretest–posttest design was used to evaluate the effectiveness of the STROKE-EASE intervention on constipation in post-stroke patients following thrombolysis. This design was selected because the short study period and limited number of patients receiving thrombolytic therapy made establishing a separate control group impractical. Although the study involved a single group, this approach allows a meaningful preliminary assessment of the intervention's impact by comparing constipation outcomes before and after implementation of the STROKE-EASE program.

The study was conducted in the Stroke Unit of a leading private hospital in East Jakarta. The hospital has been recognized with the Diamond Award by the World Stroke Organization for excellence in stroke management, including the delivery of high-quality thrombolysis services (Heran et al., 2024; Bersano & Gatti, 2023). Data collection occurred from June to December 2025.

Participants

Participants were post-stroke patients who received thrombolytic therapy at the study hospital. Purposive sampling was applied to identify eligible individuals. Inclusion criteria were: (a) age 18 years or older, (b) ability to participate in bowel care interventions, (c) absence of severe cognitive impairment, and (d) willingness to provide informed consent. Exclusion criteria included impaired consciousness, gastrointestinal obstruction, terminal illness, or other conditions that could interfere with normal bowel function.

Sample size estimation was performed using G*Power 3.1 for paired t-tests with an effect size of 0.5, alpha level of 0.05, and statistical power of 0.80, resulting in a minimum requirement of 30 participants (Kang, 2021).

Measurement

Demographic data (age, sex) and clinical characteristics (level of independence, diet type, comorbidities, medications affecting bowel function, neurological deficits, muscle strength, and National Institutes of Health Stroke Scale score) were extracted from patient medical records.

Constipation severity was assessed using the Constipation Assessment Scale (CAS), an eight-item instrument that evaluates bowel function over the preceding three days, with total scores ranging from 0 to 16 (Richmond & Wright, 2006; Nieh et al., 2023). The CAS has demonstrated strong content validity and is widely used in clinical populations with neurological impairments. Reported Cronbach's alpha values range from 0.78 to 0.86, indicating good internal consistency.

Data Collection Procedure

Data collection was conducted from June to December 2025 in the Stroke Unit. Eligible patients who had completed thrombolytic therapy were identified through daily coordination with the stroke team. After informed consent was obtained, baseline assessments were completed by trained nurses who had received standardized instruction on the STROKE-EASE protocol and administration of the Constipation Assessment Scale.

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Baseline data included demographic information, clinical variables, and the initial CAS score. The STROKE-EASE intervention was implemented throughout hospitalization, with nurses documenting adherence to each component of the intervention. Post-intervention assessments were performed prior to discharge using the same CAS instrument to ensure consistency. All data were recorded immediately after each assessment to minimize recall bias and reviewed daily for completeness by the research team. All procedures were aligned with routine clinical workflows to avoid disruption of patient care.

Intervention: STROKE-EASE

The STROKE-EASE intervention is a structured and evidence-based nursing approach designed for short-term implementation, typically during a five- to seven-day inpatient period. It adopts a holistic framework integrating educational, promotive, preventive, and curative components aimed at improving bowel function, enhancing patient comfort, and preventing complications such as elevated intracranial pressure (Kurnia et al., 2024; Suantika, 2025; Xu et al., 2024; Kessoku et al., 2024; Sharmila et al., 2024; Zhao et al., 2024).

The intervention includes coordinated activities. Patients receive individualized education regarding fiber and fluid intake, supported by visual materials illustrating fiber-rich foods such as fruits, vegetables, and cereals, along with guidance on maintaining adequate hydration according to clinical condition. Early mobilization is encouraged through light, guided physical activity including bedside sitting and short assisted walking, both of which stimulate intestinal motility (Kurnia et al., 2024; Suantika, 2025).

Abdominal massage is provided twice daily for three consecutive days, with each session lasting approximately ten to fifteen minutes. Techniques include gentle circular movements around the periumbilical area and acupressure applied to specific points such as ST25 and SP15, which have been shown to support bowel motility (Jiao & Zhai, 2013; Wang et al., 2020). Patients are also taught healthy bowel habits, including recognizing defecation urges, adopting effective toileting positions, and practicing simple relaxation techniques to prevent straining.

Throughout the intervention period, nurses conduct daily monitoring of bowel movement frequency, stool characteristics, and patient comfort, allowing for ongoing evaluation and timely adjustments as needed (Kessoku et al., 2024; Sharmila et al., 2024). The STROKE-EASE protocol is implemented consistently for three days, followed by an evaluation on the fourth day to assess overall effectiveness.

Data Analysis

All demographic variables (age, sex) and clinical characteristics (level of independence, diet type, comorbidities, medications affecting bowel function, neurological deficits, muscle strength, and NIHSS scores) were analyzed descriptively using frequencies, percentages, means, and standard deviations. Constipation severity, measured using the Constipation Assessment Scale (CAS), was analyzed by comparing pre- and post-intervention scores. A paired t-test was used to determine significant differences in CAS scores following the STROKE-EASE intervention. Statistical analyses were conducted using SPSS for Windows, with significance set at $p < 0,05$.

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Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of the Faculty of Nursing, Universitas Muhammadiyah Jakarta (No. 1315/F.9-UMJ/IX/2025). All participants received clear information about the study objectives, procedures, risks, and benefits. Written informed consent was obtained before participation. Confidentiality was ensured through coded identifiers, and data were stored securely with restricted access. Participation was voluntary, and patients retained the right to withdraw at any time without consequences for their clinical care.

RESULT AND DISCUSSION

Participant Characteristics

A total of 30 post-stroke patients participated in the study. More than half were male (56.7%), while 43.3% were female. The mean age of participants was 64.03 years (SD = 11.87), ranging from 43 to 84 years, with a median age of 66.5 years. Most participants required partial assistance in daily activities (73.3%), whereas 26.7% were fully dependent. Diet types varied, with the majority consuming a soft diet (66.7%), followed by a liquid diet (23.3%) and a regular diet (10.0%).

Comorbidities were highly prevalent, with 96.7% of participants experiencing at least one chronic condition, most commonly hypertension or diabetes mellitus. In addition, 93.3% were taking medications known to cause constipation. Neurological deficits were observed in a subset of participants, with 6.7% presenting with aphasia, 6.7% with dysphagia, and 23.3% experiencing both conditions. Muscle strength scores averaged 3.40 on the right side and 4.17 on the left side. The NIHSS scores ranged from 0 to 18, with a mean of 6.50 (SD = 5.28) and a median of 4.50, suggesting mild to moderate neurological impairment with considerable variability across individuals. Detailed demographic and clinical characteristics are shown in Table 1.

Table 1. Characteristics of Respondents (N = 30)

Variable	n	%	Mean (SD)	Median	Min–Max	IQR	95% CI
Sex							
Male	17	56.7					
Female	13	43.3					
Level of Independence							
Partial assistance	22	73.3					
Total assistance	8	26.7					
Diet							
Liquid	7	23.3					
Soft	20	66.7					
Regular	3	10.0					
Medication with Constipation Side Effects							
Yes	28	93.3					
No	2	6.7					
Comorbidity							

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Present (Hypertension/DM)	29	96.7					
None	1	3.33					
Neurological Deficits							
Aphasia	2	6.7					
Dysphagia	2	6.7					
Aphasia & Dysphagia	7	23.3					
None	19	63.3					
Age (years)			64.03(11.87)	66.50	43–84	20	59.60 – 68.47
Muscle Strength Right			3.40 (1.57)	4.0	0–5	3	2.81 – 3.99
Muscle Strength Left			4.17 (1.47)	5.0	0–5	1	3.62 – 4.71
NIHSS Score			6.50 (5.28)	4.50	0–18	7	4.53 – 8.47

Constipation Outcomes

Changes in Constipation Severity

The Constipation Assessment Scale (CAS) scores showed a substantial reduction following the STROKE-EASE intervention. The mean pretest score was 11.00 (SD = 2.78), which decreased to 2.53 (SD = 1.01) after the intervention. The mean difference was 8.47, with a 95% confidence interval of 7.50 to 9.43, indicating marked improvement in bowel function.

A paired-samples t-test demonstrated that this change was statistically significant, $t(29) = 17.95$, $p < .001$. The effect size calculated using Cohen's d for paired samples was 3.28, reflecting an exceptionally large treatment effect. These findings confirm the strong effectiveness of the STROKE-EASE intervention in reducing constipation severity.

Table 2. Paired Samples t-test for Constipation Assessment Scale Scores (N = 30)

Variable	Mean	SD	t (df)	p	Mean Difference	95% CI
Pre-test	11.00	2.779				
Post-test	2.53	1.008	17.954(29)	< .001	8.467	[7.502, 9.431]

Note. CI = confidence interval; SD = standard deviation.

Discussion

Participant Demographics and Clinical Characteristics

The demographic and clinical characteristics of participants in this study reflect typical profiles of post-thrombolysis stroke patients treated in advanced stroke care settings. The mean age of 61 years corresponds with the established pattern that stroke primarily affects older adults, who often experience physiological changes that increase susceptibility to gastrointestinal dysfunction (Yong et al., 2023). Age-related slowing of colonic motility, reduced physical activity, and decreased dietary fiber intake are common factors that heighten constipation risk. These risks are amplified by the neurophysiological effects of stroke, which can disrupt autonomic and enteric nervous system regulation and further impair bowel function (Bersano & Gatti, 2023; Ahmed et al., 2024).

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Most participants in the study required partial or complete assistance with daily activities, illustrating immobility as a major contributor to constipation in acute and subacute stroke. Immobility delays intestinal transit and weakens the abdominal musculature, which is essential for effective defecation. Similar trends have been reported by Sun et al. (2022) and Lin et al. (2013), who found that reduced independence significantly increases the likelihood of constipation among stroke survivors.

Dietary patterns also played a role in constipation risk. Many participants consumed soft or liquid diets due to dysphagia, a common complication following neurological injury. While these diets are effective in preventing aspiration (Sasegbon et al., 2025), they often contain insufficient fiber and contribute to reduced bowel motility. The co-occurrence of dysphagia and constipation in acute stroke has been highlighted in recent reviews, emphasizing the need for integrated dysphagia and bowel management (Almahal et al., 2024).

Polypharmacy was another strong contributor, as nearly all participants were taking medications associated with gastrointestinal side effects. These included antihypertensives, antithrombotics, and occasionally opioids for pain management. Polypharmacy is widely recognized as a significant factor in constipation among neurological patients (Kessoku et al., 2024). Additionally, neurological deficits such as aphasia or impaired cognition complicated the ability of some patients to report discomfort or changes in bowel patterns. This limitation introduces further barriers to early recognition and management of constipation (Sakai et al., 2024; Yang et al., 2024).

Taken together, these demographic and clinical characteristics illustrate the multifactorial etiology of constipation in post-stroke patients. Interactions among age-related changes, functional limitations, dietary modifications, pharmacological treatments, and neurological impairments are consistent with recent literature describing gastrointestinal dysfunction following stroke (Yong et al., 2023).

Effectiveness of the STROKE-EASE Program

The STROKE-EASE intervention produced a significant reduction in constipation severity, as reflected in the substantial decrease in CAS scores from baseline to post-intervention. This improvement supports the effectiveness of multimodal, non-pharmacological interventions for bowel dysfunction in patients with neurological impairment.

The physiological components of STROKE-EASE likely enhanced colonic motility through abdominal stimulation and structured movements that activate the enteric nervous system. Abdominal massage and guided exercises have been shown to improve bowel transit in stroke patients, and similar results have been reported by Kurnia et al. (2024) and Suantika (2025). Meta-analyses have also demonstrated that massage-based interventions result in meaningful improvements in poststroke constipation symptoms (Wang et al., 2020; Zhao et al., 2024).

Educational and behavioral components complemented these physiological strategies. Guidance on toileting routines, optimal body positioning, and hydration supported the restoration of healthy bowel habits. Behavioral training and bowel scheduling have been shown to improve neurogenic bowel function and enhance parasympathetic activity, both of which contribute to improved elimination patterns (Xu et al., 2025).

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Despite limitations posed by texture-modified diets, increased awareness regarding fluid balance and appropriate fiber intake provided additional support. These findings align with broader constipation management principles that emphasize hydration, dietary modification, and lifestyle adjustment (Kessoku et al., 2024).

Caregiver involvement also strengthened the intervention. Consistent assistance, encouragement, and monitoring improved adherence to recommended techniques and boosted patient confidence in managing bowel function. Psychosocial support has been found to improve self-efficacy and autonomic regulation, both of which play key roles in bowel health (Sharmila et al., 2024). The effectiveness of multimodal programs is further supported by studies showing that combined approaches yield better outcomes than single-method interventions and reduce the need for pharmacological treatments (Kristiowati et al., 2024).

Clinical Implications

The findings confirm that post-stroke constipation is multifactorial, influenced by age, functional status, diet, medication use, and neurological deficits. The multimodal design of the STROKE-EASE program, which integrates physical activity, abdominal massage, dietary education, bowel habit training, and systematic monitoring, effectively addresses these interconnected contributors. This comprehensive approach is feasible to implement during acute care hospitalization and has the potential to reduce dependence on pharmacological treatments. It also promotes greater patient comfort and enhances overall quality of life for individuals recovering from stroke.

Limitations and Future Directions

This study used a single-group pretest–posttest design due to the limited number of eligible post-thrombolysis patients, which prevented the formation of a control group. As a result, causal interpretation and generalizability are limited. The small sample size further restricts broader applicability. Future studies should include larger samples, use randomized controlled designs, and examine the long-term effects of STROKE-EASE after discharge. Exploring caregiver involvement and home-based adaptations may also enhance the intervention's feasibility.

CONCLUSION & RECOMENDATION

The STROKE-EASE intervention effectively reduced constipation severity in post-thrombolysis stroke patients. By integrating education, dietary guidance, abdominal stimulation, and light physical activity, it provides a practical, non-pharmacological approach to improving bowel function and patient comfort. Wider implementation and further evaluation using stronger study designs are recommended to confirm and expand these findings.

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