



SYSTEMATIC REVIEW OF ISCHEMIC POST-STROKE REHABILITATION AND ITS IMPACT ON MOTORIC FUNCTION, INDEPENDENCE AND QUALITY OF LIFE

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ABSTRACT

According to the World Health Organization (WHO), stroke remains the foremost cause of disability globally and ranks as the second leading cause of mortality. The progression of disability post-stroke is influenced by multiple interrelated factors, including advanced age, pre-existing comorbidities, cognitive dysfunction, and the initial severity of stroke at the time of onset. Various therapeutic approaches, including physical therapy to enhance muscle strength and coordination, occupational therapy to develop skills for performing daily activities, and psychosocial support, are essential components of rehabilitation programs aimed at improving the quality of life for stroke patients. Objective this research for analyze the effectiveness of mindfulness therapy as part of ischemic post- stroke rehabilitation strategies in improving patients' quality of life and independence. Methods this research is A systematic review was conducted on studies published between 2020 and 2024. The search terms included: "Ischemic Stroke" OR "Strokes" OR "Cerebrovascular Accident" OR "CVA" OR "CVA's" AND "Disability" AND "Rehabilitation" OR "Rehabilitations Therapy" OR "Exercise Therapy". Data identified from Pubmed 367, Semantic Scholar 287, Google Scholar 525, Science Direct 338, total number of articles used was 1517. Studies included in review 13 articles met the inclusion criteria and were deemed of sufficient quality. Eleven studies are RCT design, one study is One group pre- test post-test, and one study is quasi experiment design. Effective stroke rehabilitation requires a multidimensional approach that integrates physical exercise, community-based rehabilitation, technological innovations, and nursing interventions to enhance motor function, independence, and quality of life, with future research needed to evaluate long-term outcomes and personalized strategies.

Keywords: independence; ischemic stroke; motor function; rehabilitation therapy; quality of live

INTRODUCTION

Stroke continues to be the primary cause of long-term disability, with its prevalence exhibiting an upward trajectory each year (Gawulayo et al., 2021). Individuals who develop disabilities following a stroke frequently experience a heightened level of dependence when performing activities of daily living (ADL), necessitating assistance from others (Septianingrum et al., 2024). While approximately half of stroke survivors achieve recovery following an acute episode, many rely on the support of family members, close friends, or spouses, who often assume the role of caregivers both within the home setting and in healthcare facilities (Tyagi et al., 2021). The progression of disability post- stroke is influenced by multiple interrelated factors, including advanced age, pre-existing comorbidities, cognitive dysfunction, and the initial severity of stroke at the time of onset (E. Wurzinger et al., 2021). If left unmanaged, stroke can lead to a range of complications such as deficits in self-care abilities, compelling patients to depend on others for assistance in fulfilling ADL needs (Septianingrum et al., 2024). Despite substantial advancements in medical technology and treatment, studies indicate that while up to 90% of stroke patients may survive, nearly half still experience significant limitations in their ability to independently carry out routine daily activities (Sidek et al., 2022).

According to the World Health Organization (WHO), stroke remains the foremost cause of disability globally and ranks as the second leading cause of mortality. Between 1990 and 2019, the global burden of stroke escalated significantly, with its incidence surging by 70%, mortality rates rising by 43%, prevalence doubling with a 102% increase, and disability-adjusted life years (DALY) experiencing a dramatic 143% growth, underscoring the substantial public health challenge posed by this condition (WHO, 2022). Data from the Behavioral Risk Factor Surveillance System were utilized to examine the age-standardized prevalence of stroke among adults aged 18 years and older from 2011 to 2022. Over the period spanning from 2011–2013 to 2020–2022, the nationwide self-reported prevalence of stroke exhibited a 7.8% increase. This upward trend was observed across various demographic groups, including both younger and middle-aged adults (18–64 years), as well as among both females and males, highlighting the growing burden of stroke across diverse populations (Imoisili et al., 2024).

After experiencing a stroke, many patients face significant challenges in their daily lives (Dąbrowska' et al., 2023). Motor impairments, muscle weakness, and cognitive deficits can lead to an inability to perform basic activities such as walking, eating, dressing, or bathing independently. A study conducted by (Septianingrum et al., 2024), indicates that most stroke patients experience a high level of dependence in daily activities, making them highly reliant on family members or healthcare professionals to meet their basic needs (Nascimento et al., 2022). The degree of disability experienced by stroke patients is influenced by various factors, including patient age, the presence of comorbidities such as diabetes or hypertension, and the severity of the stroke at the time of the initial attack (Gurkova' et al., 2023). Patients who suffer from severe strokes often have slower recovery rates and require long-term rehabilitation. Research by (E. Wurzinger et al., 2021), also highlights that cognitive impairments associated with stroke can further deteriorate patients' independence, prolonging the duration of care and rehabilitation required.

In efforts to restore stroke patients' independence, rehabilitation plays a crucial role in the recovery process (Lee et al., 2022). Various therapeutic approaches, including physical therapy to enhance muscle strength and coordination, occupational therapy to develop skills for performing daily activities, and psychosocial support (Winstein et al., 2016), are essential components of rehabilitation programs aimed at improving the quality of life for stroke patients (Song et al., 2021). A study conducted by (Sidek et al., 2022), reveals that although 90% of stroke patients survive, nearly half still experience limitations in independently carrying out daily activities. This underscores the importance of comprehensive and continuous rehabilitative interventions to help patients achieve an optimal level of independence (Chiado et al., 2022). Therefore, the author aims to analyze the effectiveness of mindfulness therapy as part of ischemic post-stroke rehabilitation strategies in improving patients' quality of life and independence.

METHOD

Eligibility Criteria

The criteria for including studies in this systematic review were as follows: Article English and Indonesia, Full article access, All experimental studies. A comprehensive literature search was performed using multiple well-established electronic databases, such as PubMed, Google Scholar, and ScienceDirect. To ensure the inclusion of relevant and current information, the search was restricted to peer-reviewed journal articles published between 2020 and 2024. Furthermore, only full-text articles written in English and Bahasa were selected to enhance accessibility and uphold the quality of the sources used. The search strategy was developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. To optimize both sensitivity and specificity, a combination of controlled vocabulary (e.g., MeSH terms) and free-text keywords was employed. The search terms included: "Ischemic Stroke" OR "Strokes" OR

"Cerebrovascular Accident" OR "CVA" OR "CVA's" AND "Disability" AND "Rehabilitation" OR "Rehabilitations Therapy" OR "Exercise Therapy." Boolean operators (AND, OR) were strategically utilized to refine and expand the search, ensuring comprehensive coverage of relevant literature. A systematic approach was employed to identify and analyze relevant literature on ischemic post-stroke rehabilitation strategies aimed at improving patients' quality of life and independence. All references obtained through the structured search were imported into Zotero, a reference management software that facilitated efficient organization, citation tracking, and literature management. The initial step in the selection process involved deduplication, where duplicate records were removed to ensure that each reference appeared only once in the database. This step was crucial in minimizing redundancy and preventing potential bias in the literature selection.

Following deduplication, a preliminary screening was conducted by reviewing the titles and abstracts of the remaining articles. Studies that did not meet the predefined inclusion criteria such as literature reviews, theoretical discussions, or research that did not specifically address rehabilitation strategies to improve quality of life and independence in ischemic stroke patients were excluded. Only empirical studies that directly investigated the effectiveness of various rehabilitative interventions, such as physical therapy, occupational therapy, neuromotor exercises, and multidisciplinary approaches in ischemic stroke recovery, were retained for further evaluation. For studies that passed the initial screening, a more in-depth assessment was conducted to determine their methodological rigor and relevance. Key factors considered included research design clarity, validity of findings, alignment with study objectives, and specific relevance to post-stroke rehabilitation strategies. The assessment focused on aspects such as the effectiveness of rehabilitation programs in improving motor function, the ability to perform activities of daily living (ADL), patient independence, and the psychosocial well-being of ischemic stroke survivors.

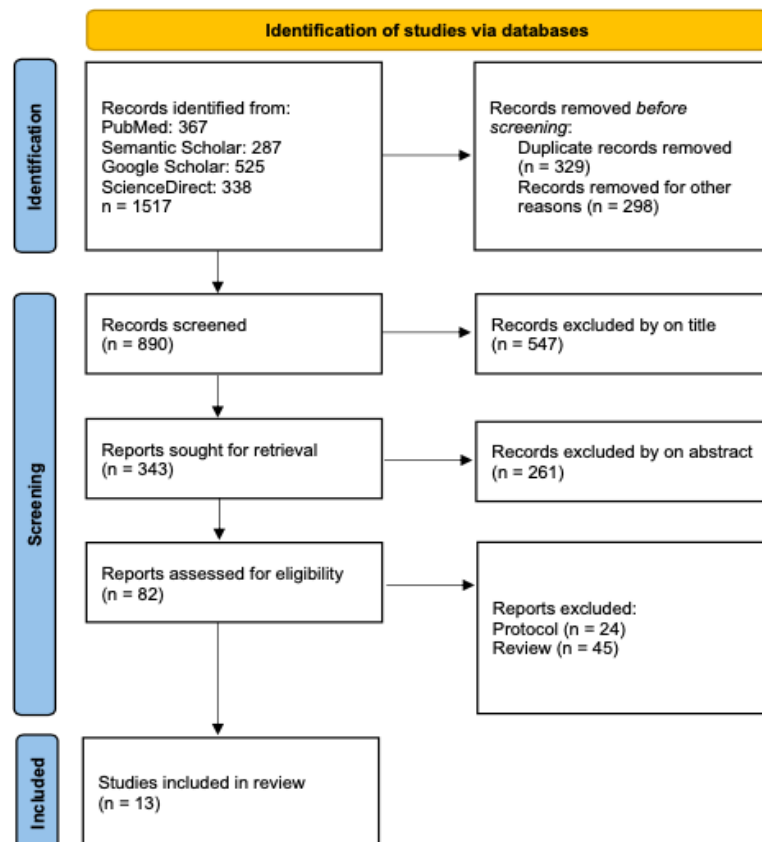


Figure 1. PRISMA Flow Chart

In the final selection phase, only high-quality studies with robust methodologies that met all inclusion criteria were chosen for in-depth review and analysis. This multi-stage screening process ensured that the final dataset comprised credible, methodologically sound research that provided valuable insights into the role of rehabilitative strategies in enhancing quality of life and independence in ischemic stroke patients. By employing a structured and transparent selection approach, this review strengthens the reliability of its findings and makes a significant contribution to the scientific evidence base on rehabilitative interventions for stroke recovery.

The systematic review process began with the identification phase, during which a total of 402 articles were retrieved from multiple databases 104 from PubMed, 200 from Google Scholar, and 98 from ScienceDirect. An initial screening was conducted to eliminate duplicate records, resulting in the removal of 24 articles. Additionally, 28 articles were excluded due to other factors, reducing the dataset to 350 articles for further evaluation. During the screening phase, 137 articles were excluded based on title relevance, narrowing the selection to 213 articles for abstract assessment. At this stage, 148 articles were eliminated as they did not meet the predefined eligibility criteria. The remaining 65 articles then underwent a full-text review to determine their relevance and feasibility for inclusion. In the final selection phase, 24 articles were excluded as they were protocol studies, while 45 were removed for being literature reviews. As a result, 13 articles met the inclusion criteria and were considered of sufficient quality for the study. This systematic and structured approach ensured the selection of high-quality, relevant literature to support the research. A journal literature review is conducted by systematically identifying, evaluating, and synthesizing relevant literature to build new understanding, rather than simply summarizing. The process includes topic selection, literature searches (journals, books), critical analysis of research methods and results, comparisons between studies, and the development of a review framework that identifies gaps and new contributions.

RESULT AND DISCUSSION

Table 1.
Characteristic of the studies

No	Author (year)	Research Purpose	Sample	Methods	Results
1	(Mahmood et al., 2022)	This study aims to evaluate the effectiveness of core stabilization exercises versus conventional therapy in enhancing trunk mobility, function, ambulation, and quality of life in stroke patients.	44 Respondents	Randomized Controlled Trial	Post-treatment, the experimental group showed statistically significant improvements over the control group in trunk impairment, functional ambulation, quality of life, and frontal plane trunk motion ($p < 0.05$), with higher mean values for core stabilization training. However, differences in frontal plane trunk mobility and rotation were not significant ($p > 0.05$).
2	(Purwati et al., 2022)	It seeks to assess changes in functional abilities of stroke patients' post-rehabilitation, focusing on their capacity to perform daily activities independently	50 Respondents	One group pre-test post-test	The Wilcoxon signed-rank test revealed a significant impact of the medical rehabilitation program on the independence of ischemic stroke patients ($p = 0.000$), resulting in the rejection of the null hypothesis and acceptance of the alternative hypothesis.
3	(Alsubiheen et al., 2022)	The study aims to assess the impact of T-ADL training on activities of daily living (ADL)	33 Respondents	Randomized Controlled Trial	Significant improvements were observed in the affected side manual function test (MFT) scores and both sides of the box and block test (BBT) scores post-intervention

No	Author (year)	Research Purpose	Sample	Methods	Results
		performance and quality of life (QoL) among the participants			in the T-ADL training group
4	(Chen et al., 2021)	The study aims to investigate whether HREPro can significantly improve the recovery of motor function in patients experiencing lower limb spasticity within 12 months following a stroke	121 Respondents	Randomized Controlled Trial	The study found that HREPro significantly improved motor function, spasticity, walking ability, and ADL in post-stroke patients, with higher Fugle-Meyer scores, reduced spasticity, and better ADL at 6- and 12-months post-discharge.
5	(Song et al., 2021)	The research aimed to determine the effects of a Tai Chi-based stroke rehabilitation program on various outcomes among stroke survivors, specifically focusing on symptom clusters, physical and cognitive functions, and stroke-specific quality of life (QOL) in Korea	34 Respondents	Randomized Controlled Trial	The study found that the Tai Chi-based rehabilitation program significantly improved swallowing, ambulation, muscle strength, and cognitive function in stroke survivors. Additionally, the Tai Chi group showed better self-care and cognitive function in SS-QOL compared to the control group.
6	(Hu & Liu, 2021)	The primary objective of the research paper is to explore the effects of early rehabilitation nursing (ERN) on neurological functions in patients with ischemic stroke hemiplegia (ISH)	123 Respondents	Randomized Controlled Trial	The study found that early rehabilitation nursing (ERN) significantly improved ESS, BI, and FMA scores in the study group compared to the control group ($P < 0.05$). Additionally, the incidence of complications and LEDVT was significantly lower in the study group ($P < 0.05$).
7	(Swanson et al., 2023)	This study aimed to compare the effectiveness of two home exercise programs in reducing upper extremity impairment in individuals in the subacute phase of stroke recovery. Specifically, it evaluated the sensorized FitMi system versus a conventional paper-based program.	27 Respondents	Randomized Controlled Trial	The study found that participants using the FitMi system showed a significantly greater improvement in UEFM scores (8.0 ± 4.6) compared to the conventional therapy group (3.0 ± 6.1 , $P = .029$). However, no significant changes were observed in secondary outcomes, including spasticity (Modified Ashworth Scale) and pain (Visual Analog Scale)
8	(Yang et al., 2023)	This study aims to evaluate the Effectiveness of community-based group rehabilitation program for stroke patients with dysphagia by assessing improvements in quality of life, depressive symptoms, and swallowing function.	64 Respondents	Randomized Controlled Trial	The study found significant improvements in swallowing function in both groups ($P < 0.001$). The intervention group showed a significant reduction in depressive symptoms ($P = 0.002$), while the control group showed a worsening trend ($P = 0.265$). Quality of life improved in both groups, with greater enhancements in the intervention group ($P < 0.001$).

No	Author (year)	Research Purpose	Sample	Methods	Results
9	(Perez-Dominguez et al., 2021)	The study aimed to assess postural control and balance improvements in stroke patients, hypothesizing that the aquatic exercise and combined therapy groups would achieve greater motor disability and balance enhancements than the conventional dry land physiotherapy group	45 Respondents	Randomized Controlled Trial	The study, involving 45 participants, found significant balance and functional capacity improvements after 12 weeks. The combined therapy group (aquatic and dry land therapy) showed the greatest enhancements in the Berg Balance Scale, Timed Up and Go Test, and Five Times Sit-to- Stand Test ($P < 0.01$) compared to the dry land therapy group
10	(Dąbrowska et al., 2023)	The study sought to fill the evidence gap on the effects of virtual reality (VR) on health-related quality of life (HRQoL) and self-sufficiency in post-stroke patients, emphasizing the optimization and timing of interventions in stroke rehabilitation.	50 Respondents	Randomized Controlled Trial	The study found no significant differences between groups in WHODAS 2, self-sufficiency, and balance scores, though both improved post-rehabilitations. The experimental group showed significant WHODAS 2 score improvements before and after therapy.
11	(Gjellesvik et al., 2021)	The HIIT Stroke Study aimed to evaluate the impact of high-intensity interval training (HIIT) on physical, mental, and cognitive function in stroke survivors by comparing standard care with and without HIIT.	70 Respondents	Randomized Controlled Trial	The HIIT group showed significant improvements in walking distance (28.3m), balance (1.27 points, Berg Balance Scale), and executive function (24.16s, TMT-B) after 8 weeks compared to the control group. However, at the 12-month follow-up, only the executive function improvement remained significant.
12	(Chiado et al., 2022)	The primary objective of the research paper is to assess the effect of a Nursing Rehabilitation program on the management of urinary incontinence in women who have experienced a cerebrovascular accident (CVA)	30 Respondents	Quasi experiment	The study found a significant negative correlation between functional disability and the impact of urinary incontinence on quality of life ($r = -0.499$; $p = 0.005$). The experimental group's rehabilitation program led to a significant reduction in both urinary incontinence frequency ($t = 6.985$, $p = 0.000$) and amount ($Z = -2.762$, $p = 0.006$)
13	(Hyun et al., 2021)	The primary objective of the study was to investigate the effects of sit-to-stand training combined with real-time visual feedback on lower limb muscle strength, balance, gait ability, and quality of life in patients with stroke	40 Respondents	Randomized Controlled Trial	The study found that the RVF-STs group showed significant improvements in lower extremity strength, balance, walking ability, and quality of life post-training ($p < 0.05$). Additionally, significant differences between the RVF-STs and C-STs groups confirmed the effectiveness of sit-to-stand training with real-time visual feedback

The studies included in this systematic review examined various stroke rehabilitation methods with the main objectives of improving motor function, balance, activities of daily living (ADL), quality of life,

and reducing complications. The interventions evaluated ranged from core stabilisation exercises, task-based ADL exercises (T-ADL), community-based rehabilitation, high-intensity training, to technological innovations such as virtual reality (VR)-based rehabilitation and the sensor-based FitMi system. Studies conducted by (Mahmood et al., 2022) and (Hyun et al., 2021) show that core stabilisation exercises and sit-to-stand exercises with real-time visual feedback significantly improve muscle strength, balance, and walking ability. Similarly, (Chen et al., 2021) and (Swanson et al., 2023) found that rehabilitation technologies such as HREPro and FitMi provided superior results compared to conventional therapy in improving upper and lower extremity motor function.

A study by (Yang et al., 2023) highlights that community-based rehabilitation significantly improves quality of life and reduces symptoms of depression in stroke patients with dysphagia. These findings are reinforced by (Purwati et al., 2022), who reported a significant improvement in stroke patients' ability to perform daily activities independently after medical rehabilitation. A study by (Gjellesvik et al., 2021) investigated the impact of virtual reality (VR) therapy on the quality of life and independence of stroke patients. Although their results showed a significant improvement in WHODAS 2 scores after therapy, no significant differences were found between groups. Meanwhile, (Chiado et al., 2022) found that nursing rehabilitation programmes significantly reduced the frequency and severity of urinary incontinence in post-stroke women, underscoring the important role of nursing interventions in post-stroke recovery. Studies by (Gjellesvik et al., 2021) and (Song et al., 2021) showed that high-intensity exercises, such as High-Intensity Interval Training (HIIT) and Tai Chi-based rehabilitation, significantly improved balance, physical function, and cognitive abilities in stroke patients. Although the long-term effects of HIIT are more pronounced on executive function than on other physical aspects, these findings still highlight its potential in stroke rehabilitation.

Several studies indicate that an effective stroke rehabilitation approach should not focus solely on one type of therapy, but rather combine physical exercise, community-based rehabilitation, innovative technology, and nursing interventions (Lee et al., 2022). Future research should explore the long-term effects of combined rehabilitation approaches, particularly those integrating high-intensity exercise, technology-assisted therapy (such as VR and sensory systems), and community-based interventions. Additionally, further studies are needed to assess the cost-effectiveness and accessibility of these interventions across different healthcare settings, ensuring that stroke rehabilitation strategies can be optimised for diverse patient populations. Investigating personalised rehabilitation programmes tailored to patients' specific needs, including cognitive and psychological aspects, may also enhance recovery outcomes.

The Relationship between Self-Efficacy and Self-Care

The correlation test results show a positive relationship between self-efficacy and self-care with a correlation coefficient value of $p = 0.412$. However, this relationship was found to be statistically insignificant, with a significance value of $p = 0.071$ ($p > 0.05$). This indicates that, although there is a tendency for increased self-efficacy to be followed by increased self-care, the statistical evidence supporting a significant linear relationship in the population at a 95% confidence level is not met.

The Relationship between Self-Efficacy and Quality of Life

There is a strong and significant positive relationship between self-efficacy and quality of life. The correlation coefficient obtained is $p = 0.620$ with a significance value of $p = 0.004$ ($p < 0.05$). In fact, this result is significant at the 0.01 level (marked with **). These findings indicate that the higher an individual's level of self-efficacy, the higher their perceived quality of life, and this relationship is strongly supported by statistical data.

The Relationship between Self-Care and Quality of Life

The results of the analysis show a strong and highly significant positive relationship between self-care and quality of life. The correlation coefficient value found was $p = 0.665$, with a significance value of $p = 0.001$ ($p < 0.05$). This correlation indicates that improvements or enhancements in self-care practices are strongly and unidirectionally associated with improvements in an individual's quality of life. The correlation coefficient between self-care and quality of life ($p = 0.665$) is the highest correlation value among all variable pairs tested in this study.

CONCLUSION

Overall, quality of life was found to have a significant positive correlation with both self-efficacy and self-care. The relationship between self-care and quality of life was the strongest. Meanwhile, although positive in direction, the relationship between self-efficacy and self-care did not reach statistical significance at the $p=0.05$ level. This systematic review highlights that effective stroke rehabilitation involves a multidimensional approach, combining physical exercise, community-based rehabilitation, technological innovations, and nursing interventions. Studies have demonstrated that core stabilization exercises, high-intensity training, and task-based ADL training significantly improve motor function, balance, and independence. Additionally, technology-assisted rehabilitation, including VR therapy and sensorized systems like FitMi, has shown superior outcomes compared to conventional therapy. Community-based interventions also play a crucial role in enhancing quality of life and psychological well-being.

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