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Stroke Rehabilitation Program in Improving ADL (Activity Daily Living): Literature Review

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Background: One-third of stroke patients experience moderate to severe physical disorders, such as decreased independence in daily activities. Stroke therapy is vital in assisting stroke survivors in achieving optimal functional levels and preventing further functional loss. Objective: To see how stroke rehabilitation programs improve ADL (Activity Daily Living). Methods: There are six stages in this literature, including goal identification, literature selection using Prisma diagrams, data mapping by conducting critical appraisals based on the RCT research checklist, summarizing and reporting results, and expert consultation. Relevant literature was found using four databases, including JSTOR, Science Direct, ProQuest, and Cambridge core, using the keywords (stroke survivor) AND (rehabilitation program) AND (activities of daily living). Results: Literature obtained 186022 articles. Eight articles were selected for review. The intervention group in all articles showed a significant increase in ADL ability compared to the control group. Conclusion: Early rehabilitation management in acute stroke care is essential to optimize recovery potential and avoid secondary problems different from stroke sequelae. The improved physical recovery and daily functional abilities result from a rehabilitation program at a higher level of intensity and consistency.

Kata kunci:

ADL (Activity Daily Living)
Rehabilitasi
penderita stroke

A B S T R A K

Latar belakang: Sepertiga penderita stroke mengalami gangguan fisik sedang hingga berat, seperti penurunan kemandirian dalam aktivitas sehari-hari. Terapi stroke sangat penting dalam membantu penderita stroke dalam mencapai tingkat fungsional yang optimal dan mencegah kehilangan fungsional lebih lanjut. Tujuan: untuk melihat bagaimana program rehabilitasi stroke meningkatkan ADL (Activity Daily Living). Metode: Ada enam tahapan dalam literatur ini, meliputi identifikasi tujuan, pemilihan literatur menggunakan diagram Prisma, pemetaan data dengan melakukan penilaian kritis berdasarkan checklist penelitian RCT, meringkas dan melaporkan hasil, dan konsultasi ahli. Literatur yang relevan ditemukan menggunakan empat database, termasuk JSTOR, Science Direct, ProQuest, dan Cambridge core, dengan menggunakan kata (stroke survivor) AND (rehabilitation program) AND (activities of daily living). Hasil: Literatur didapatkan 186022 artikel, 8 artikel terpilih untuk direview. Kelompok intervensi pada semua artikel menunjukkan peningkatan yang signifikan untuk kemampuan ADL dibanding dengan kelompok kontrol. Kesimpulan: Manajemen rehabilitasi dini dalam perawatan stroke akut sangat penting untuk mengoptimalkan potensi pemulihan dan menghindari masalah sekunder yang berbeda dari gejala sisa stroke. Peningkatan pemulihan fisik dan kemampuan fungsional sehari-hari adalah hasil dari program rehabilitasi pada tingkat intensitas dan konsistensi yang lebih tinggi.

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INTRODUCTION

As a result of a stroke, people can become disabled and lose the ability to live independently. Hemi-paralysis, common after a stroke, can significantly impact ADL (Activity Daily Living). This can make getting around tricky (W. Y. Huang et al., 2021). Hospital and community-based research show that stroke survivors are less active than people who have not had a stroke (Mozaffarian et al., 2016). As a complex neurological disorder, stroke interferes with a person's quality of life and negatively impacts his physical, psychological, and social health (Skoglund et al., 2019). One-third of stroke patients experience moderate to severe physical dysfunction, including reduced independence in daily tasks and motor and life dysfunction (Yoo et al., 2020). Physical disturbances after stroke decrease daily activities and involvement in the lives of stroke survivors (Li et al., 2020). Social isolation, recurrent stroke episodes, and higher mortality were all associated with participation limits (Misawa & Kondo, 2019). The degree and diversity of disease experienced by stroke survivors depend on the location and extent of the infarct, and motor dysfunction is a significant problem. The leading cause is an injury to the Cortico Spinal Tract (CST) and the brain's motor centers (Pramanick et al., 2020). CST is the main motor control route that impacts the restoration of motor function. Acute motor function training (during the first two weeks) has been shown to improve the structural integrity of the ipsilesional CST (Powers et al., 2019).

METHOD

This literature goes through six stages of the literature review process as follows: Identify goals, namely to find out how stroke rehabilitation programs improve ADL (Activity Daily Living), then find relevant literature using four databases (such as JSTOR, Science Direct, Proquest, and Cambridge Core) with the keywords "stroke survivor" AND "rehabilitation program" AND "activities of daily living". Prism diagrams are used to select the best literature. In December 2021, a literature search was conducted. This review looks at articles published between 2017 and 2021, in English and in research journal form. Articles must also be open access and have research results on ADL (Activity Daily living). The author critically appraised the type of RCT research using a checklist from the Joanna Briggs Institute (Moola et al., 2017).

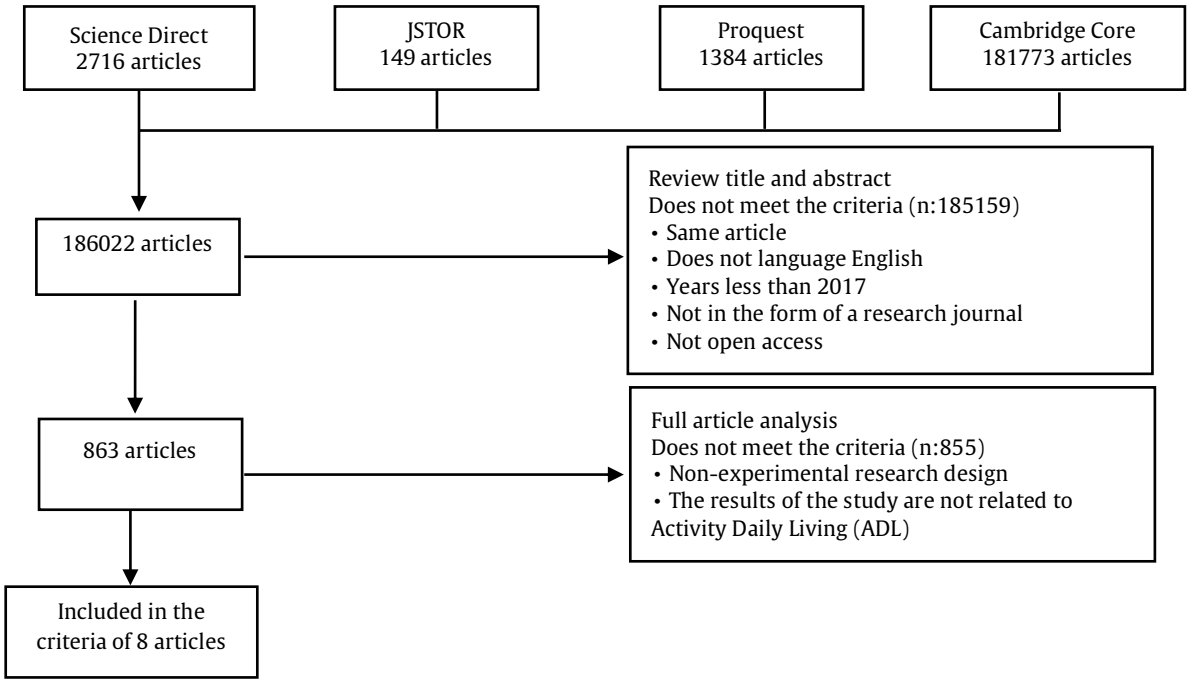

Figure 1. Selection Process

RESULT

The results of the literature search found 186022 articles. Then restrictions were placed on articles published between 2017 and 2021, open access, in English, in research journals, experimental designs, and research results on ADL (Activity Daily Living) obtained from 8 journals (figure 1). The articles reviewed are from Asia and Europe. Respondents used in the journal are between 30 and 221 stroke patients with research settings in hospitals, rehabilitation clinics, and communities. A randomized control trial, a randomized non-inferiority trial, and a quasi-experiment were used as the research designs.

Based on this design, only one article uses experimental quasi. For others, sample randomization is used so that in this way, the results are of higher quality because there is the randomization of the sample without knowing the previous sample information. The articles reviewed in 2021 were six articles, and in 2020, there were two. The duration of the intervention given to the respondents was between 2 weeks to 1 year.

Table 1. Summary of Selected Literature

No	Author and Years	Title and Country	Method	Intervention	Research Result
1	Huang *et al.*, (2021)	Efficacy of a novel walking assist device with auxiliary laser illuminator in stroke Patients~ a randomized control trial; Taiwan	Randomized control trial with community research area. The sample is 30 respondents.	The experimental group received 15 minutes of walking training with a laser cane and 15 minutes of traditional physical therapy. Patients in the control group received the same rehabilitation without the laser-cane. Rehabilitation lasts for 4 weeks, twice a week. Outcomes were measured at baseline, at the end of rehabilitation, and 4 weeks after rehabilitation.	The results of the experimental group showed a significant increase in walking balance (p-value: 0.001), ADL (p-value: 0.002), gait parameters (p-value: 0.038) and symmetry (p-value: 0.028).
2	Wang *et al.*, (2020)	Effects of high-frequency repetitive transcranial magnetic stimulation (rTMS) over the contralesional motor cortex on motor recovery in severe hemiplegic stroke: A randomized clinical trial; China.	Randomized control trial with research area in hospital. The sample is 45 respondents.	Groups were divided into 3 for treatment with 10 Hz rTMS (high frequency group), 1 Hz rTMS (low frequency group) or sham rTMS (sham group) applied over the contralection motor. cortex (M1) before daily physiotherapy for two weeks.	It was found that high-frequency rTMS over the contralesional cortex was superior to low-frequency rTMS and spurious stimulation in promoting motor recovery in patients with severe hemiplegic stroke (p-value 0.039).
3	(S. Chen et al., 2021)	Effectiveness of a Home-based exercise program among patients with lower limb spasticity post-stroke: A randomized controlled trial; China	Randomized control trial with research areas in hospitals and communities. A sample of 121 respondents with lower extremity weakness after stroke, then divided into two groups of 59 respondents and a control group of 62 respondents.	The intervention group underwent Home-based Rehabilitation Exercise Program (HREPro) and the control group underwent conventional rehabilitation. Then evaluated at 0 3, 6, and 12 months.	Significant differences were found in walking ability at 6 months (p-value: 0.042), and 12 months (p-value: 0.001) and ADL at 6 months (p-value: 0.002) and 12 months (p-value: 0.001) after discharge between the control and intervention groups. Thus HREPro is effective for the rehabilitation of patients with post-stroke lower extremity spasticity and has beneficial home applications.
4	(Kim et al., 2021)	The Effects of Auditory Feedback Gait Training Using Smart Insole on Stroke Patients; Korea Selatan	Randomized control trial with research area in hospital. The sample is 45 stroke respondents with the criteria that they can walk more than 10 meters.	Respondents were randomly assigned to a treatment group, 23 respondents using Auditory Feedback Gait Training (AFGT) using smart insole and 22 control group respondents using General Gait Training Group (GGTG). Both groups completed conventional rehabilitation, including conventional physiotherapy and gait training, which lasted for 60 minutes per session, five times per week for 4 weeks. For the treatment	Parameters of spatiotemporal gait, gait symmetry, Timed Up and Go test (TUG), Berg Balance Scale (BBS), and Modified Barthel Index (MBI) in the smart insole training group increased significantly compared to those in the control group. (p-value <0.05) The AFGT system approach is a helpful method to improve gait, dynamic balance, and ADL variables in chronic stroke patients.

				group there was an additional intervention in the form of a "smart insole" twice a week for 4 weeks.	
5	(Derakhshanfar et al., 2021)	Sensory interventions on motor function, activities of daily living, and spasticity of the upper limb in people with stroke: A randomized clinical trial; Iran	Randomized control trial with research area in rehabilitation clinic. The number of samples of 60 respondents with chronic stroke was selected by convenience sampling.	The intervention was conducted for 6 weeks with subjects attending 4 days a week for 45 minutes/session. Participants in the control group received conventional occupational therapy interventions. Meanwhile, the intervention group, apart from the usual occupational therapy services, received exteroceptive and proprioceptive stimulation randomly. The intervention was performed by an occupational therapist.	There was an increase in upper motor function (p-value: 0.001) and activities of daily living (p-value: 0.000) and muscle tone strength (p-value: 0.002). Exteroceptive and proprioceptive stimulation of the upper extremities can be used in the chronic phase of stroke.
6	Tarantino *et al.*, (2021)	Efficacy of a Training on Executive Functions in Potentiating Rehabilitation Effects in Stroke Patients; Italia	Randomized control trial with research area in hospital. The number of samples was 37 respondents with stroke who were divided into 18 respondents in the intervention group and 19 respondents in the control group.	In addition to the intervention group receiving the usual rehabilitation program, there was also training lasting 10 sessions, each about one hour. EF training consists of Working Memory (WM), Interference Control and Inhibition (ICI), Task-Switching tasks, targeting Working Memory (WM), Interference Control and Inhibition (ICI), Task- (TS), and Monitoring (M). The control group only received regular rehabilitation.	Showed that patients who received a combination of training improved their scores on Attentional Matrices (p-value: 0.001) and Phonemic Fluency tests (p-value: 0.02) after the rehabilitation program. In addition, they also showed greater functional improvement in the Barthel scale (p-value: 0.049). So the combination of EF intervention with regular rehabilitation gives a better effect.
7	Jung *et al.*, (2021)	Effects of Self RehAbilitation Video Exercises (SAVE) on Functional Restorations in Patients with Subacute Stroke; Korea Selatan	Quasy experiments with research areas in hospitals and communities. The number of samples was 184 respondents consisting of 88 respondents in the intervention group and 96 respondents in the control group.	The intervention group "Self rehabilitation Video Exercises (SAVE)" in addition to conventional rehabilitation therapy, also received additional self-rehabilitation sessions by watching bedside exercise videos and continuing their exercise independently for 60 minutes daily for 4 weeks. The control group received only conventional rehabilitation therapy. After 4 weeks of hospitalization, both groups were assessed.	Patients in the SAVE group showed a more significant increase in the Berg Balance Scale/BBS component (p-value: 0.002), Modified Barthel Index/MBI (p-value: 0.001), Physical Component Summary/PCS (p-value: 0.013) in Short-Form Survey 36 (SF-36) was compared with the control group.
8	Wang *et al.*, (2021)	Effectiveness of Rehabilitation Nursing versus Usual Therapist-Led Treatment in Patients with Acute Ischemic Stroke: A Randomized Non-Inferiority Trial; China	Randomized control trial with research area in hospital. A sample of 224 respondents consisting of the experimental group (n = 121) and the control group (n = 103).	The experimental group received rehabilitation care from a trained nurse (30 minutes per session, two sessions per day for seven consecutive days). The control group received the therapist-led rehabilitation at the same time and frequency.	Both groups showed significant improvement after seven days in daily activity level (p-value: 0.001) and neurological improvement (p-value: 0.001). However, there was no significant difference between the experimental group and the control group.

DISCUSSION

Stroke Rehabilitation

Stroke patients with motor and sensory have a limited tendency to carry out activities independently. Therefore, with motor and sensory decline, rehabilitative care is needed, so stroke sufferers need to be helped to return to their best functional ability to avoid future reduction in function (Teasell et al., 2020). The primary approach to stroke rehabilitative care is inpatient or outpatient treatment (Magwood et al., 2020). However, about 70% of all stroke patients discharged to outpatient and home care experience problems in carrying out follow-up care. This is due to the lack of family readiness in facing the transition period of changes in the daily activities of stroke sufferers and in carrying out their treatment (Reeves et al., 2017). So far, stroke rehabilitation in the hospital has run smoothly through explicit coordination within the interprofessional team. However, stroke rehabilitation by a community-based interpersonal squad tends to be separate or overlapping services, so recovery and transition from hospital to home-based care is not optimal. Therefore, all parties' roles are needed, such as nurses, doctors, nutritionists, physiotherapists, and others. Community-based stroke rehabilitation aims to reduce the utilization of health services, increase knowledge about stroke risk, increase self-efficacy, and improve quality of life (Magwood et al., 2020).

Early rehabilitation can improve outcomes and quality of life when given correctly. Early rehabilitation management in the acute care setting is critical to optimizing recovery potential and avoiding secondary problems associated with stroke sequelae (Bernhardt et al., 2017). The outcome of hospital-based rehabilitation in stroke patients in the subacute phase is excellent, but it must be designed for long-term rehabilitation. Chen et al. (2001) showed that managing stroke patients who exhibit sequelae after the acute phase require long-term repair. Home rehabilitation research on motor skills of the lower extremities revealed that the months of improvement in motor skills increased significantly. During the first few days and weeks, the brain responds most rapidly to motor training stimuli (Livingston-Thomas et al., 2016).

It has been demonstrated that exteroceptive and proprioceptive stimulation of the upper extremities can alleviate paralysis and improve motor function in chronic stroke patients. Proprioceptive stimulation activates muscle spindles, tendons, and joints to increase mobility and control over motor responses in specific body areas. This form of motivation ensures that the muscle can withstand stress and strain. Exteroceptive stimulation is achieved through the use of a facilitation approach.

Additional rehabilitation activities dose-dependent effect on functional improvement in subacute and chronic stroke patients. Increased intensity and commitment to rehabilitation exercise results in better physical and functional recovery (Jung et al., 2021). Five intervention articles were used in conjunction with proven effective technologies. However, in terms of cost, this limits how long the rehabilitation program can last. In addition, as the majority of stroke patients and caregivers are older, it is essential to perform rehabilitation in an immediate environment such as a home that does not require unique technology if the device is too complex to operate, such as when specific electronic devices are used for rehabilitation, then specialized training may be necessary (S. Chen et al., 2021).

ADL (Activities of Daily Life)

The Barthel Index (BI) measure is used in the articles in this body of literature to evaluate the functional capacity of stroke patients. The Barthel Index (BI), which has been demonstrated to have positive outcomes in assessing or developing a patient's ADL, is used to develop a patient's capacity to do ADL. The Barthel Index has seven self-care activities (bathing, feeding, grooming, bladder and bowel, and toilet usage) as well as three mobility assessments (on the data surface, during transfers, and on stairs) (S. Chen et al., 2021). ADL disorders that are not detected function of the ADL assessment are as initial data to provide appropriate interventions for the condition of stroke patients (P.-W. Chen et al., 2021). ADL disorders that are not detected and do not receive appropriate interventions will affect other stroke patients' abilities, such as cognitive abilities (attention and executive function), motor skills (such as balance and dexterity), psychological abilities (e.g., motivation and depression) (Mlinac & Feng, 2016; Kadkhodaie et al., 2020).

In every article, the intervention group outperformed the control group in their ability to do ADLs. For patients to achieve functional progress, home-based rehabilitation programs have been made available at least equally to hospital-based postoperative rehabilitation programs (including pain relief, walking, balance, and functional ability).This is supported by research conducted by Chen et al., (2021) with the Home-based Rehabilitation Exercise Program (HREPro), a rehabilitation program designed individually for a year in the home environment. This rehabilitation consists of adjusting the patient to navigate the home environment, the home environment, modifying the home environment, and guiding the patient on how to walk safely. In addition, the motivation for independence. The house showed that the intervention group had significantly improved lower extremity motor performance with reduced paralysis, including the Barthel index value, compared to the control group 6 and 12 months after stroke. Home-based exercise programs have also been reported to improve mobility and quality of life in sedentary elderly, even without constant supervision during exercise (López-Liria et al., 2015). Rehabilitation with lower extremity motor recovery is significantly correlated because high speed and leg exercises can improve mobility in patients after stroke (Lodha et al., 2019).

The experimental group had considerably longer strides and a relatively lower percentage of standing duration for the following step on the non-paralyzed side of the leg (W. Y. Huang et al., 2021). Patients with hemiplegic stroke will move and posture asymmetrically. When walking, they frequently transfer their center of gravity to the side paralized (Archer et al., 2018). According to research, adjusting visual cues can enhance motor function by lowering mistakes. This device will be able to treat paresis of limb steps in stroke patients by adding additional illuminators to deliver visual cues. Therefore, by employing a laser wand during rehabilitation, chronic stroke patients can restore their balance and basic functional performance more rapidly and without increasing the danger of falling (W.-Y. Huang et al., 2019). Another research determined that persons with stroke benefit from sensory and motor training for daily living activities, which raised their average Barthel Index score (Eghlidi et al., 2015). For instance, exteroceptive and proprioceptive stimulation of the upper extremities is a component of sensory and motor training rehabilitation programs for stroke patients with chronic phases (Q. Wang et al., 2021).

Decreased sensory function after a stroke can affect the patient's functional ability so that people with sensory and motor disorders, compared to people who only experience motor disorders, will achieve a slower rehabilitation recovery. Therefore, patients with ADL disorders need to consider whether there are other aggravating factors in the ADL recovery process, so it is necessary to design specifically to carry out their rehabilitation (Derakhshanfar et al., 2021).

LIMITATIONS OF THE RESEARCH

Few articles were published internationally on stroke rehabilitation with open access. The search results for articles contain differences in the characteristics of the respondents, so they need to be considered in their application.

CONCLUSION

Home-based rehabilitation will be more effective if there is interpersonal coordination among health workers, families of sufferers, and stroke survivors. The scarcity of supporting resources for stroke rehabilitation, such as equipment and caregiver behavior, is a systemic problem that must be recognized and recommended to increase stroke patients' ADL (Activity Daily Living). Patients who have suffered a stroke with intracranial hemorrhage or ischemic brain injury may experience profound physical changes, especially stroke survivors who do not undergo rehabilitation. Thus, goal planning and restoration are considered critical. However, which rehabilitation approach is superior and for how long is debatable and requires more detailed research. Alternative strategies are needed to increase the number and duration of stroke rehabilitation sessions without increasing health care costs and with increased accessibility. Independent exercise, in which the patient performs activities on their own, is a better option for continuing a stroke rehabilitation program.

ETHICAL CONSIDERATIONS

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Conflict of Interest statement

The author has no conflict of interest with anyone. The focus of the study by the author is related to activity daily living and stroke survivor.

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