JHPM Journal of Health Policy and Management (2022), 07(01): 46-57
Masters Program in Public Health, Universitas Sebelas Maret

Research

Meta-Analysis: Association between Empowerment of Home-Based Rehabilitation Intervention on the Escalation of Functional Ability in Post Stroke Patients

Muhammad Husein Syawaludin[1)], Sumardiyono[2)], Bhisma Murti[2)]

[1)]Masters Program in Public Health, Universitas Sebelas Maret
[2)]Department of Public Health, Faculty of Medicine, Universitas Sebelas Maret

ABSTRACT

Background: Stroke is a disease that is the third leading cause of death in the world after heart and cancer. Stroke is also a disease that causes serious and permanent disability in the first order in the world. The rehabilitation program or recovery of stroke patients will greatly affect the improvement of functional abilities and independence of post-stroke patients, one of the keys to functional improvement is the intensity of therapy and family involvement in supporting the rehabilitation process. This study aims to analyze the relationship between empowering home-based recovery interventions to improve the functional ability of post-stroke patients, with a meta-analysis of primary studies conducted by previous authors.
Subjects and Method: This study is a systematic review and meta-analysis with the following PICO, Population: stroke patients. Intervention: home-based recovery. Comparison: not home based recovery. Outcomes: functional ability. The articles used in this study were obtained from several databases, namely PubMed, Springer Link, Cochrane Database, Hindawi, Elsevier, JBBA, LWW, Google Scholar. Search keywords "home-based" AND "intervention" OR "rehabilitation" OR "exercise" OR "therapy" OR "care" AND "stroke" AND "functional ability" OR "functional capacity" AND "Randomized Controlled Trial " OR " RCT". The articles included are full-text English and Indonesian languages with a study design of a Randomized Controlled Trial from 2000 to 2021 and reporting on the Mean and SD in multivariate analysis. The selection of articles is done by using PRISMA flow diagram. Articles were analyzed using the Review Manager 5.3 application.
Results: A total of 9 randomized controlled trials from Iran, Turkey, Australia, Taiwan, China, Thailand and the Netherlands were selected for a systematic review and meta-analysis. The data collected showed that the home-based recovery intervention improved functional ability in post-stroke patients compared to usual care (SMD = 2.70; 95% CI = 1.53 to 3.87; p<0.001). There is a publication bias that indicates an overestimation).
Conclusion: Home-based recovery interventions improve functional ability in post-stroke patients.

Keywords: Home-based recovery, functional ability, stroke patients, meta-analysis

Correspondence:
Muhammad Husein Syawaludin. Masters Program in Public Health, Universitas Sebelas Maret, Jl. Ir. Sutami 36A, Surakarta 57126, Central Java. Email: fahusein26@gmail.com. Mobile: +6285-728989309.

Cite this as:
Syawaludin MH, Sumardiyono, Murti B (2022). Meta-Analysis: Association between Empowerment of Home-Based Rehabilitation Intervention on the Escalation of Functional Ability in Post Stroke Patients. J Health Policy Manage. 07(01): 46-57. https://doi.org/10.26911/thejhpm.2022.07.01.05.

BACKGROUND

Stroke conditions occur when the blood supply to the brain is cut off due to blockage or rupture of blood vessels, causing cell death in some areas of the brain (Rahayu, 2019).

The blood supply to the brain is reduced due to a stroke causing the brain to be damaged, this condition is known as a brain attack. The brain can function properly when it gets nutrients and oxygen through the blood, with reduced blood supply to the brain that carries oxygen and nutrients causing neurons (brain cells) to die and the connections between brain cell neurons or synapses are lost (Silva et al, 2014).

In the world, stroke occurs in more than 15 million people every year. Of these 15 million people, 5 million died, and others survived, but experienced permanent disabilities and lived dependent on family and society, and a small number of people recovered as before they had a stroke (WHO, 2014). stroke is not productive, in carrying out daily activities must get help from others, so it is necessary to have a recovery program that aims to improve the functional abilities of post-stroke patients so that they can carry out daily activities independently.

The rehabilitation program or recovery of stroke patients will greatly affect the improvement of functional abilities and independence of post-stroke patients, one of the keys to functional improvement is the intensity of therapy and family involvement in supporting the rehabilitation process. The rehabilitation process will be effective if it is carried out continuously in the environment of daily activities, namely at the patient's home so that the patient will be more motivated and adapt to daily activities in the home environment. According to research conducted by Gelaw et al (2020), home-based rehabilitation is an effective option for people with physical disabilities, including stroke patients.

Although the rehabilitation program after stroke theoretically proves to be very good, according to Heron et al (2015), there is not enough information and research on rehabilitation programs, especially home-based rehabilitation for use in the period after a stroke. In the home-based care program for stroke patients, family empowerment is a very important supporting factor for the implementation of the home-based rehabilitation program.

Based on this background, a comprehensive study is needed from various studies of the relationship between empowerment of home-based recovery interventions to improve the functional ability of post-stroke patients. This study aims to analyze the effect of home-based recovery interventions on improving the functional ability of post-stroke patients.

SUBJECTS AND METHOD

1. Study Design

This research is a systematic review and meta analysis. The articles used in this study were obtained from several databases, namely PubMed, Springer Link, Cochrane Database, Hindawi, Elsevier, JBBA, LWW, Google Scholar between 2000 and 2021. The selection of articles was carried out using PRISMA flow diagrams. The keywords to search for articles were as follows “home-based” AND “intervention” OR “rehabilitation” OR “exercise” OR “therapy” OR “care” AND “stroke” AND “functional ability” OR “functional capacity” AND “Randomized Controlled Trial “OR “RCT”.

2. Inclusion Criteria

The inclusion criteria in this research article are: full-text article using a randomized controlled trial study design, research subjects are post-stroke patients, the relationship measure used is Mean and SD, the intervention given is a home-based recovery intervention, the study outcome is functional ability.

3. Exclusion Criteria

The exclusion criteria in this research article were: articles published in languages other

than English and Indonesian, articles before 2000.

4. Operational Definition of Variable

The search for articles was carried out by considering the eligibility criteria determined using the PICO model. Population: stroke patients. Intervention: home based recovery. Comparison: not home based recovery. Outcome: functional ability.

Home-based recovery interventions are the integration or continuation of home care measures for patients that are patient-focused and oriented towards recovery.

Functional ability is defined as a person's ability to carry out specific activities related to the routines of daily life that are integrated into their activity environment.

5. Instrument Study

Research is guided by PRISMA flow diagrams and quality assessment using Critical Appraisal for Randomized Controlled Trial CEBM (Center For Evidence-Based Medicine).

6. Data Analysis

The data in the study were analyzed using the Review Manager application (RevMan 5.3). Forest plots and funnel plots were used to determine the size of the relationship and heterogeneity of the data. The fixed effect model is used for homogeneous data, while the random effect model is used for heterogeneous data across studies.

RESULTS

The article search process was carried out through several journal databases including PubMed, Springer Link, Cochrane Database, Hindawi, Elsevier, JBBA, LWW, Google Scholar. The review process for related articles can be seen in the PRISMA flow diagram in Figure 1. Research related to the effect of home-based interventions on improving functional ability in post-stroke patients consists of 9 articles from the initial search process which yielded 690 articles, after the process of deleting published articles, 634 articles were obtained. with 319 of them qualified for further full text review. A total of 9 articles that met the quality assessment were included in the quantitative synthesis using meta-analysis. It can be seen in Figure 2. that the research articles come from 3 continents, namely Asia (Iran, Turkey, Taiwan, China and Thailand), Europe (Netherlands) and Australia (Australia). Table 1. Researchers conducted an assessment of the quality of the study. Table 2. shows that 9 articles from a randomized controlled trial (RCT) as evidence of the effect of home-based interventions on improving functional ability in post-stroke patients.

Based on the results of the forest plot study, a randomized controlled trial showed that the home-based recovery intervention affected the increase in functional ability in post-stroke patients higher by 2.70 points compared to non-home-based interventions (SMD= 2.70; 95% CI= 1.53 to 3.87; $p<0.001$) , the results were statistically significant. The heterogeneity of the research data shows $I^2= 97\%$ so that the distribution of the data is declared heterogeneous (random effect model).

The funnel plot results show a publication bias with an overestimated effect which is indicated by an asymmetric distribution between the right and left plots. There are five plots on the left, two plots on the right, and two plots touching the vertical line. The plot on the left side of the graph has a standard error (SE) between 1 and 2. The plot on the right side of the graph has a standard error (SE) between 2 and 3. This indicates a publication bias in the direction of overestimating the true effect of home-based recovery interventions (overestimate).

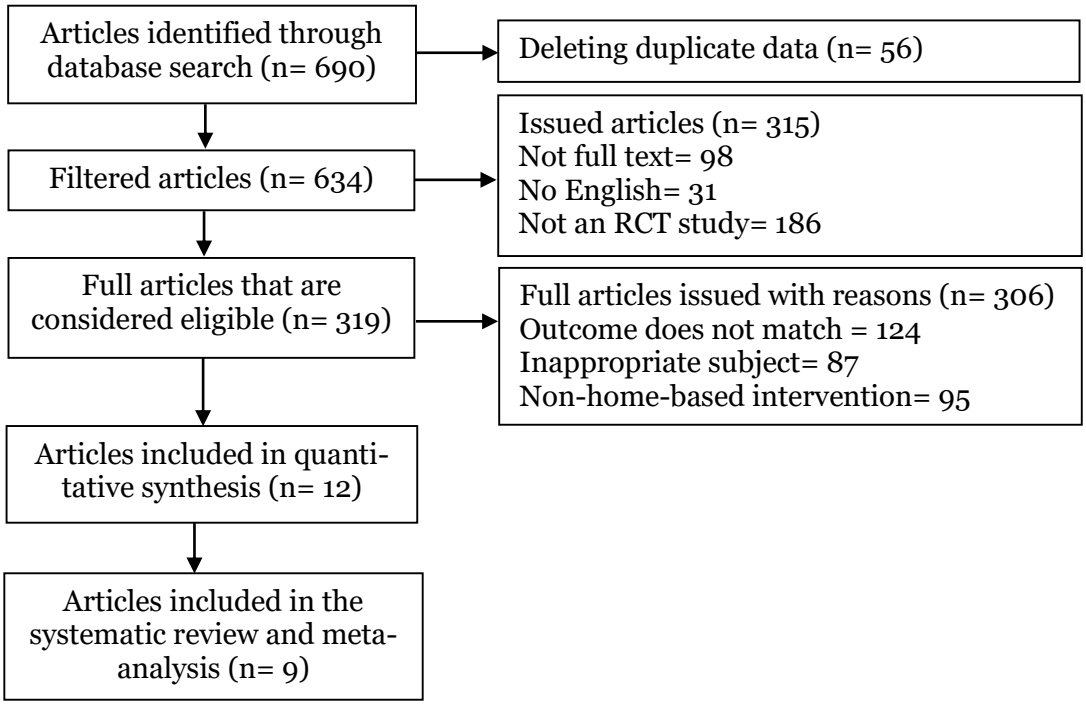

Figure 1. PRISMA flow diagram

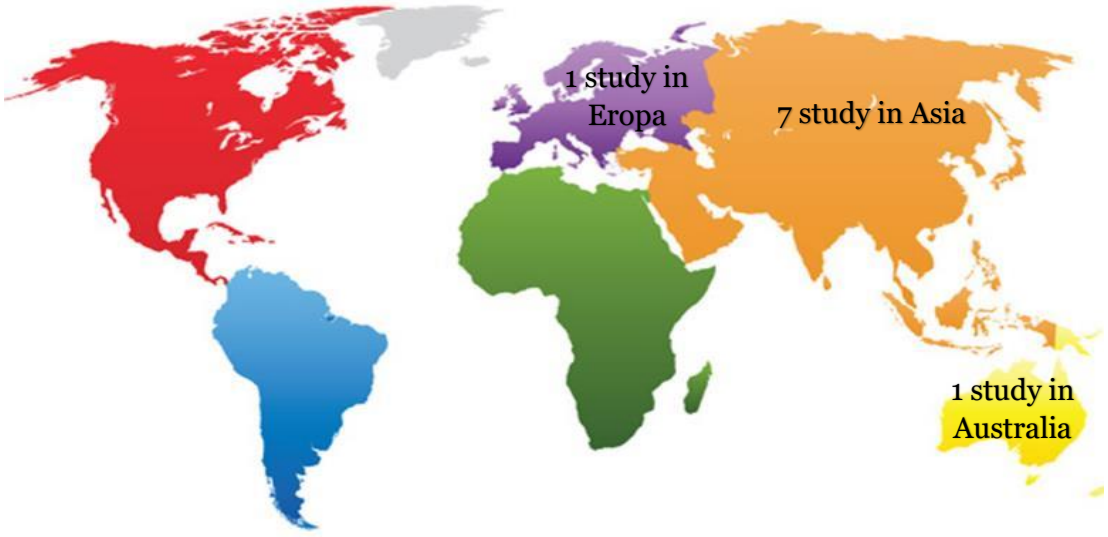

Figure 2. Map of the research area

Table 1. Assessment of study quality published by the Center for Evidence-Based Medicine (CEBM)

No	Questions	Saadatnia et al., (2019)	Koc, (2015)	Anderson et al., (2000)	Vluggen et al., (2021)	Han et al., (2020)	Chaiyawat et al., (2009)	Chaiyawat et al., (2012)	Chen et al., (2017)	Hekmatpou et al., (2019)
1	Does this study address a clear research focus?	1	1	1	1	1	1	1	1	1
2	Is the Randomized Controlled Trial research method appropriate to answer the research question?	1	1	1	1	1	1	1	1	1
3	Are there enough subjects in the study to establish that the findings did not occur by chance?	0	1	1	1	0	1	1	1	1
4	Were subjects randomly allocated to the experimental and control groups? If not, could this be biased?	1	1	1	1	1	1	1	1	1
5	Are inclusion/exclusion criteria used?	1	1	1	1	1	0	0	1	0
6	Were the two groups comparable at the start of the study?	1	1	1	1	1	1	1	1	1
7	Were objective and unbiased outcome criteria used?	1	1	1	1	1	1	1	1	1
8	Are objective and validated measurement methods used in measuring the results? If not, were results judged by someone who did not know the group assignment (ie was the assessment blinded)?	1	1	1	1	1	1	1	1	0
9	Is effect size practically relevant?	0	1	0	1	1	1	1	1	1
10	How precise is the estimate of the effect? Is there a confidence interval?	0	1	1	1	1	1	1	1	0
11	Could there be confounding factors that have not been taken into account?	1	1	1	1	1	1	1	1	1
12	Can the results be applied to your research?	1	1	1	1	1	1	1	1	1
	Total	**9**	**12**	**11**	**12**	**11**	**11**	**11**	**12**	**9**

Table 2. Description of the primary studies included in the meta-analysis primary studies

(Population)	(Intervention)	(Comparison)	(Outcome)	P	I	C	O
Saadatnia et al., (2019)	Iran	RCT	Intervention = 20 Control = 20	Post-acute ischemic stroke patients who have just been hospitalized	3 months telesupervised home-based exercise intensive rehabilitation program	Normal care	Functional ability of daily activities with Barthel Index (MRS,)
Koc, (2015)	Turkei	RCT	Intervention = 35 Control = 37	Patients after subacute stroke. The mean age of the sample is 67 years.	12-week structured, progressive and supervisory home-based exercise program	Normal care	Functional ability of daily activities with the Barthel . Index
Anderson et al., (2018)	Australia	RCT	Intervention = 42 Control = 44	Post-stroke patients who just finished hospitalization. The mean age of the intervention group was 72 years and the control group was 71 years	Home-based rehabilitation program for 6 months	Normal care	The level of independence of daily functional activities with the Barthel Index, Mini Mental State Examination
Han et al., (2020)	Taiwan	RCT	Intervention = 12 Control = 14	Patients after hemorrhagic and ischemic stroke. The mean age of the intervention group was 70.8 years and the control group was 65.4 years	Home-based therapy occupational rehabilitation rehabilitation program for 6 weeks	Normal care	Functional ability (COPM) and Barthel Index-based. Supplementary Scales (BI-SS)
Vluggen et al., (2021)	Belanda	RCT	Intervention = 99 Control = 91	Post-stroke patients. The mean age of the intervention group was 78.9 years and the control group was 79 years	6 month home-based sustainable integrated rehabilitation program	Normal care	Functional ability perceived quality of life (SSQoL) and social participation (IPA)
Chaiyawat et al., (2009)	Thailand	RCT	Intervention = 30 Control = 30	Post-ischemic stroke patients who have just finished hospitalization. The mean age of the intervention group was 67 years and the control group was 66 years	Daily home-based individual exercise rehabilitation program with physiotherapy visits once a week for 3 months.	Normal care	Functional ability of daily activities with Barthel Index, disability scale with (MRS) and measurement of Quality of life with EQ-5D
Chaiyawat et al., (2012)	Thailand	RCT	Intervention = 30 Control = 30	Post-ischemic stroke patients who have just finished hospitalization. The mean age of the intervention group was 67 years and the control group was 66 years	Home-based individual exercise rehabilitation program every day with physiotherapy visits once a week for 6 months.	Normal care	Functional ability of daily activities with Barthel Index, disability scale with (MRS) and measurement of Quality of life with EQ-5D

(Popula-tion)	(Inter-vention)	(Compa-rison)	(Outcome)	P	I	C	O
Chen et al., (2017)	China	RCT	Intervention= 27 Control = 27	Post-ischemic stroke patients who have just finished hospitalization. The mean age of the intervention group was 66.5 years and the control group was 66.1 years	Physical Exercise, ETNS and home-based tele-supervision rehabilitation program for 24 weeks	Normal care	Functional ability activity with Modified Barthel Index, Berg Balance Scale, modified Rankin Scale,
Hekmatpo u et al., (2019)	Iran	RCT	Intervention = 50 Control = 50	Post-stroke patients who use caregiver	Rehabilitation program with home-based education care	Normal care	Quality of life and functional ability

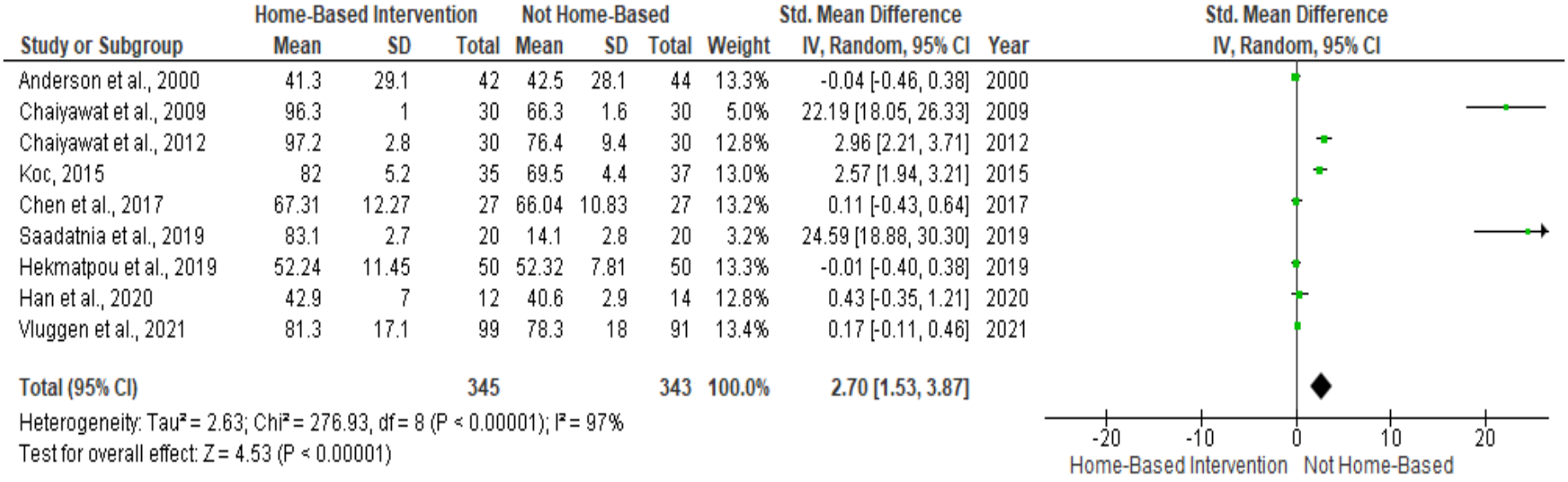

Figure 3. Forest Plot Effect of home-based intervention on improving functional ability in post-stroke patients

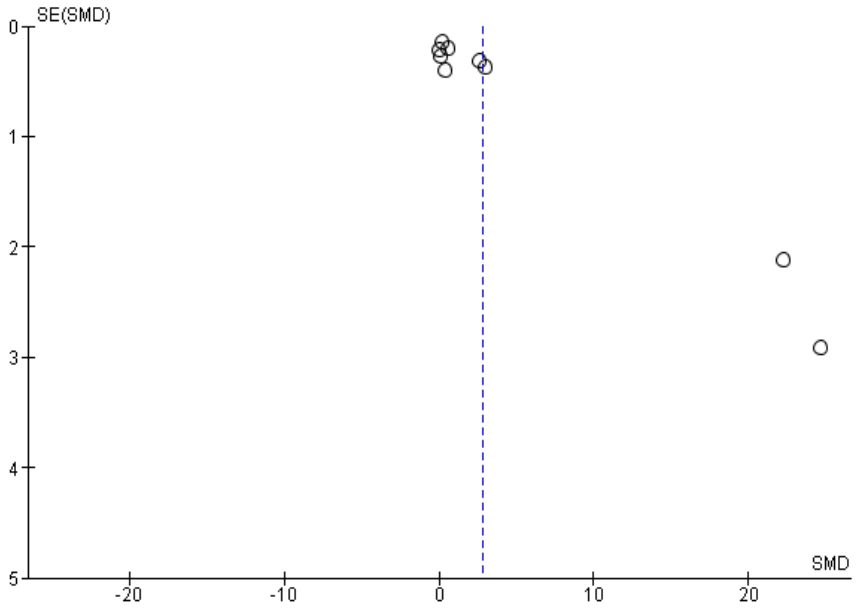

Figure 3. Funnel Plot Effect of home-based intervention on improving functional ability in post-stroke patients

DISCUSSION

Systematic studies and meta-analyses examine the effect of home-based interventions on improving functional ability in post-stroke patients. This study discusses the application of home-based interventions which are considered important because they can be one of the treatments that can be carried out in post-stroke patients to increase exercise intensity and maximize rehabilitation outcomes.

Home-based recovery interventions can improve functional ability in post-stroke patients. This is in line with Chaiyawat et al. (2012) home-based recovery intervention or often called HBR (Home-Based Rehabilitation) is the integration or continuation of home care measures for patients that focus and are oriented towards patient recovery.

In a study conducted by Chaiyawat et al., (2012) reported home-based rehabilitation resulted in greater benefits and levels of functional independence, ability to, and a higher quality of life than usual care. This study involved 60 randomly selected post-ischemic stroke patients. The mean value was 97.2 with a standard deviation of 2.8 in the experimental group and in the control group the mean was 76.4 with a standard deviation of 9.4.

An article from Pallesen et al., (2019) stated that home rehabilitation is at least as effective as an outpatient rehabilitation program in hospital rehabilitation, in terms of functional recovery and quality of life in post-stroke patients. A study by Dodakian et al., (2017) evaluating the efficacy of home-based telerehabilitation for stroke survivors showed that the home-based system was effective in providing recovery, education, and secondary stroke prevention to participants.

Home-based recovery interventions can have a positive effect on improving the functional abilities of post-stroke patients which are closely related to the five components of the home-based recovery intervention, namely, home aid and modification, home care, and home nursing. and family help), social support (social support) and

home-based primary care programs from medical groups such as doctors, nurses, physiotherapy, multidisciplinary occupational therapy (home-based primary care) (Rezaei et al., 2019).

Modification of adjustment to home conditions is very important to support the recovery process of post-stroke patients, especially in terms of increasing their functional abilities. Modifications can greatly help post-stroke patients in the exercise process and make it easier for patients to carry out daily activities. Biering-Sorensen et al., (2009) explained that modifications can be in the form of adjusting seats, beds, handles in the bathroom to the use of modifications to kitchen utensils. With adjustments to these home appliances, it will greatly assist patients in practicing and improving functional abilities.

Family support is likened to a process that occurs throughout life with different characteristics and types at each stage of life. There are four kinds of family support, namely instrumental support, appreciation support, emotional support and informational support. In instrumental support, the family acts as a source of practical help and facilities during the treatment period. This study emphasizes that the family here acts as an intermediary between stroke sufferers and health services, for example dropping and picking up patients for therapy, being a source of financial care or providing health funds because stroke sufferers cannot work. Apart from that, another thing that families can do is to help sufferers if they have difficulty in doing something. This support is most effective when it is appreciated by the sufferer and can reduce depression.

Support in which the family expresses appreciation and positive assessment of the sufferer. Support for this award is rarely done because it is not used to express. This support serves to encourage the sufferer, so that they are more enthusiastic in carrying out rehabilitation. This support also means providing motivation. With the motivation, the patient will be more active in practicing and the desire to recover will appear (Lingga, 2013). So that family and social support is very influential on the optimal process of home-based recovery interventions being carried out by post-stroke patients, both from the spirit, motivation and intensity of the exercise program carried out.

Scientifically, the recovery of post-stroke patients is closely related to the theory of neuroplasticity and motor learning. Kandel et al., (2000), in Raine et al., (2019), describe plasticity as a potential that bodes well for each of us as individuals. It is the ability of the central nervous system (CNS) to be manipulated and restructured by a programmed recovery intervention process which is the key to successful rehabilitation.

Motor learning (motor learning) refers to permanent changes in an individual's motor performance as a result of practices or recovery interventions performed (Wishart et al., 2000; Lehto et al., 2001; in Raine et al., 2019). Motor learning principles help identify how we can best manipulate individuals, tasks and the environment to effect long-term neuroplastic changes to improve motor performance in individuals.

There are a number of stages required in learning a new skill. This stage is described as a development from a cognitive level to an automatic level characterized by increasingly refined performance and shows a continuous learning process (Wishart et al., 2000; Haslband and Lange, 2006; in Raine et al., 2019). This process indicates the development of cortical representations for the learning of new skills. Motor learning

theory requires active participation, practice, and meaningful goals (Schimdt, 1991; Winstein et al., 1997; in Raine et al., 2019)

Home-based recovery interventions for post-stroke patients programmed by medical and paramedical professionals in synergy with the patient's family and environment have a very supportive role for optimal brain plasticity and the concept of motor learning in improving the functional abilities of post-stroke patients.

Other things that affect the success of home-based interventions are knowledge and education of families and patients, attitudes and family support as well as facilities and the active role of health services provided. Family knowledge is influenced by family education where the higher a person's education level, the higher the knowledge about something, as well as family knowledge about stroke and the recovery process. Good knowledge will certainly affect the attitude of the family. Therefore, if the family has good knowledge then the attitude shown by the family is a positive attitude. This means that if the family's knowledge is good, they will have a supportive attitude and play an active role in this home-based recovery intervention. Decisions made by family members and support for participating in rehabilitation programs will also affect the speed of post-stroke patients to achieve independence (Karunia, 2016). This is in line with research conducted by Rinajumita (2011), which states that there is a significant relationship between family support and independence in activities of daily living..

AUTHOR CONTRIBUTION

Muhammad Husein Syawaludin is the main researcher who chooses the topic, searches for and collects research data. Sumardiyono and Bhisma Murti analyzed data and reviewed research documents.

FUNDING AND SPONSORSHIP

This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

ACKNOWLEDGEMENT

We thank the database providers PubMed, Springer Link, Cochrane Database, Hindawi, Elsevier, JBBA, LWW, Google Scholar.

REFERENCE

Andeson C, Rubenach S, Mhurchu CN, Clark M, Spencer C, Winsor A (2000). Home or Hospital for Stroke Rehabilitation? Results of a Randomized Controlled Trial: I Health Outcomes at 6 Months. Am. Heart J. 31(5):1024-31. https://-doi.org/10.1161/01.str.31.5.1024.

American Heart Association (AHA). (2018). Guideline for the early management of patients with acute ischemic stroke: A guideline for healthcare profesionals. J Am Heart Assoc. 50(12): e344-e418. https://doi.org/10.1161/STR.0000000000000211.

Biering-Sørensen T, Hansen RB, Biering-Sørensen F (2009). Home aids and personal assistance 10-45 years after spinal cord injury. Spinal Cord. 47: 405-12. Doi: 10.1038/sc.2008.132.

CEBM (2021). Critical appraisal tools Center for Evidence-Based-Medicine. Retrieved from https://www.cebm.ox.ac.uk-/resources/ebmtools/criticalappraisal-tools.

Chaiyawat P, Kulkantrakorn K, Sritisukho P (2009). Effectiveness of home rehabilitation for ischemic stroke. Neurol. Int. 1(1):e10. https://doi.org/10.4081-/ni.2009.e10.

Chaiyawat P, Kulkantrakorn K (2012). Effectiveness of home rehabilitation program for ischemic stroke upon dis-

ability and quality of life: a randomized controlled trial. Clin Neurol Neurosurg. 114(7): 866-70. https://doi.org/10.1016/j.clineuro.2012.01.018.

Chen J, Jin W, Dong WS, Jin Y, Qiao FL, Zhou YF, Ren CC (2017). Effects of home-based telesupervising rehabilitation on physical function for stroke survivors with hemiplegia randomized controlled trial. Am J Phys Med Rehabil. 96(3):152-160. https://doi.org/10.1097/phm.0000000000000559.

Cochrane. (2014). RevMan 5.3 User Guide. The Cochrane Collaboration

Dodakian L, McKenzie AL, Le V, See J, Pearson-Fuhrhop K, Quinlan EB, Zhou RJ, et al. (2007). A home-based telerehabilitation program for patients with stroke. Neurorehabil Neural Repair. 31(10-11): 923-933. https://doi.org/10.1177/1545968317733818.

Gelaw AY, Janakiraman B, Gembremeskel BF, Ravicandran H (2020). Effectiveness of Home-based rehabilitation in improving physical function of person with stroke and other physical disability: A Systematic review of randomized controlled trials. J Stroke Cerebrovasc Dis. 29(6): 104800. https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.104800.

Han DS, Chuang PW, Chiu EC (2020). Effect of home-based reablement program on improving activities of daily living for patients with stroke A pilot study. J Med. 99(49):e23512. https://doi.org/10.1097/md.0000000000023512.

Hekmatpou D, Baghban EM, Dehkodi LM (2019). The effect of patient care education on burden of care and the quality of life of caregivers of stroke patients. J Multidiscrip Healthc. 12: 211-217. https://doi.org/10.2147/jmdh.s196903.

Karunia E (2016). *Hubungan antara dukungan keluarga dengan kemandirian* activity of daily living pasca stroke (The relationship between family support and independence activity of daily living post stroke). JBE Unair. 4(2): 213-224. http://e-journal.unair.ac.id/JBE/article/view/2147/2462.

Koc A (2015). Exercise in patients with subacute stroke: A randomized, controlled pilot study or home-based exercise in subacute stroke. Work. 52(3): 541-7. https://doi.org/10.3233/wor-152156.

Lingga L (2013). All about stroke: Hidup sebelum dan paska stroke (All about stroke: Life before and after stroke). Jakarta: PT Elex Media Komputindo.

Pallesen H, Bjerk M, Pedersen AR, Nielsen JF, Evald L (2019). The effects of high-intensity aerobic exercise on cognitive performance after stroke: a pilot randomised controlled trial. J Cent Nerv Syst Dis. 11: 1179573519843493. https://doi.org/10.1177/1179573519843493.

Rahayu UB. (2019). *Fisioterapi Neurologi Pada Sistem Saraf Pusat* (Neurological Physiotherapy in the Central Nervous System). Surakarta: Muhammadiyah University Press.

Raine S, Ellerington ML, Meadows L (2019). Bobath Concept, Teori & Praktik Klinis dalam Rehabilitasi Neurologis. Jakarta. EGC

Rezaei M, Sharifi A, Vaccaro AR, Movaghar VR (2019). Home-based rehabilitation programs: promising field to maximize function of patient with traumatic spinal cord injury. Asian J Neurosurg. 14(3): 634-640. https://doi.org/10.4103/ajns.ajns_86_17.

Rinajumita (2011). *Faktor-faktor yang Mempengaruhi Kemandirian Lansia di Wilayah Kerja Puskesmas Lampas*

Kecamatan Payakumbuh Utara Tahun 2011 (Factors Affecting Elderly Independence in the Working Area of the Lampas Health Center, North Payakumbuh District in 2011). Padang: Universitas Andalas.

Saadatnia M, Khorvash F, Shahnazi H, Ghashghagi FE. The impact of home-based exercise rehabilitation on functional capacity patien with acute ischemic stroke: A randomized controlled trial. Home Health Care Manag Pract. 32(3). https://doi.org/10.1177%2F1084822319895982.

Silva DAD, Narayanaswamy V, Artemio AR, Loh PK, Yair L (2014). Understanding Stroke A Guide for Survivors and Their Families. http://www.neuroaid.com/

Vluggen TPMM, Haastregt JCM, Tan FE, Verbunt JA, Heugten CMV, Schols JMGA (2021). Effectiveness of an integrated multidisciplinary geriatric rehabilitation programme for older persons with stroke: a multicentre randomised controlled trial. BMC Geriatrics. 21(1):134. https://doi.org/10.1186/s12877-021-02082-4.

World Health Organization (2014). Stroke, Cerebrovascular Accident. Retrieved October 1, 2021, from http://www.who.int/topics/cerebrovascular_accident/en/.