




Review

The Motor Imagery (MI) Intervention and Rubber Ball Grafting Therapy on Rehabilitation and Increasing Motor Strength in Stroke Patients: Literature Review

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ARTICLE INFO	ABSTRACT
<p>Article History Submit : Marc 30, 2024 Revised : Jun 24, 2024 Accepted : Jun 24, 2024</p> <p>Keywords: Motor Imagery (MI), Therapy Gripping A Rubber Ball, Stroke Rehabilitation, Strength Motor, Stroke</p>	<p>Background: Strokes are A disease caused narrowing of the vessels blood to the brain, which can obstruct Genre blood and also oxygen to the brain, and also can stop. Objective from the literature review This is For now influence motor imagery (MI) intervention and therapy holding a rubber ball to rehabilitation and improvement strength motor skills in stroke patients . Methods: Article methodology This is a literature review that searched the following databases: Science Direct, PubMed, and Google Scholar for articles published between 2019 and 2024 that dealt with the following topics: motor imagery (MI), therapy involving a rubber ball, rehabilitation after a stroke, motor strength, and stroke. Results: From the results of identification based on inclusion criteria and review of eligibility, 10 articles were obtained for review . Studies literature review obtained results that There is influence motor imagery (MI) intervention and therapy holding a rubber ball to rehabilitation and improvement strength motor skills in stroke patients . Conclusion: The Motor Imagery (MI) Intervention and Rubber Ball Grafting Therapy may be recommended for patients who have muscle strength problems in stroke patients in rehabilitation centers.</p>
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Introduction

Strokes are A disease caused narrowing of the vessels blood to the brain , which can obstruct Genre blood and also oxygen to the brain , and also can stop . If it happens blockage Can makes the nervous system stops , the supply of blood and oxygen will die , which makes the internal organs connected bodies with the nervous system will

difficulty or even No can move (Dwi Rahmawati & Tamara Yuda, 2022)

In 2020 WHO reported that there is a total of 7.6 million patients who have had a stroke as well happen enhancement patient at each the year an estimated 500,000 and 125,000 people died because of a stroke. 10 of reason death according to the registration system until (SRS) is a disease that is not infectious disease (NCD) which is where stroke

occupies number First, disease heart occupy number second and third occupied diabetes. The increase in stroke is very high. The highest number of stroke cases in Indonesia experienced by people aged >75 years with stroke sufferers 50.2%. This stroke No occurs with age-old Of course, you can have a stroke attack from various age that is from aged 15-24 years with 0.6%, at the age of 24-34 years a total of 1.4%, for aged 35-44 years amounting to 3.7%, and aged 45-54 years with a total of 14.3% (Dwi Rahmawati & Tamara Yuda, 2022)

Stroke patient with limitations functional extremities above is very vulnerable to problem in do activity everyday (Ikbali Afsar et al., 2018). Moment here, some technique treatment advanced has developed and used For stroke sufferers. However Thus, we face a number of challenge in rehabilitation after a stroke. In practice clinical, recovery extremities top and function hand after a difficult stroke (Liu et al., 2024).

Lots of motor imagery training (MIT) used in rehabilitation function motor extremities on after a stroke as technology intervention central active (Villa- Berges et al., 2023). MIT does not own condition special For level function motor patient. Patient can increase performance motor they with repeatedly imagine and simulate prescribed actions (Wang et al., 2019). Studies This observes that motor imagery as a technique complementary to increase function of motor limbs (Liu et al., 2024)

Use hand man play role important in part big function social and cognitive, incl do part big activity life daily life and activities work. Skills motor hand or ability For finish task in a way accurate, fast, and reasonable influence continuity life. This

technique reach purposeful movement in humans. When complexity movement hand increased, interaction system nerve center increase For support effective functionality (Choi et al., 2022). Physical training rehabilitation has carried out by a therapist very a day and sometimes three times per week in the morning day, but not optimal because limitations personnel therapists and facilities. Nurses who work in the stroke field have role main For practice patient the result of 24 hours of being near patient and when patient return to home, family and patient feel difficult For get access to rehabilitation. One easy therapy done is holding a rubber ball (Pongantung et al., 2019)

According to study Daya (2017) explains that There is effect significant to therapy active Grip the rubber ball on force muscles in non-hemorrhagic stroke patients. Squishy therapy can speed up healing stroke patients, because will influence sensation movement in the brain. Le Mone (2016) stated that therapy exercise physique with holding a rubber ball can help recovery stroke patients, increase use extremities and strengthening muscle weak. Objective intervention therapy exercise physique with the squishy method is For increase strength muscle extremities above and prevent complications in stroke patients. Therefore that, knowledge about education health and mobility physicality is very necessary for stroke patients and caring families they related problem disturbance mobility physique (Biantara et al., 2023)

From the introduction the on writer want to do related literature review influence intervention motor imagery (MI) and therapy holding a rubber ball to rehabilitation and strength motor skills in stroke patients.

articles were obtained for review .
Search and Selection Results Studies

Methods

Method used in article This that is *literature review* with using a journal database from *science direct* , *pubmed* , and *google scholar* in range time 2019-2024 with the keywords Motor Imagery (MI), therapy grasping a rubber ball , stroke rehabilitation , motor strength , stroke. From the results of identification based on inclusion criteria and review of eligibility, 10 articles were obtained for review .

Data obtained in form Language England , article *full text, open access* with use *boolean operators (AND, OR)* . Criteria Inclusion : 1) post-stroke patients who experienced disturbance extremities movement, 2) cooperative stroke patients undergo rehabilitation independent . Criteria Exclusions : 1) post-stroke patients who experience total bed rest.

Articles that have been obtained from the database will done evaluation with use PICOS method is appropriate with criteria inclusion and exclusion , which contains about 1) Title article , 2) Author and year publication article , 3) Methodology research (population , sample , intervention , and analysis) 4) Research results 5) Conclusion

Results

Total 1 440 article journal identified and then done deletion duplicate and automatic tools so that remains 675 article journal to stay away . It then excluded a total of 275 articles journal based on 5 years finally , the experimental test method with a *Randomized Controlled Trial design (RCT)* in Language English , *full text, open access* so that earned 400 article journal and excluded 225 article journal so that taken 175 article journal study to be reviewed for eligibility, so that 10

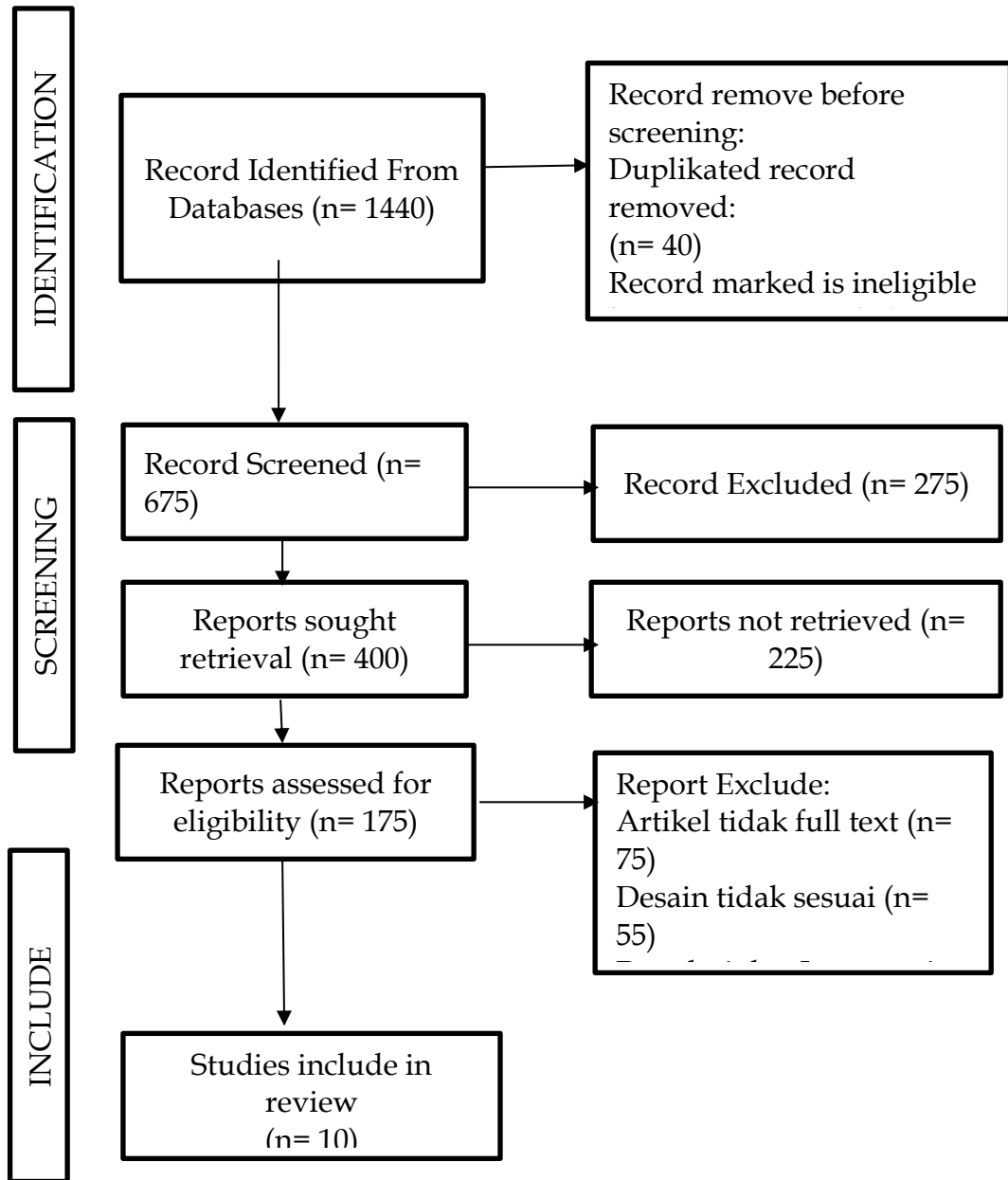


Table 1 Methods Data Distraction

No	Title and Author	Method	Results	Conclusion
1	Effect therapy grip the ball with force muscle extremities on the patient post- stroke at Stella Maris Hospital, Makassar (Pongantung et al., 2019)	D: Pre-experiment with one group pre-post test S: 14 respondents man and woman after experiencing a non- hemorrhagic stroke weakness extremities above , aged between 44-75 years V: Independent “ holding the ball.” Dependent “ power muscle extremity on the patient post- stroke” I: Handgrip Dynamometer A: paired sample t-test	This data show that There is effect therapy grip the ball with force muscle extremities on the patient post- stroke .	Based on results Therefore , it is recommended that energy health use exercise holding the ball as intervention For increase strength arm .
2	Application Squishy intervention With Active ROM Combination For Increase Strength Muscle Hands in Stroke Patients (Biantara et al., 2023)	D: Study case for 6 days S: stroke patient V: Independent “ squishy intervention with active ROM combination ” Dependent “ increase strength muscle hands in stroke patients I: inspection of hemodynamics and strength of muscle A: -	Masterpiece scientific This shows that with a squishy intervention combination of active ROM for 6 days, yes enhancement strength significant muscle tone in the extremities right on before intervention worth 2 and after intervention worth 4	Application squishy intervention in non-hemorrhagic stroke patients with weakness muscle hand can in a way effective increase strength muscle . For 6 days found that happen enhancement strength muscles in the extremities right above in non-hemorrhagic stroke sufferers , where range movement in the extremities up and down value 4, ie there is contraction muscle or motion reflex , capable move joints , capable oppose gravity for 10 seconds .
3	Effect of Cylinder Training On On Power Grip in Stroke Patients (Santoso et al., 2021)	D: Pre Experiment with pre and post-tests S: 16 ischemic stroke patients V: Independent “ influence of Cylinder exercise active.” Dependent “ Power grip in stroke patients.” I: handgrip dynamometer and questionnaire A: Wilcoxon non-parametric test	Statistical test results obtained p-Value strength value grip is 0.001, which means p-Value of strength grip $\alpha(0.05)$.	Can concluded that there is significant influence from Cylindrical Grip Active ROM exercises against grip strength
4	Effects of Motorcycle Imagery Training for Lower Limb Dysfunction inPatients With Strokes(Zhao et al., 2023)	D: <i>systematic review</i> S: 23 journals V: Independent “ effect motor imagery training ” Dependent “ dysfunction extremities lower in stroke patients.” I: Device soft RevMan 5.3 was used for meta-analysis A: -	Combined motor imagery training with therapy rehabilitation conventional versus therapy rehabilitation conventional show significant benefits in function motor ,function balance , variable style walk temporospatial (speed walking , long pace , and cadence) and activity life daily	Training imaging motor – therapy rehabilitation conventional own more effect good at recovery function motor extremities lower in patients poststroke than therapy rehabilitation conventional , which is probably the most useful For function motor extremities lower in 7 days First up to 6 months .
5	Motor imagery therapy improved upper limb motor	D: control test random	FC between cortex ipsilesional primary motor (M1. I) and	MIT and CRT impact the network brain in a way



No	Title and Author	Method	Results	Conclusion
	function in stroke patients with hemiplegia by increasing functional connectivity of sensorimotor and cognitive networks(Liu et al., 2024)	S: 26 stroke patients V: Independent “ Motor imagery therapy improves function motor extremities above in hemiplegic stroke patients.” Dependent “ increase connectivity sensorimotor and network function cognitive.” I: FMA-UL and MBI scores A: chi-square	supplementary motor areas contralateral (SMA. C), M1. I and ipsilesional SMA (SMA. I), and SMA. C and contralateral dorsolateral premotor cortex (DLP. C) increased in a way significant in the group control but decreased in the MIT group ; whereas FC between high schools. C and cortex Contralateral primary somatosensory (S1. C) increased in a way significant in the group control but No show significant differences in the MIT group .	different and creating Different SMN FC patterns in stroke patients . Next , results study show increased intra-FCs in SMN in patients with CRT. However, MIT combined with CRT increases the FC of SMN and networks cognitive in patients .
6	The Effect of Action Observations Combined with Motorcycle Imagery Training on Upper Extremity Function and Corticospinal Excitability in Strokes Patients(Choi et al., 2022)	D: control test random S: 45 patients V: Independent “ influence motor imagery intervention (MI) with action observation (AO).” Dependent “ function extremities top and activation corticospinal in stroke patients.” I: MEP, FMA-UE, WMFT, MAL A: chi-square	As results from study this , AO with MI is effective in increase function extremities up and up Activation marrow bone behind cortex in patients with a major stroke with movement limited	Possible interventions accessed by rehabilitation based House through education For stroke patients and caregivers own A little cost economy .
7	Effectiveness of ROM and Therapy Rubber Ball Grip in Increase Strength Muscles in Stroke Patients (Dwi Rahmawati & Tamara Yuda, 2022)	D: study case S: 3 respondents had non - hemorrhagic stroke V: Independent “ Effectiveness of ROM and Therapy Rubber Ball Grip ” Dependent “ increase Strength Muscles in Stroke Patients ” I: SPO, sheet measurement strength muscles and rubber balls A: -	Study results case show enhancement strength muscles in the extremities client . Conclusion ROM exercises and therapy hold a rubber ball can used For non-hemorrhagic stroke problems that have disturbance mobility physique Because can happen enhancement strength muscle .	There is exists enhancement strength muscles in the extremities client after done application exercise <i>Range Of Motion</i> and therapy hold a rubber ball on the patient with a stroke, after done action nursing for five days in 10 meetings in the third respondents .
8	Motorcycle imagery for gait rehabilitation after strokes (Silva et al., 2020)	D: <i>Systematic Review</i> S: 21 journals V: Motor imagery (MI) for style walk after a stroke I: Device soft RevMan 5.3 was used for meta-analysis A: Manager review 5	There is evidence very low certainty that MI is more beneficial For increase style walking (speed walking) compared with other therapy at the end treatment (pooled standardized mean difference (SMD) 0.44; 95% confidence interval (CI) 0.06 to 0.81; P = 0.02; six studies ; 191 participants ; IO = 38%).	Proven very low certainty about benefit period short MI on speed walking in individuals who have had a stroke, compared with therapy other . Proof no Enough For estimate Effects of MI on dependence on aid personal and power stand walk
9	Graded motorcycle imagery training US a home exercise program for upper limb motor function in patients with chronic strokes (Ji et al., 2021)	D: control test random S: 42 stroke sufferers V: Independent “ phased MI training as a home exercise program ”	FMA and MFT scores improved in a way significant along time . Extremity MFT score on increase in a way important in the GMI group compared with control (Fig . 3). All results functional other No different in a way significant between the 2 groups .	We hypothesize that GMI training at home will increase function motor extremities on the patient with chronic stroke : increase small However significant observed . Size effect more small from



No	Title and Author	Method	Results	Conclusion
		Dependent " motor function of the extremities above in chronic stroke patients."		which was reported in non - randomized trials , however in same direction .
		I: FMA and MFT scores		
		A: -		
10	Motor networks reorganization after motor imagery training in strokes patients with moderate to severe upper limb impairment (Wang et al., 2022)	D: control test resourceful S: 39 stroke patients with disturbance extremities on V: Reorganization network motor after MI training in stroke patients with disturbance extremities on currently until heavy I: Evaluation Fugl -Meyer Upper Limb Scale (FM-UL) and Barthel Index (BI) A: Shapiro-Wilk test	MIT group reached more improvement high on FM-UL and relative BI to group control after treatment . Passive movement affected hand awaken pattern Abnormal bilateral activation in both group before intervention . Interaction <i>Group × Time</i> significant found in contralesional S1 and ipsilesional M1, shows decline Activation after intervention especially in the MIT group , which was correlated negative with FM-UL increase . FC analysis of the ipsilesional M1 displays reorganization deep motor network cleavage ipsilesional , which is associated with change motor score .	MIT can reduce action excessive in both cleavage brain and organize repeat network internal motor cleavage ipsilesional , so promote function motor extremities on during stroke recovery .

Discussion

Based on results reviewed 10 journals obtained results that There is influence motor imagery (MI) intervention and therapy holding a rubber ball to rehabilitation and strength motor skills in stroke patients . According to (Heni et. al 2019) with using quasi- experimental tests obtained results There is effect therapy grip the ball with force muscle extremities on the patient post- stroke . Based on results Therefore , it is recommended that energy health use exercise holding the ball as intervention For increase strength arm (Pongantung et al., 2019)

According to (Irgi et. al 2023) with using study tests case obtained results with squishy intervention combination of active ROM for 6 days , yes enhancement strength significant muscle tone in the extremities right on before intervention worth 2 and after intervention value 4. Application squishy intervention in non- hemorrhagic stroke patients with weakness muscle hand can in a way effective increase strength muscle (Biantara et al., 2023)

According to (Budi & Gini, 2021) with using pre- experimental tests obtained results p-Value strength value grip is 0.001, which means p-Value of strength grip $< \alpha$ (0.05), present significant influence from Cylindrical Grip Active ROM exercises against grip strength (Santoso et al., 2021) . According to (Li Juan et. al, 2023) through *systematic review* obtained results Combined motor imagery training with therapy rehabilitation conventional versus therapy rehabilitation conventional show significant benefits in function motor , function balance , variable style walk temporospatial (speed walking , long pace , and cadence) and activity life daily (Zhao et al., 2023)

According to (Wan Liu et. al, 2024) with using control tests random obtained results MIT and CRT impact the network brain in a way different and creating

Different SMN FC patterns in stroke patients . Next , results study show intra-FCs increase in SMN in patients with CRT. However, MIT combined with CRT increases the FC of SMN and cognitive networks in patients (Liu et al., 2024)

According to (Jong et. al, 2022) with using control tests random obtained results AO with MI is effective in increase function extremities on and improve Activation marrow bone behind cortex in patients with a major stroke with movement limited (Choi et al., 2022)

According to (Yunita & Hendri , 2022) with use design studies case obtained results enhancement strength muscles in the extremities client . Conclusion ROM exercises and therapy hold a rubber ball can used For non- hemorrhagic stroke problems that have disturbance mobility physique Because can happen enhancement strength muscle (Dwi Rahmawati & Tamara Yuda, 2022)

According to (Silfa et. al, 2020) via *systematic review* obtained results There is evidence very low certainty that MI is more beneficial For increase style walking (speed walking) compared with other therapy at the end treatment (pooled standardized mean difference (SMD) 0.44; 95% confidence interval (CI) 0.06 to 0.81; P = 0.02; six studies ; 191 participants ; IO = 38%)(Silva et al., 2020). According to (Eun Kyu et. al, 2021) with using control tests random obtained results FMA and MFT scores improved in a way significant along time . Extremity MFT score on increase in a way significant in the GMI group compared with control . All results functional other No different in a way significant between the two groups (Ji et al., 2021). According to (Hwei et al., 2022), by using control tests and random obtained results, MIT can reduce action excessive in both cleavage brain and organize repeat network internal motor cleavage is-signal , so promote function of

motor extremities during stroke recovery (Wang et al., 2022)

Conclusion

From reviewing 10 articles on related motor imagery (MI) intervention and therapy gripping a rubber ball is very effective For help stroke patients do rehabilitation in a way independent or help family at home and able increase strength motor skills in affected extremities decline strength muscle . Expected in research furthermore added social family support to obedience Stroke patients do motor imagery (MI) and therapy holding a rubber ball To use increase strength motor .

Authors Contributions

The authors' contributions to this literature review are comprehensive and synergistic: one author conducted an exhaustive literature search, identified seminal works, and developed a comprehensive database of sources; another author critically analyzed the literature, synthesized key findings, and contextualized them within the study's theoretical framework; while a third author meticulously organized the manuscript, integrated diverse perspectives, and ensured logical flow and coherence throughout the narrative.

Conflicts of Interest

The research team declares that no conflicts of interest, whether financial, personal, or professional, existed at any stage of this study, ensuring that the research was conducted with complete independence and integrity.

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review and ensuring a comprehensive and robust framework for this research.

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