14 (1) (2025) 239 - 244
Journal of Physical Education, Sport, Health and Recreations
https://journal.unnes.ac.id/journals/peshr

Exercise for Dysphagia Pasca Stroke : A Literature Review

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Article History

Received February 2025
Accepted February 2025
Published Vol.14 No.(1) 2025

Keywords:
Stroke; Dysphagia; Exercise; Rehabilitation

Abstract

Stroke causes many complications, one of which is dysphagia which is common after a stroke. Medical complications of dysphagia include the risk of aspiration pneumonia which results in increased hospitalization and morbidity. Several approaches to treating dysphagia can be taken including exercise therapy interventions. The aim of this study was to examine the effects of exercise for stroke patients with dysphagia. The method of this research was to look for studies related to exercise in post-stroke dysphagia and review them using an electronic database. Search for articles to review using the keywords "exercise", "dysphagia", and "stroke" and their combinations. The results of data extraction found a total of five pieces of literature which were thoroughly reviewed in the form of resistance training combined with kinesiology taping, group-based training, lingual strengthening exercise, Inspiratory and Expiratory Respiratory Muscle Training (IEMT), and McNeill Dysphagia Therapy Program (MDTP) exercises, showing that training for post-stroke dysphagia not only improves swallowing ability but can also improve mood, quality of life, and swallowing efficiency and reduce the cost of post-stroke dysphagia treatment. The conclusion of the review study was that in general exercise can overcome post-stroke dysphagia.

How to Cite

Dewi, A. F., Rahayu, U. B., & Subandi. (2025). Exercise for Dysphagia Pasca Stroke : A Literature Review. Journal of Physical Education, Sport, Health and Recreation, 14 (1), 239-244.

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p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Stroke is the leading cause of death and disability worldwide (Ma et al., 2022). Stroke is the 3rd leading cause of death worldwide and the most common cause of disability in adults (Insani & Ngkolu, 2020). One of the common and significant symptoms after stroke is dysphagia. Dysphagia or difficulty swallowing, affects one-third to more than two-thirds of patients after stroke (Falsetti et al., 2009). Dysphagia leads to medical complications, including increased hospitalization, morbidity, and risk of aspiration pneumonia (Singh & Hamdy, 2006). The condition is associated with poor psychosocial health outcomes, such as reduced nutrition, hydration, and quality of life (M. Arnold et al., 2016). Patients with dysphagia have a longer length of hospital stay and higher healthcare costs (Pacheco-Castilho et al., 2022). Depending on the affected area and its severity, stroke can cause damage to the area of neurological control of swallowing, which can lead to dysphagic disorders (Ickenstein et al., 2012).

Dysphagia is common in post-stroke individuals and contributes to poorer long-term outcomes, including functional dependence (Rofes et al., 2018). It is reported that dysphagia may be associated with poor functional recovery, post-stroke depression, and prolonged hospitalization (Hien et al., 2024). There are various approaches to treat dysphagia, ranging from medication to surgery (Liao et al., 2017). According Balcerak et al., 2022 submitted that interventional treatment which includes acupuncture (Bai et al., 2024), drug therapy (Vose et al., 2014), neuroelectrical stimulation, pharyngeal electrical stimulation, transcranial direct current stimulation dan repetitive transcranial magnetic stimulation pada pasien disfagia pasca stroke. Previous studies, according (Bath et al., 2018) of all modalities have shown some effects on post-stroke dysphagia used to prevent and avoid dysphagia-related complications, but did not include interventions in the form of exercise therapy used for post-stroke dysphagia recovery, in addition, in the study (Liu et al., 2022) investigate the effect of chin tuck against resistance exercise on swallowing function and psychological condition in stroke survivors, but not all types of exercise for stroke patients with dysphagia only chin tuck against resistaance exercise so the novelty in this study is to summarize the published literature regarding exercise interventions for post-stroke dysphagia.

METHODS

The search strategy for relevant articles was initially identified using databases from Scopus and PubMed using keywords such as ”exercise”, ”dysphagia” AND ”stroke”. To optimize the number and quality of articles selected on the theme exercise dysphagia stroke, an additional literature search was conducted in Scopus and PubMed with a combination of the following two keywords ”exercise” OR ”treatment” and ”dysphagia” AND ”stroke” OR ”swallowing disability”. Articles had to meet a number of criteria to be included in this review. Only human published articles with a research study design were considered for inclusion in Scopus and PubMed searches of ”clinical trials”, ”journal articles”, ”RCTs”, and ”clinical studies”. Studies were also considered eligible if the language of publication was English.

Articles that met the stated eligibility criteria and results were pooled and duplicates were removed. Suitable studies were assessed based on the title and abstract to ensure that 1) the study primarily addressed exercise dysphagia due to stroke, and that 2) individuals with dysphagia due to stroke were the primary population. After this initial selection, each article was read carefully to ensure that it addressed the theme. The selected articles discussed exercise dysphagia due to stroke. Eligible and relevant articles were selected, articles were included if online version or full access.

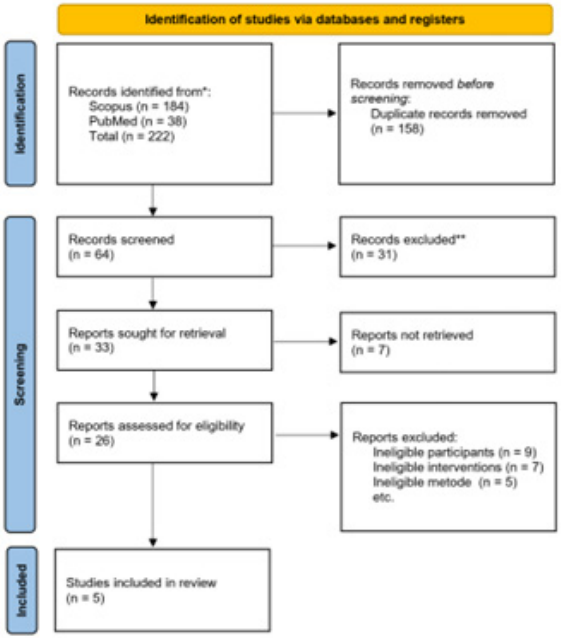

Figure 1. Flowchart for literature search on exercise post-stroke dysphagia.

Table 1. Review artikel

Artikel	Metode	Intervensi	instrument	Main findings
(Kim & Park, 2024)	30 patients with post-stroke dyphagia were recruited and randomized.	Kinesiology taping, swallowing against resistance training	Videofluoroscopic Dysphagia Scale (VDS) dan Penetration aspiration Scale (PAS)	Effective therapeutic exercises to improve swallowing function in post-stroke dysphagia patients
(Yang et al., 2023)	Prospective, single-blinded, randomized controlled trial.	Rehabilitation oral and facial exercises, Game-based surface electromyographic biofeedback training (GBsEMGBF), Individual direct feeding training	Standardized Swallowing Assessment, Functional Oral Intake Scale, Geriatric Depression Scale, Swallowing-related Quality of Life	Community-based group rehabilitation programs are a feasible and cost-effective way to help stroke patients improve swallowing function, mood, and quality of life.
(Krekeler et al., 2023)	Participants with dysphagia wth 6 months of acute stroke	Compensatory treatments, mendelsohn, effortful swallow and lingual progressive resistance training.	Penetration-Aspiration scale, the Normalized Residue Ratio Scale,Functional Oral Intake Scale Scores, Swallowing Quality of Life Scale	Efficiency of pharyngeal swallowing with liquids, and improved ability of oral intake in those with post-stroke dysphagia.
(Guillen-Sola et al., 2021)	Randomized controlled study with blinded assessors and the participation	Inspiratory and Expiratory Muscle Training (IEMT), swallowing manuvers, oral exercises and compensatory techniques.	Severity of dysphagia assessed by VFSS (Video Fluoroscopic Swallowing Study)	Reduction of hospital stay, breathing muscle exercise can help reduce the direct and indirect costs associated with stroke.
(Carnaby et al., 2020)	Stroke patients with dysphagia admitted to sub-acute rehabilitation hospital were randomized.	Neuromuscular electrical Stimulation (NMES), McNeill Dysphagia Therapy Program (MDTP).	Primary outcome include improvement in clinical swallowing ability (MASA score), dan Oral IntakeLevel (FOIS).	Reduction in dysphagia severity, improved oral intake and earlier return to pre-stroke diet) compared to NMES or Usual Care.

RESULTS AND DISCUSSION

The search results obtained five articles that discuss exercise in post-stroke dysphagia obtained from Scopus and PubMed searches. The five selected articles come from several countries, namely Korea, China, USA (2 articles), and Spain, and the selected articles are used as a theoretical basis, then a review of each article is carried out to find out the types and details of the exercises used. The following **Table 1** reviews the selected articles.

Resistance training combined with kinesiology taping measured usin Videofluoroscopic Dysphagia Scale (VDS) and Penetration Aspiration Scale (PAS), group-based exercises measured swallowing function, depressive symptoms and quality of life, lingual strenghtening exercise measured using the Functional Oral Intake Scale (FOIS), Inspiratory and Expiratory Respiratory Muscle Training (IEMT) measured as dysphagia severity, and McNeill Dysphagia Therapy Program (MDTP) exercise with the main measurement being improved swallowing ability.

Group rehabilitation programs have become increasingly popular in recent years, and have demonstrated the potential of community-based exercise programs in older adults (Langoni et al., 2019). In addition, the clinical and cost effectiveness of community-based group rehabilitation programs for stroke patients with dysphagia.

The rehabilitation program included oral and fascial exercise rehabilitation, game-based surface electromyographic biofeedback training, participant experience sharing, and individual direct feeding training which was conducted each session for 40 minutes of basic training and a total duration of 1.5 hours (Yang et al., 2023). Group training conducted in a community center significantly improved swallowing function, alleviated depressive symptoms, and improved overall quality of life among stroke patients with dysphagia, and also showed benefits in improving depressive symptoms(Yang et al., 2023).

Oropharyngeal exercise Oropharyngeal muscle training wich include shaker exercise (Kagaya & Inamoto, 2022) or chin tuck against resistance exercise (Chang et al., 2021) and tongue strenghtening exercise (Lin et al., 2021) showed that significant improvement in functional oral intake for patients with post-stroke dysphagia compared with usual care. Chin tuck against resistance exercise consists of two parts, which include a static part by pressing the ball between the chin and sternum, held 30 seconds while swallowing saliva hard, then the second dynamic part where the ball is pressed between the chin and sternum 10-30 times until the neck muscles are tired, both parts of the exercise are repeated three times a day for six weeks (Jensen et al., 2022) which can activate the suprahyoid muscle more selectively and is an effective exercise to improve swallowing function in patients with dysphagia (J.-S. Park & Hwang, 2021). Lingual (tongue) exercise is one of the approaches in the rehabilitation of post-stroke dysphagia patients, where impaired lingual strength can contribute to the safety and efficiency of swallowing (Steele et al., 2016).

The Inspiratory and Expiratory Respiratory Muscle Training (IEMT) program serves to improve cough effectiveness and airway protection in neurological patients, and can improve inspiratory and expiratory muscle strength, and reduce the risk of respiratory complications and prevent aspiration (Martin-Harris et al., 2003). Combined respiratory muscle training (cRMT) using Inspiratory and Expiratory Respiratory Muscle Training (IEMT) performed in the patient sitting upright then using inspiratory and expiratory exercises with diaphragmatic breathing techniques with 3 sets for 5 minutes showed effective results in improving airway safety with swallowing function (R. J. Arnold & Bausek, 2020). This exercise follows the principle that respiratory muscles respond to stimuli, training against resistance triggers respiratory muscle hypertrophy, fiber formation and increased function thereby increasing the adaptability of respiratory muscles to increased ventilation needs of laryngeal and pharyngeal muscle function (R. J. Arnold & Bausek, 2020).

Effortful swallowing exercise can significantly increase their muscle activity, and in this study the combination of Surface electromyograph helps in performing the exercise and can be used to treat swallowing disorders in post-stroke dysphagia patients (Archer et al., 2021). Patients are instructed to swallow while pushing hard with the tongue against the palate and squeezing hard with their swallowing muscles, which serves to increase posterior tongue base movement, push the bolus more efficiently through the pharynx, reduce post-swallowing residue and reduce the incidence of aspiration (H. S. Park et al., 2019).

The McNeill Dysphagia Therapy Program (MDTP) is an exercise-based dysphagia intervention with reported good outcomes in cases of dysphagia, simple swallowing instructions are monitored and modified at each swallowing attempt (Carnaby et al., 2020). MDTP is a structured, exercise-based treatment program involving progressive swallowing exercise, resistance based training and task specific practice with the intensity of the exercise coupled with the number of swallows completed in a treatment session as well as the volume (viscosity) of material swallowed (Crary et al., 2012). MDTP is also widely combined with Neuromuscular Electrical Stimulation (NMES) but MDTP therapy with or without NMES results in greater benefits of increased oral intake, decreased dysphagia severity, and faster return to pre-stroke diet (Carnaby et al., 2020)

CONCLUSION

This review provides empirical evidence on exercise in patients with post-stroke dysphagia which can lead to various complications including increased risk of aspiration, malnutrition, decreased quality of life, and even death. Various rehabilitation programs and latihan exercise includes resistance training combined with kinesiology taping, the rehabilitation program included oral and fascial exercise rehabilitation, game-based surface electromyographic biofeedback training, oropharyngeal exercise (oropharyngeal muscle training, shaker exercise, chin tuck against resistance exercise, and tongue strenghtening exercise), inspiratory and expiratory respiratory muscle training, effortful swallowing exercise, and McNeill Dysphagia Therapy Pro-

gram. have been shown to be effective in improving swallowing function, reducing depressive symptoms and improving overall quality of life in stroke patients with dysphagia. While this review did not specifically address the main impact of exercise on stroke patients with dysphagia, further research is needed for consideration in both research and clinical practice.

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