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PHYSIOTHERAPY INTERVENTION IN DYSPHAGIA AMONG POST STROKE PATIENTS-A NARRATIVE REVIEW

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ABSTRACT

The available data supporting the use of physiotherapy as an intervention for dysphagia in post-stroke patients is the main topic of this study's literature review. A computerized database related to studies including physiotherapy among stroke patients was used in the investigation. There were fifteen articles that demonstrated the effects of physiotherapy on oropharyngeal dysphagia, the Masako technique, Mendelson's procedures, and the shakers maneuver on post-stroke patients. Among the top factors contributing to stroke patients' incapacity and demise is oropharyngeal dysphagia (OD). Patients with OD who go undiagnosed and untreated have a higher chance of dying, spending a lengthy time in the hospital, contracting pneumonia, respiratory infections, malnutrition, and dehydration. Early detection of post-stroke oropharyngeal dysphagia (PSOD) is essential for lowering hospital admission and post-discharge morbidity and mortality rates.

Key words: Oropharyngeal dysphagia, stroke, physiotherapy

Search Method

By applying key words (stoke – definition, incidence, prevalence, ethology, pathophysiology, process of swallowing, dysphagia, recent advance intervention, shakers maneuver, Mendelsohn's maneuver, Masako maneuver, swallowing problem) on search bar in google schooler, PubMed, Scopus index,

INTRODUCTION

A stroke, also known as a cerebrovascular accident (CVA), is an abrupt loss of brain function brought on by a disruption in blood supply to the brain. About 80% of stroke victims experience an ischemic brain injury, which is the most common kind. It occurs when a clot obstructs or reduces blood flow, depriving the brain of vital nutrients and oxygen. When blood arteries burst, blood leaks into or around the brain, resulting in hemorrhagic stroke. Clinically, a range of focused abnormalities can occur, such as altered consciousness and deficiencies in motor, cognitive, perceptual, sensory, and language abilities.

For neurological abnormalities to be categorized as stroke, they must last for a minimum of twenty-four hours. Hemiplegia (paralysis) or hemiparesis (weakness), usually on the side of the body opposite the injury, are the hallmarks of motor impairments. Hemiplegia is a term that is frequently used to describe a broad range of motor impairments following a stroke. The severity of neurological abnormalities in a given patient is determined by the location and extent of brain injury, the amount of collateral blood flow, and the prompt acute care therapy. In most cases, impairments go away on their own in three weeks or less when brain swelling goes down (reversible ischemic neurological deficit). Neurological deficits that continue longer than three weeks are referred to as residual and have the potential to cause permanent disability. The etiological groups of strokes are thrombosis, Global Health Estimates: According to this report's life expectancy and main causes of death and disability, stroke ranks as the second most common cause of death[1)]. It is anticipated to rise in the upcoming decades[2)]. It is having an effect on higher socioeconomic[3)]. progressively in low- and middle-income nations (LMICs)[4)]. LMICs account for 70% of stroke cases, and as a result, their illness burden is higher than that of high-income nations[5)]. India's life expectancy has recently risen to well than 60 years of age[6,7)]. According to a recent systematic review, which primarily included cross-sectional studies, India's annual stroke incidence is thought to be between 105 and 152/100,000 persons. The World Health Organization recognizes poststroke oropharyngeal dysphagia, which has the following International Classification of Diseases (ICD) codes: 438.82 in the the I69.391 in the ICD-10.19 and the ICD-9). At the time of admission, 45% of patients had post-stroke (PS) OD, and up to 38% of them had clinical indications of compromised swallow safety. A voice change was the most common indicator of decreased swallow safety, appearing in as many as 43.65% of cases [10)]. A food bolus that is difficult to transport from the oral cavity to the stomach is known as dysphagia. This swallowing issue

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is caused by abnormalities in the pharynx, oesophagus, and oral cavity. The feeling of obstruction when swallowing, the sense of food stuck in the throat, and coughing or choking are among the symptoms [13]. Oropharyngeal dysphagia (OD) is the disorder's most prevalent manifestation. Stroke or cerebrovascular accident (CVA) is the most prevalent cause of dysphagia [14], as it disrupts deglutition and prevents the swallowing trigger [12]. Apraxia, slurred speech, and aphasia are additional stroke symptoms that can impair function[15]. Stroke accounted for 35,960 fatalities in 2018, making it the leading cause of death in the UK [16].The OD incidence in strokes that are acute (37%) and chronic (over 6 months) (78%)[17]. Other dysphagia problems range from drastically reduced deglutition with a high aspirational incidence to malnourishment and dehydration after poor swallowing effectiveness [19.20]. Of the deaths after a stroke, aspiration pneumonia accounts for 35%, making it among the top cleading factor of death[21]. Because cortical reorganization takes place undamaged hemisphere, roughly 50% of stroke-related dysphagia patients get a rapid resolution of their dysfunction[22]. Symptoms that last six months or more for 11e50% of patients are the main obstacle to recovery. In stroke patients, dysphagia is caused by a disturbance in the swallowing process, which calls for several sensory input elements from central nervous system and peripheral nerves coordination, motor responses, and feedback. This is evident in cases [23,24,25] Interference with the regulation of innervation during the swallowing process, particularly in cranial nerves V, VII, IX, X, and XII, results in dysphagia. shown that between 28 and 65 percent of stroke patients have dysphagia. [26].

Treatment options for dysphagia include the shaker manoeuvre, Mendelsohn manoeuvre, and Masako manoeuvre. electrical stimulation of the muscles (NMES)[27], Stimulation with Transcranial Direct Current[29], Tongue-Pressure Resistance Training Protocols[30], Lingual Exercise [31], Resistance exercise from the tongue to the palate enhances oropharyngeal and tongue strength[32].
DEGLUTITION (SWALLOWING) Swallowing of food occurs in three stages described below. Muscles of pharynx act during swallowing.
Flow chart. 1 Stages of swallowing [47]

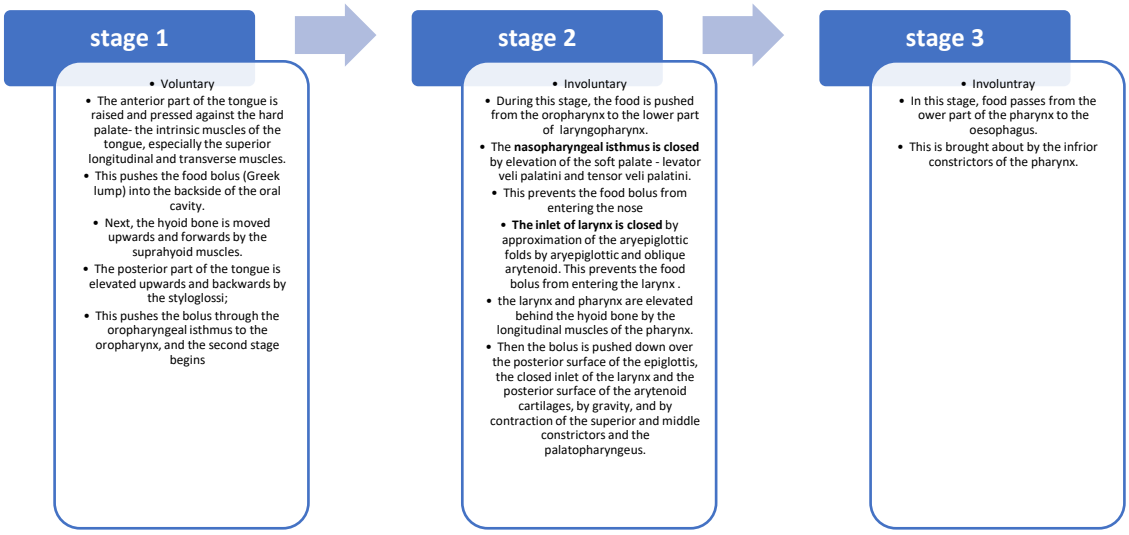

Table:1 [48]

S NO	CRANINAL NERVES	INNERVATION	SENSORY FUNCTIONS	MOTOR FUNCTIONS
1.	TRIGEMIAL(V) MIXED	snout, eye ball, lachrymal gland, lower eye lid, upper eye lid, upper jaw, gum, teeth.	Touch sensation skin on face and taste.	Mastication and movement of lower jaw.
2.	FACIAL(VII) MIXED	Tastebud, salivary gland, facial and neck muscle.	Taste, salivation and tear secretion.	Facial expression and neck muscles.
3.	GLASSOPHARYGEAL(IX) MIXED	Pharynx, tongue, salivary gland.	Taste and salivation.	Swallowing.
4.	VAGUS(X)MIXED	Pharynx, heart rate, respiratory tract, pancreas, blood vessels and alimentary canal.	Gastric and pancreas secretion.	GI movements, gastric reflex, pancreas reflex, visceral reflex and respiratory reflex.
5	HYPOGLOSSAL (XI) MOTOR	Tongue.	-------	Tongue movements.

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NEED OF THE STUDY AND TOOLS TO MEASURE

One of the leading factors contributing to stroke patients' disability and death is oropharyngeal dysphagia (OD). Our group conducted a study that found that 45% of patients had post-stroke (PS) OD upon admission, and that up to 38% of patients had clinical indications of reduced swallow safety. A shift in voice was the most common indicator of compromised swallow safety, occurring in as many as 43.65% of cases. Patients with OD who go undiagnosed and untreated have a higher chance of dying, spending a lengthy time in the hospital, contracting pneumonia, respiratory infections, malnutrition, and dehydration. Early detection of post-stroke oropharyngeal dysphagia (PSOD) is essential for lowering hospital admission and post-discharge morbidity and mortality rates. There is a dearth of research on the management of dysphagia, making it difficult to determine whether maneuverer best shakers, Mendelsohn's and Masako maneuverer.

METHODOLOGY

The research published after 2015 up until July 2023 were included in the review of the literature. The Shakers Manoeuvre, Masako Manoeuvre, Mendelson's Manoeuvre, Jaw Opening Exercises and Head Lifting Exercises, Kinesio Taping, and game based chin tuck exercises vs head lifting exercises are some of the databases that were included in PubMed Cochran and Google Scholar. exercises that raise the head, A total of 15 publications that examined dysphagia in stroke patients were included. These included studies on lingual strengthening, transcutaneous neuromuscular electrical stimulation, electroacupuncture, 4-channel neuromuscular electrical stimulation, and transcranial direct current stimulation.

Inclusion criteria

1. Both male and female
2. Initial days of acute stroke
3. Conscious and oriented individuals
4. Aged from 21-60 years old

Exclusion criteria

1. Tracheostomy tube placement and limitations in neck mobility.
2. Comatose and unconscious patients[52)]
3. Malignant tumour
4. Severe systemic disease;
5. Mental illnesses;
6. Organ dysfunction;
7. A long history of alcoholism;
8. A long history of psychotropic substance abuse;
9. Neurological dysfunction;
10. Dementia caused by infection,
11. Metabolic disorder, or poisoning;
12. Myocardial infarction,
13. Systemic acute and chronic infection, or
14. Any unstable condition.[44)]

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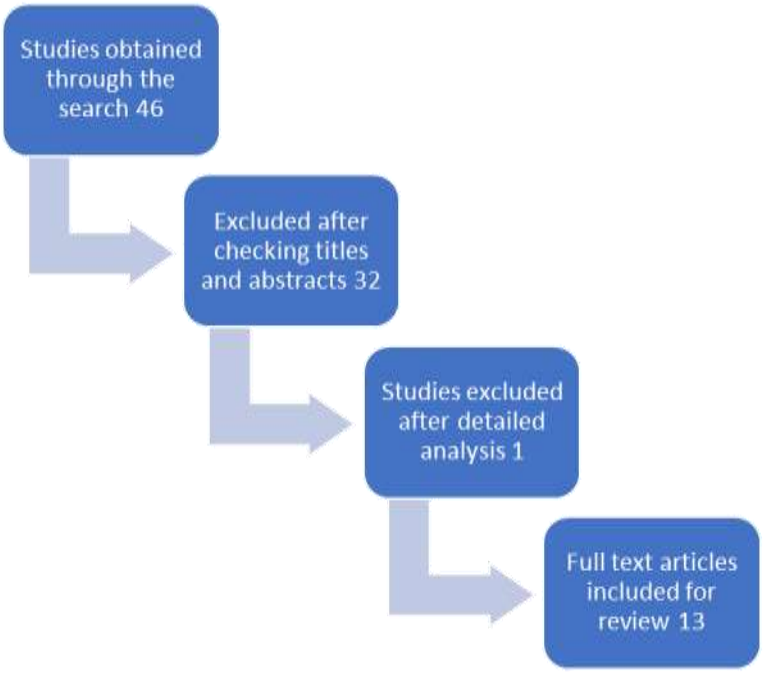

Table.2 Reviews

S NO	TITTLE OF THE ARTICLE	NAME OF THE AUTHER	YEAR OF PUBLIC-ATION	TYPE OF STUDY	MODE OF INTERVENTION	RESULTS
1.	A systematic review and Meta- Analysis of dysphagia and associated with pneumonia in patients with stroke from India[32)]	Rahul Krishnamurthy et al.	2022	experimental	Dysphagia prevalence among stoke patient	prevalence of dysphagia (47.71%; 95% confidence interval [CI] [20.49%, 70.92%], $p < .001$) for the patients with stroke in India.
2.	Comparison of 2 types of therapeutic exercise jaw opening exercises and head lift exercise for dysphagic stroke[33)]	Jong Bae Choi, PhDa et al	2020	Experimental	Jaw opening exercises and head lifting exercises	This study demonstrated that both the JOE and the HLE exhibited comparable outcomes in relation to increasing the thickness of the suprahyoid muscles and improving hyoid bone movement. However, the JOE may require less overall physical effort than the HLE, but may cause discomfort in the temporomandibular joint. Therefore, it is recommended that these 2 exercises be selected according to the condition of the patient.
3.	Effect of head lift exercise on kinematic	J.S. Park et al.	2017	Experimental	Head lift exercise on kinematic the hyolaryngeal complex's motility	For patients with dysphagic stroke, HLE is a useful strategy for

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	motion of the hyolaryngeal complex and aspitarion in patients with dysphagic stroke[34)]					improving hyoid mobility and reducing aspiration. This non-invasive, low-cost indirect treatment is secure. Without a therapist, patients are able to conduct HLE on their own. HLE is therefore advised as a successful course of treatment for people who have dysphagic stroke.
4.	Effect of Shaker's Swallowing Exercises on Swallowing Ability among Dysphagic Patients with Cerebrovascular Accident[35)]	Zeinab Gamal Mohamed Ellatif Abouelezz et al.	2020.	Quasi experimental.	Shaker's maneuver.	Based on the study results, the current study findings concluded that Shaker's swallowing exercises were effective in enhancing dysphagic patients' capacity to swallow after a cerebrovascular accident.
5.	Effect of the combination of Mendelsohn maneuver and effortful swallowing on aspiration in patients with dysphagia after stroke[36)]	Ji-Hoon Kim et al.	2017	Experimental	Mendelsohn maneuver and effortful swallowing on aspiration.	Participant 1's aspiration reduced with food type, going from 6 to 4 points for liquid food and from 3 to 2 points for semi-solid food, according to the PAS assessment. With liquid-type food, participant 2's aspiration dropped from 6 to 4 points, and with semi-solid-type food, it decreased from 3 to 2 points. When eating liquid-type food, participant 3's aspiration dropped from 5 to 4 points, and when eating semi-solid food, it dropped from 3 to 1 points. With liquid food, participant 4's aspiration dropped from 7 to 5 points, and with semi-solid food, it dropped from 5 to 4 points.
6.	Efficacy of modified chin tuck against resistance exercise using hand-free device for dysphagia in stroke survivors: A randomised controlled trial [37)]	Hwan-Hee Kim et al	2019	Experimental	Chin tuck exercises against resistance exercises	This study showed that individuals with post-stroke dysphagia may improve their nutritional levels and reduce aspiration by using the mCTAR exercise. Consequently, it is anticipated that mCTAR training will be advantageous for physically susceptible dysphagia patients who have restricted hand

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						strength and range of motion.
7.	Immediate effects of Kinesio Taping on the movement of the hyoid bone and epiglottis during swallowing by stroke patients with dysphagia[38)]	Seo Yoon Heo et al.	2015	Experimental	Kinesio taping	the kinematic analysis of the hyoid bone and the epiglottis should continue to be used as it's the optimal method for determining the results of dysphagia therapy approaches. Consequently, research in the future should look at not only clinical evaluation tools but also kinematic analysis using VFSS. With more evidence, KT for dysphagia p
8.	effects of game-based chin tuck against resistance exercise vs head-lift exercise in patients with dysphagia after stroke: an assessor-blind, randomized controlled trial[39)]	Ji-Su PARK et al	2019	Experimental	game-based chin tuck against resistance exercise vs head-lift exercise.	The effects of gbCTAR exercise and HLE on swallowing function and compliance in stroke patients with dysphagia were compared in this research. Swallowing function significantly improved with both approaches, although there was no discernible difference between the two groups. This implies that in dysphagic individuals, gbCTAR exercise and HLE have comparable benefits.
9.	Effects of Device-Facilitated Lingual Strengthening Therapy on Dysphagia Related Outcomes in Patients Post-Stroke: A Randomized Controlled Trial[40)]	Brittany N. kekeler et al.	2023	experimental	Lingual strengthening	Lingual strengthening exercise resulted in notable advancements in functional oral consumption in individuals with post-stroke dysphagia contrasted with usual care after 8 weeks. Future studies should include greater sample size and address treatment impact on specific aspects of swallow physiology
10.	Effect of the Masako maneuver and neuromuscular electrical stimulation on the improvement of swallowing function in patients with dysphagia	Haewon Byeon, Dr Sc	2016	experimental	Masako maneuver and neuromuscular electrical stimulation	Both Masako maneuver and NMES significantly improved the swallowing ability in dysphagic patients caused by stroke;

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	caused by stroke[41)]					
11.	Examining the Evidence on Neuromuscular Electrical Stimulation for Swallowing[42)]	Giselle D. Carnaby-Mann, MPH et al.	2023	Meta analysis	Neuromuscular electrical stimulation.	For adult dysphagic patients undergoing NMES therapy, there has been a marginally statistically significant improvement in their clinical swallowing function. These results offer some indication that NMES for swallowing treatment may be a useful technique in the rehabilitation of dysphagic patients, but they are constrained by the quality of the studies that were available for analysis.
12.	Electroacupuncture improves swallowing function in a post-stroke dysphagia mouse model by activating the motor cortex inputs to the nucleus tractus solitarii through the parabrachial nuclei [43)]	Lulu Yao et al.	2023	Experimental study	Electroacupuncture activating the motor cortex inputs to the nucleus tractus solitarii through the parabrachial nuclei	effectively with acupuncture combined with balloon dilatation. In comparison with balloon dilatation alone, acupuncture combined with balloon dilatation can significantly improve the gulping capability of patients, and it is also effective for patients at different courses of the disease (less than one month or longer than one month), different ages (over 60 years old and under 60 years old) and different treatment course (over 30 days and under 30 days), while patients over 60 years old and the treatment course over 30 days may have the better clinical outcome.
13.	Effects of transcutaneous neuromuscular electrical stimulation on post-stroke dysphagia: a systematic review and meta-analysis[44)]	Yuhan Wang et al.	2023	Systematic review; Meta Analysis	Transcutaneous neuromuscular electrical stimulation and swallowing therapy	Transcutaneous neuromuscular electrical stimulation and swallowing therapy reduced the rate of complication and promote the restoration of swallowing function. NMES with a frequency of 25 Hz, an intensity of 0–15 mA, and a treatment course of 4 weeks or less may have better results. Patients with an onset of fewer than 20 days and over 60 years old appear more effective with NMES + ST.

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14.	Compensatory Effects of Sequential Treatment of Acute, Subacute, and Chronic Dysphagia Using 4-Channel Neuromuscular Electrical Stimulation in a Prospective, Double-Blinded Randomized Clinical Trial[45)]	So Young Lee, MD, PhD et al.	2021	experimental	4-Channel Neuromuscular Electrical Stimulation	Regarding VDS, PAS, and kinematic analysis, 4-channel NMES that activated the suprahyoid, thyrohyoid, and other infrahyoid muscles during swallowing shown a substantial increase in clinical outcomes. Consequently, a novel functional electrical stimulation method for the management of dysphagia might be consecutive 4-channel NMES.
15.	Efficacy and Safety of Transcranial Direct Current Stimulation on Post-Stroke Dysphagia: A Systematic Review and Meta-Analysis[46)]	Kelin He et al.	2022	Experimental	Transcranial Direct Current Stimulation	The application of tDCS can promote the recovery of deglutition function in stroke patients who have dysphagia, and bilateral stimulation and high-intensity stimulation may have better effects.

DISCUSSION

In their comparison of two therapeutic exercise types—the mouth opening exercise and the exercise with a head raise for dysphagic stroke—Jong Bae Choi, PhDa et al. address muscle thickness, hyoid movement, the Borg rating scale, and compliance related to dropout rates. Both HLE and JOE have similar effects, as seen by the lack of significant differences in muscle thickness and hyoid movement between the two. Borg grading system HLE has the advantage over JOE since it is a more severe and demanding workout than JOW. compliance related to dropout rates HLE group 4 withdrew from the trial due to exhaustion in their necks and abdomens, but no problems followed. Muscle exhaustion, temporomandibular discomfort, and TMJ displacement were reported by JOE subjects[33)].

An investigation of the effects of head lift exercise on aspiration and hyolaryngeal complex kinematic motion Among individuals suffering from dysphagia stroke was carried out by Park, J. S. et al. Random assignment accustomed to place the enrolled members of the experimental group (n = 20) or the controlled group (n = 17). HLE was administered to the experimental cohort in addition to standard CDT (traditional dysphagia therapy). The control group only got CDT. CDT consists of therapeutic maneuvers, ice stick thermal tactile stimulation, and orofacial muscular exercises. The hyolaryngeal complex was analyzed for movement using the Image J program, and the degree of penetration-aspiration was measured using the Penetration-Aspiration Scale (PAS). The approach used to examine hyporyngeal movement was identical to that used in a prior study. A frame from the VFSS accustomed to record the swallowing process. Kinematic influence on the the mobility of the hyolarynx The larynx's anterior and superior movements were significantly increased in the experimental group. The larynx and hyoid bone's anterior and superior movements both significantly increased in the control group. After the intervention, the experimental group outperformed the control group in terms of only superior movement of the hyoid bone, with a statistically significant increase. When the groups' respective amounts of change were compared, only the hyoid bone's vertical displacements revealed significant variations between them. Impact on aspiration and penetration The experimental group had a significant drop in PAS scores for liquids and semisolids in the aspiration evaluation. The PAS scores for liquids and semisolids significantly decreased in the control group as well. Following the intervention, the PAS scores for liquids in the experimental group declined far more than those in the control group. Both groups' PAS scores for liquids and semisolids showed no discernible difference when the magnitude of change between them was compared[34)].

Gamal Zeinab The impact of Shaker's swallowing exercises on the ability to swallow in dysphagic study participants with cerebrovascular accidents by Mohamed Ellatif Abouelezz et al. In order to complete the Shaker exercise, Every patient had a separate interview. and in private for 25 to 35 minutes per session. During six sessions—two theoretical and four practical—the researchers provide the patients a thorough description of the swallowing exercises. According to the study, there was a considerable

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improvement in the awareness of dysphagic patients about the Shaker swallowing exercise before, after two weeks, and one month after its implementation. At various stages of implementation, there was a highly substantial favorable association between the overall knowledge and swallowing skills of dysphagic patients [35].

A study by Ji-Hoon Kim et al. combined the Mendelsohn maneuver with forceful swallowing to examine dysphagia in stroke patients. The videofluoroscopic swallowing study (VFSS) modified Logemann protocol and penetration-aspiration scale (PAS) are employed to assess the VFSS outcome on a pre- and post-study basis for all subjects. PAS maximum of eight subjects with a high level of ambition Participant 1's aspiration reduced with food type, going from 6 to 4 points for liquid food and from 3 to 2 points for semi-solid food, according to the PAS assessment. With liquid-type food, participant 2's aspiration dropped from 6 to 4 points, and with semi-solid-type food, it decreased from 3 to 2 points. When eating liquid-type food, participant 3's aspiration dropped from 5 to 4 points, and when eating semi-solid food, it dropped from 3 to 1 points. With liquid-type food, participant 4's aspiration dropped from 7 to 5 points, and with semi-solid-type food, from 5 to 4 points [36].

A study comparing the chin tuck against the shaker maneuver (SM) and the resistant exercise (CTAR) was done by Jing GAO et al. Self-Rating Depression Scale (SDS) and video fluoroscopic swallowing study (VFSS) outcome measures. One group received CTAR, another group received shakers, and a third group had conventional intervention. Of the three groups, the CTAR group showed the greatest improvement, followed by the SM group, which showed the least change when compared to CATR and SM[37]. Kinematic analysis of the results of KT on the motion of the epiglottis and hyoid bone dysphagia in stroke patients was carried out by Seo Yoon Heo et al. Marosis M-view 5.4 accustomed to administer the functional dysphagia scale (FDS) in order to Evaluate the effect of KT in a real swallowing scenario. two groups kinesio taping and non kinesio taping The KT group demonstrated advancements in the vertical excursion of the hyoid bone and rotation of the epiglottis, the results were statistically significant. The clinical assessment and analysis revealed changes in FDS and horizontal movement, but the differences were not statistically significant[38].

A study on the effects of the device-facilitated lingual strengthening in stroke victims experiencing dysphagia was carried out by Brittany N. Kekeler et al. Approach split into two groups: one for lingual strengthening exercises and the other for routine medical attention. In order to evaluate group differences in oral intake, lingual pressure generation, swallow safety, efficiency, and swallowing quality of life, outcomes were examined at 8 and 12 weeks. Exercises for strengthening the tongue demonstrate a considerable improvement over standard care[39].

A study was done by Ji-Su PARK et al. on game-based tucks in stroke victims who have dysphagia, comparing them to resistance exercise and head lifts. While the controlled group engaged in HLE, the experimental group used the LES 100 gadget to finish the gbCTAR task. The video fluoroscopic dysphagia scale (VDS), penetration aspiration scale (PAS), and functional oral intake scale (FOIS), which is according to the VFSS, were the outcome measures utilized to assess oral diet and swallowing performance. The organization conducting the experiment demonstrated a statistically notable advancement in their the capacity to ingest during the pharyngeal and oral stages of VDS, PAS, and FOIS. The control group exhibited noteworthy advancements in the oral and pharyngeal stages of VDS, PAS, and FOIS. Between the two groups, there was no appreciable difference in the pharyngeal and oral phases of VDS, PAS, or FOIS after the intervention. During the pharyngeal and oral stages of VDS, there were no discernible differences between the groups when the quantity of change was compared. Rate of dropouts and adverse effects In terms of adhering to as part of the gbCTAR exercise, there no dropout in the experimental group. Conversely, though, four patients in the control group withdrew due to transient neck pain, exhaustion, and discomfort. Nonetheless, the patient described the discomfort as transient, and no other adverse effects were reported. According to a numerical rating self-report scale, the experimental group scored higher than the control group on the items related to motivation and interest/enjoyment, but considerably lower on the items related to physical effort required and muscle fatigue[40].

An investigation of the effects of neuromuscular electrical stimulation and the Masako manuvere on dysphagia in stroke patients was carried out by Haewon Byeon and colleagues. For four weeks, the NMES group received 20 minutes of stimulation five days a week. 20 minutes a day, five days a week, for four weeks is the Masako move. Result evaluates the functional dysphagia scale using video fluoroscopic analysis. There was not observable change between the two groups[41].

A comprehensive analysis was conducted by Giselle D. Carnaby-Mann, MPH, et al. to discover all the publications published between January 1996 and 2006. As a result, adult dysphagic patients receiving NMES have demonstrated a modest yet statistically meaningful rise in their clinical swallowing function, according to this early meta-analysis evaluating the treatment's efficacy. These findings suggest that using NMES for ingesting treatment might be a useful technique in the recovery of dysphagic patients, but they are constrained based on how well the research was done that were available for analysis. As new information becomes available, Guidelines for implementing this method ought to be reassessed. To determine if NMES for swallowing is more effective

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than standard swallowing treatments alone, more separate experiments involving carefully controlled designs and analyses based on intent-to-treate required[42].

According to a study by Lulu Yao et al., electroacupuncture activates the motor cortex inputs to the nucleus tractus solitarii through the parabrachial nuclei, an acupoint situated on the anterior median line and in the depression above the hyoid bone. This improves swallowing function in a post-stroke dysphagia mouse model. The Video Fluoroscopic Swallowing Study (VFSS) measures the pharyngeal transit time, oesophageal transit time, and food size; Fibreoptic evaluation of swallowing (FEES) assesses the structure of the pharynx and larynx; Standardized Swallowing Assessment (SSA) measures consciousness, body control, breathing, oral closure, laryngeal function, pharyngeal reflex, and spontaneous cough, among other things. These assessments are used in clinical practice to evaluate swallowing function following stimulation at CV23 [43].

Transcutaneous neuromuscular electrical stimulation's impact on stroke patients' dysphagia were studied by Yuhan Wang et al. in a systematic review. The database collecting deadline was June 9, 2022. final measurements The Water swallow test, the Video fluoroscopic Swallow Study, the Penetration-Aspiration Scale, the Standardized Swallowing Assessment, and the Functional Oral Intake and Dysphagia Scale. Regular swallowing treatment (ST) in conjunction with NMES effectively enhances swallowing function. The Water Swallow Test increased the hyoid bone's upward and forward movement distances, decreased the rate of problems, and enhanced quality of life[44].

Thus, Young Lee, MD, PhD, et al. studied 4-channel neuromuscular electrical stimulation's impact on stroke patients' dysphagia, which was verified by stable vital signs and the video fluoroscopic swallowing study (VFSS). score ≥6 on the penetration–aspiration scale (PAS). 52 individuals in all (26 in the sham group and 26 in the NMES 4 channel group). With regard to PAS, VDS AND kinematic analysis, a novel technique that employed consecutive During swallowing, 4-channel NMES is applied to the suprahyoid, thyrohyoid, and infrahyoid muscles. shown a notable improvement in clinical outcomes. Given that No negative consequences were seen during the study, 4-channel NMES appears to hold the position of secure and well-absorbed dysphagia treatment option. Thus, a novel therapeutic approach for the method of compensation in dysphagic patients is consecutive 4-channel NMES [45].

These seven digital repositories were thoroughly searched by Kelin He et al. in a comprehensive analysis that was finished between January 1, 2021, and December 31, 2021. The intervention in the experiment group consisted of tDCS alone or in tandem with conventional therapy, while Conventional therapy was administered to the control group. and/or sham tDCS. The Kubota water-drinking test, the modified Mann assessment of swallowing ability, the functional oral intake scale, the dysphagia outcome and severity scale, and the dysphagia outcome and severity scale are the outcome measures. Patients with dysphagia following a stroke could gain additional from transcranial direct current stimulation (tDCS); higher-intensity stimulation and bilateral stimulation may yield greater benefits. Nevertheless, there is not enough safety data to support tDCS for dysphagia following a stroke. Furthermore, Each research only contains one center and no common assessment tool. To overcome these limitations, more investigation should move in this direction[46].

CONCLUSION

All the above review interventions for dysphagia among post stroke patients effective hence above interventions are recommended.

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