Indian Journal of Physiotherapy and Rehabilitation Science

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

Effect of Masako Maneuver Along with Orofacial Exercise on Swallowing Ability and Quality of Life In Subject with Post Stroke Dysphagia

[1]V. Pradhapsankar
Assistant Professor, Department of Physiotherapy,
KG College of Physiotherapy
Mail: pradhapsankar3@gmail.com
[2]Dr. M. Manoj Abraham
Principal, Department of Physiotherapy,
KG College of Physiotherapy.
[3]S. Subikshamalya
BPT Intern, Department of Physiotherapy,
KG College of Physiotherapy
(Affiliated to The Tamil Nadu Dr. M.G.R. Medical University),
KG Hospital & PG Medical Institute, Coimbatore, Tamil Nadu, India.

Received: 22nd Aug 24
Revised: 20th Sept 24
Accepted: 1st Oct. 24

ABSTRACT

Background: Stroke is one of the most common causes of disability and the second leading cause of mortality in India. It is very usual for dysphagia to occur after an acute stroke. In physical treatment, manual therapy is essential. Many exercises are taught to patients suffering from dysphagia and they focus more on oropharyngeal region.

Objectives: The aim of the study is to find the effect of Masako maneuver along with Orofacial exercise on swallowing ability and quality of life in subject with post stroke dysphagia.

Methodology: The study was a single group pre and post experimental study design. 20 patients were selected in this study with post stroke dysphagia. Swallowing ability and Quality of Life will be measured by using MD Anderson Dysphagia Inventory and Short Form 36 questionnaire. The group received Masako maneuver along with orofacial exercise.

Result: The result showed that there is a significant improvement in MD Anderson Dysphagia Inventory (Pre-test - 36.50 and Post-test - 51.65) and in Short Form 36 (Pre-test - 44.30 and Post-test - 59) after 6 months of training.

Conclusion: The study concludes that Masako maneuver along with Orofacial exercises are effective in improving the swallowing abilities and quality of life among subjects with post stroke dysphagia.

Key words: Dysphagia, Masako Maneuver, MD Anderson Dysphagia Inventory Questionnaire, Orofacial Exercises, Short Form 36 Questionnaire, Stroke.

Funding Acknowledgement: This study was unfunded.

Ethical Approval: The study was approved by the college ethics committee, K.G. College of Physiotherapy, Coimbatore.

Indian Journal of Physiotherapy and Rehabilitation Science

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

INTRODUCTION

The World Health Organization (WHO) defines a stroke as having rapidly developed clinical indications of a localized or generalized impairment of brain function that lasts for more than 24 hours or results in death and has no other apparent cause other than a vascular origin. A stroke is a sudden decline in brain function caused by a significant reduction in blood supply to a specific area of the brain, or due to haemorrhage. These are her two basic types of strokes. Both damage certain areas of the brain and also impair its function. A stroke's clinical characteristics include BEFAST (Balance, Eye, Facial droop, Arm weakness, Speech difficulty and Time) [12,27]. Stroke Association of India: Over the past few decades, the incidence of stroke in India has nearly tripled. Only prompt treatment can reduce morbidity and mortality among the 1.8 million stroke patients who suffer a stroke in India each year [2]. The burden of stroke in India is steadily increasing, with stroke now being the fourth leading cause of death and the fifth leading cause of disability in the country. Studies suggest that the rate of stroke in India falls between 105 and 152 cases per 100,000 individuals annually. Moreover, men are about 1.25 times more likely to suffer from a stroke compared to women. As such, addressing the rising prevalence of stroke in India is crucial to mitigating its impact on public health and improving overall quality of life for individuals at risk [3,26,28]. Stroke frequency doubles in the 10 years after age 65. Haemorrhagic stroke is the most common cause of death with a mortality rate of 37% to 38%, while ischemic stroke has a mortality rate of 8 to 12%. Important mortality indicators include loss of consciousness at stroke onset, lesion size, chronic severe hemiplegia, multiple neurological deficits, and history of previous stroke, three major stages are used to describe the progression of stroke [29].

- Acute (1 to 7 days)
- Sub-acute (1 weeks to 6months)
- Chronic (more than 6 months)

Stroke is a major cause of abnormal movement synergies, decreased motor performance, and long-term disability, especially in adulthood. Additionally, for each people, the risk of falls due to decreased balance and increased energy expenditure during daily activities is reduced[11,16,14].The most common clinical presentation was headache complained by 87 [75.0%] patients followed by aphasia/dysphasia 70 [60.3%], hemiparesis62 [53.4%], facial palsy 60 [51.7%], vomiting [46.6%], bladder/ urinary incontinence 44 [37.9%], decreased level of consciousness 43 [37.1%], hemiplegia 38 [32.8%],dysphagia 26 [22.4%], dysarthria 24 [20.7%], blurred vision 23 [19.8%], ataxia 21 [18.1%], loss of memory 18 [15.5%], vertigo 16 [13.8%], neck stiffness 15 [12.8%], asphyxia 14 [12.1%], chest pain 14 [12.1%], forced gaze (conjugated deviation) 12 [10.3%], coma 11 [9.5%], altered sensorium 9 [7.8%], seizure 8[6.9%], trismus (lock jaw) 5[4.3%] [5]. Oropharyngeal dysphagia, a common condition, affects three main groups: the elderly, patients with neurological or neurodegenerative diseases, and patients with head and neck diseases. This condition makes it difficult for individuals to swallow food and liquids safely and comfortably. Proper diagnosis and treatment can help individuals with oropharyngeal

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

dysphagia enjoys eating and drinking without complications. Oropharyngeal dysphagia is associated with decreased laryngopharyngeal sensitivity, damage to cortical regions of the central nervous system or the swallowing centre, and impaired efferent nerve or muscle drive [1,25]. Oropharyngeal dysphagia is a Serious condition because it affects quality of life and causes nutritional and respiratory complications associated with poor prognosis and high mortality. Oesophageal dysphagia is usually caused by primary or secondary oesophageal dysmotility affecting the enteric nervous system or the muscular layer of the oesophagus [7]. A commonly used medication and drug for dysphagia is botulinum toxin type A (BONT-A), Diltiazem – May help the oesophagus contract and move, especially in a condition known as nutcracker oesophagus. Glucagon – Diazepam is used to relieve esophagitis, a condition where the lining of the oesophagus becomes inflamed and irritated. This medication helps to reduce the inflammation and discomfort caused by esophagitis, allowing the person to feel better and improve their overall quality of life. Sometimes diazepam is also used. Cystine depletion therapy with cysteamine - treatment of choice for patients with dysphagia due to cystinosis before and after transplantation [8,20]. Several interventions are being investigated to treat dysphagia. When we speak, our vocal folds come together to produce sound. Our lips, tongue, and jaw also move to help form different sounds. Additionally, our jaw helps with chewing and biting while we eat. All of these movements work together to help us communicate effectively through speech and eating. Exercises to help dysphagia like Effortful swallow, Dynamic shaker, Jaw thrust, Masako manoeuvre, Mendelsohn manoeuvre, Supraglottic manoeuvre, Hyoid lift manoeuvre is used as a treatment for dysphagia [3,10,24]. In this think about we utilized to treat dysphagia subjects by Masako manoeuvre along with Orofacial exercise. In Post stroke dysphagia (PSD), swallowing ability is measured using several outcome measures such as the Dysphagia Severity Rating Scale (DSRS), which grades how severe dysphagia is based on fluid and diet modification, Functional Diet Scale, MD Anderson Dysphagia Inventory, Penetration Aspiration Scale (PAS), Functional Oral Intake Scale (FOIS), The Mann Assessment of Swallowing Ability (MASA), Dysphagia Severity Rating Scale (DSRS), National Institutes of Health Stroke Scale (NIHSS), Modified Rankin Scale (MRS), and Quality of Life (QoL) [6]. In this study we used to measure the swallowing ability by using the MD Anderson Dysphagia Inventory. There are several outcome measures for the Quality of Life. The outcome measures used to measure Quality of Life are Swallowing Quality of Life (SWAL-QOL), Health Related Quality of Life (HRQOL), General Quality of Life, Dysphagia – Related Quality of Life were used as an outcome to measure the Quality of Life. In this study we used to measure the Quality of Life by using Short Form 36. The aim of this study is to find out the effect of Masako manoeuvre along with Orofacial exercise on gulping capacity a nd Quality of Life in subjects with post stroke dysphagia. The objective of the study is to find out the effects of Masako manoeuvre along with Orofacial exercise on swallowing ability and Quality of Life in subjects with post stroke dysphagia.

OBJECTIVES

- To find out the effects of Masako manoeuvre along with Orofacial

exercise on swallowing ability in subjects with post stroke dysphagia.
- To find out the effects of Masako manoeuvre along with Orofacial exercise on Quality of Life in subjects with post stroke dysphagia.

REVIEW OF LITERATURE

STROKE

Tasneem Hartley et al., (2022)

Globally, stroke is the third most common cause of disability and an increasing global burden. It is well-documented that 80% of strokes occur in low- to middle-income countries. With the high rate of Non-Communicable Diseases (NCDs), lack of physical activity, poor diet and rate of alcohol consumption, stroke has become the eighth most common cause of years of life lost to illness and ninth cause of disability in South Africa.

Corinne A. Jones et al., (2020)

Stroke is one of the leading causes of dysphagia, with incidence rates up to 80%. Incidence estimates depend on the definition of dysphagia, which can range from failing a dysphagia screen, to prescribed diet modifications, to measures of physiology on an instrumented swallowing study.

MASAKO MANEUVER

Jahanvi Barot et al., (2023)

The Masako manoeuvre improves the function of pharynx musculature by strengthening the base of the tongue muscles. It has been reported to improve swallowing by improving the coordination of the larynx, hyoid bone, and pharynx. This also reduces airway obstruction during pharyngeal swallowing.

OROFACIAL EXERCISE

Lockwood C et al., (2023)

Oral motor exercises support the maintenance and strengthening of the oral cavity for persons with dysphagia following a stroke. Adapt swallowing exercises to the individual's needs, abilities and preferences and the specific swallowing impairment. Regular therapy is recommended including skill and strength training in direct therapy (with food/fluids) and indirect motor therapy.

MD ANDERSON DYSPHAGIA INVENTORY

Hemail M. Alsubaie et al., (2021)

The MD Anderson Dysphagia Inventory (MDADI) is a self-administered, 20-item survey devised to assess the degree of swallowing-related QOL.The composite score ranges from 20 (extremely low functioning) to 100 (high functioning) The results of the test–retest reliability was revealed to be acceptable for the MDADI kappa coefficient for each item (ICC > 0.70), as well as the ICC for individual domains (emotional = 0.973, physical = 0.971, and functional = 0.956) and composite score (ICC = 0.984)

SHORT FORM 36

Craig Anderson et al., (1996)

Few studies have examined the utility of a new generic health status measure, the Short Form 36 health survey questionnaire (SF-36), in stroke patients. Our aim was to test the internal consistency and validity of the SF-36 in a cohort of long-term stroke survivors. The SF-36 was relatively quick and easy to use and had satisfactory internal consistency (Cronbach's α>0.7).

MATERIALS & METHODS

The study design is a Pre-test and Post-test Single group Experimental study. The study was conducted at the K.G PHYSIOTHERAPY AND REHABILITATION CENTER, Saravana Patti, K.G HOSPITAL, Coimbatore. The study was conducted for the period of 6 months, the treatment

Indian Journal of Physiotherapy and Rehabilitation Science

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

duration was 60 minutes / session, 5 times / week for a period of 4 weeks.20 subjects who fulfilled predetermined inclusion criteria and exclusion criteria were selected as Single group using convenient method. This group was named as group A. This group receives Masako manoeuvre along with Orofacial exercise. The selection of the patients based on the inclusion criteria are subjects with post stroke dysphagia were clinically diagnosed by neurologist, subjects with symptoms of stroke after 7 days of onset, age 50 - 70 years. Both genders were included, subjects who have sufficient, physical and mental ability to understand instruction and cooperate throughout the session, able to communicate properly. The exclusion criteria are haemorrhagic stroke, uncontrolled hypertension, hearing impairment, pain from multiple sources, behavioural disorders, patients who could not lift their head and flex the neck, those who had undergone tracheostomy, unstable medical conditions.

MASAKO MANEUVER:

The Masako manoeuvre fortifies the muscles at the base of the tongue and progresses the muscles of the throat. The Masako manoeuvre has been observed that the Masako manoeuvre enhances the synchronisation of the pharynx, hyoid bone, and larynx, hence enhancing swallowing. This reduces airway obstruction during swallowing [7,8].

Instructions:

- Adhere out your tongue and hold it between your lips/teeth.
- Swallow your saliva while holding in this position.
- If this is as well troublesome to start with, you can keep your tongue against the interior of your teeth.
- Practice this technique 3 times per day 3-5 repetitions per set.
- Stop if you are getting tired or finding it difficult.

Tip: If you don't have enough saliva, moisten your mouth in between repetitions.

MASAKO MANEUVER:

Indian Journal of Physiotherapy and Rehabilitation Science

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

OROFACIAL EXERCISE

Orofacial Exercises & Oral Exercises-the oral muscles can help you improve your ability to swallow, speak, and function. The following treatment procedure was used during the orofacial exercise session.[12].

- Warm up session- 5 minutes
- Stretching- 5 minutes
- Active range of motion exercise- 10 minutes
- Passive range of motion exercise- 5 minutes
- Strengthening exercise- 10 minutes
- Cool down session- 5 minutes

Each session has some special types of exercise and rest is provided during the session. The therapist guided throughout the sessions. Totally the treatment duration are 40 minutes per session, one session per day, 3days per week for a duration of 4 weeks.

Warm up session:

- Finger tapping over the face.
- Brushing over the facial muscle.

Stretching:

- Orbicularis oris
- Mentalis muscle
- Frontalis muscle
- Masseter muscle
- Temporalis muscle
- Circular stretching over the buccinators muscle, zygomatic major and minor, and depressor angular orris.

Relaxation:

- Brushing with three- point position (jaw, lower lip, upper lip)

Active range of motion exercise:

- Air blowing exercise.
- Back and forth
- Pointing tongue
- Jaw aerobics
- Say ‘ahh’ mouth opening exercise
- Straw sucking exercise

Passive range of motion exercise:

- Eye brows rising exercise with assistance and passively.
- Eye closing exercise with assistance and passively.
- Make the nasolabial fold passively.
- Mouth opening exercise with passively therapist by assistive.

Strengthening exercise:

- Tongue in cheek
- Wide mouth Grog pulls
- Jaw curls
- Tongue pops
- Sucking
- Water hold

Cool down:

- Tapping
- Brushing

OROFACIAL EXERCISE WARM UP

Indian Journal of Physiotherapy and Rehabilitation Science

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

Figure Tapping

Frontalis

Brushing

Buccinator

STRETCHING OF FACIAL MUSCLES:

Orbicularis orris

Mentalis

Masseter

Zygomaticus

ACTIVE RANGE OF MOTION EXERCISES

Air Blowing Exercise

Back and forth

Indian Journal of Physiotherapy and Rehabilitation Science

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

Pointing tongue exercise

Jaw Aerobic Exercise

Say ‘ahh’ mouth

Straw sucking exercise

STRENGTHENING EXERCISE:

Wide mouth grog pulls

Jaw Curls

Water Hold

STATISTICAL ANALYSIS

The statistical tool used to this study was paired ‘t’ test.

The paired ‘t’ test was used to find out the statistical significance in pre and post-test of the subject treated with Masako maneuver along with Orofacial exercises.

TABLE – I

COMPARISON OF PRE-TEST AND POST-TEST VALUES OF MD ANDERSON DYSPHAGIA INVENTORY FOR SWALLOWING ABILITY IN GROUP A.

Indian Journal of Physiotherapy and Rehabilitation Science

e-ISSN 2583 4304 Vol: 3, Issue: 4 Oct. 2024

S.NO	MD ANDERSON DYSPHAGIA INVENTORY	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED 't' VALUE
1.	Pre test	36.50	15.15	7.19	26.898
2.	Post test	51.65		7.34	

It shows the analysis of MD Anderson Dysphagia Inventory. The paired 't' test with 19 degrees of freedom with Pre versus Post session value of **26.898** at 0.05 level of significance which was greater than the tabulated value of **2.093.** This showed that there was a statistical significance difference in between Pre versus Post-test values.

GRAPH – I

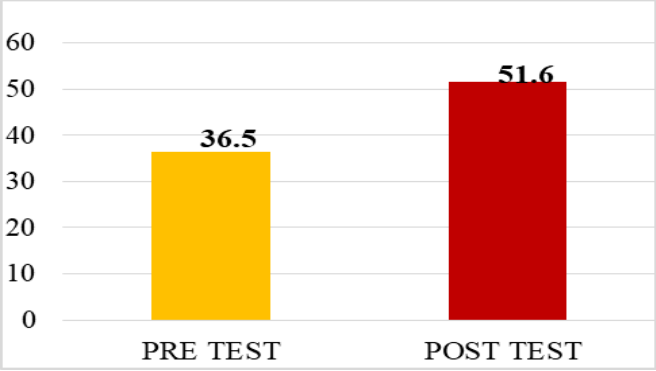
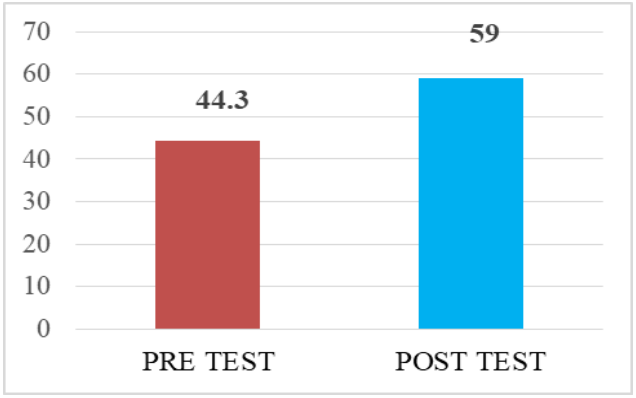


TABLE - II

S.NO	SHORT FORM 36	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED 't' VALUE
1.	Pretest	44.30	14.7	2.54	18.412
2.	Post test	59		3.68	

GRAPH – II



It shows the analysis of short form 36. The paired "t" test with 19 degrees of freedom with pre versus post session value of **18.412**at 0.05 level of significance which was greater than the tabulated value of **2.093**. This showed that there was a statistical significance difference in between pre versus post-test values.

The paired 't' test analysis for the pre- test and post-test variables of MD Anderson Dysphagia Inventory group A with post stroke dysphagia which was shown in table III. The group shows significant difference in pre-test and post-test values. The 't' value of group A is **26. 898.**The paired 't' test analysis for the pre-test and post-test variables of short form 36 group A with post stroke dysphagia which was shown in table IV. The group shows significant difference in pre-test and post-test values. The 't' value of group A is 18. 412.Even though statistical analysis revealed that there is statistically significant improvement in pre and post of group in MD Anderson

Dysphagia Inventory questionnaire and short form 36 questionnaire.

Totally 20 subjects were conveniently selected into group A. Age group of subjects are between 50-70 years. The paired "t" test analysis for the pre-test and post-test variables of MD Anderson Dysphagia Inventory group A with post stroke dysphagia which was shown in table III. The group shows significant difference in pre-test and post-test values. The "t" value of group A is 26.898.

The paired "t" test analysis for the pre-test and post-test variables of short form 36 group A with post stroke dysphagia which was shown in table IV. The group shows significant difference in pre-test and post-test values. The "t" value of group A is 18.412.

Even though statistical analysis revealed that there is statistically significant improvement in pre and post of group in MD Anderson Dysphagia Inventory questionnaire and short form 36 questionnaire.

CONCLUSION

The MD Anderson Dysphagia Inventory questionnaire and short form 36 questionnaire was given to each subject individually and marked the score. The study concludes that Masako maneuver along with Orofacial exercises are effective in improving the swallowing abilities and Quality of Life in subjects with post stroke dysphagia.

LIMITATIONS AND RECOMMENDATIONS

- The study was not followed in the age of below 50 years
- The study was done with two outcome measures
- This was a lack of long term follow up study.
- Only stroke dysphagia patients were included
- This study was including the age group of 50 to 70 years
- This study was focused on swallowing ability and Quality of Life
- Large sample size can be used to demonstrate the effects of intervention.
- Long term follow up should be done
- Future study can focus on improving other skills such as breathing control and speech

CONFLICT OF INTEREST

There was no personal or institutional conflict of interest for this study.

ACKNOWLEDGEMENT

The authors sincerely thank Dr. G. Bakthavatsalam, Chairman, Mrs. Vasanthi Raghu, Vice Chairman, Mr. Prabhu Kumar, CEO, Prof V. Mohan Gandhi, CEO, Department of Physiotherapy, KG Hospital, Coimbatore, India, for their support and logistical help to conduct this research.

REFERENCES

1. Abdel Jalil AA, Katzke DA, Castell DO. Approach to the patient with dysphagia. Am J Med. 2015 Oct;128(10): 1138.e17-23. Doi: 10.1016/j.amjmed.2015.04.026. Epub 2015.
2. Bullinger M. [Assessment of health-related quality of life with the SF-36 Health Survey]. DieRehabilitation. 1996 Aug;35(3): XVII-XXVII; quiz XXVII-XXIX.
3. CarolDerSarkissian et al. Best Exercises for Dysphagia. WebMD Editorial Contributors WebMD. 2022.
4. Colleen Beck et al. Oral Motor Exercise. Occupational therapy proprioception sensory. The two toolboxes. 2021.
5. Anderson C, Laubscher S, Burns R. Validation of the Short Form 36 (SF-36) health survey questionnaire among stroke patients. Stroke. 1996 Oct;27(10):1812-6. Doi: 10.1161/01.str.27.10.1812. PMID: 8841336.
6. Danielle N et al. Dysphagia Management in Stroke Rehabilitation. CurrPhys Med RehabilRep (2014) 2:207 218 DOI 10.1007/s40141-014-0059-9.
7. Cohen DL, Roffe C, Beavan J, Blackett B, Fairfield CA, Hamdy S, Havard D, McFarlane M, McLauglin C, Randall M, Robson K, Scutt P, Smith C, Smit hard D, Sprigg N, Varsovian A, Watkins C, Woodhouse L, Bath PM. post-stroke dysphagia: A review and design considerations for future trials. Int J Stroke. 2016

Jun;11(4):399-411. Doi: 10.1177/1747493016639057. Epub 2016 Mar 22. PMID: 27006423.

8. D. Ganesh Ram et al. Comparative study of Masako and Mendelsohn manoeuvre for post Stroke dysphagia. International Journal of Creative Research Thoughts. 2022 IJCRT | Volume 10, Issue 6 June 2022 | ISSN: 2320-2882.
9. Elizabeth Denslow et al. Swallowing Exercises for Stroke Patients to Recover from Dysphagia. Flint Rehab. (2023).
10. Khedr, E.M., Abbass, M.A., Soliman, R.K. *et al.* post-stroke dysphagia: frequency, topographic representation: hospital-based study. Egypt J Neural Psychiatry Neurosurgeon 57, 23 (2021). https://doi.org/10.1186/s41983-021-00281-9
11. Fekadu G, Chelkeba L, Kebede A. Risk factors, clinical presentations and predictors of stroke among adult patients admitted to stroke unit of Jimma university medical centre, south west Ethiopia: prospective observational study. BMC Neurol. 2019 Aug 7;19(1):187. Doi: 10.1186/s12883-019-1409-0. PMID: 31390995; PMCID: PMC6685251.
12. Gore M et al. Overview of stroke. Cleveland Clinic. (2022)
13. Hyuk-Cheol Kwon et al. Effect of Orofacial Exercise on the Swallowing Function of Stroke Patients. Korean J Health Promote 2015;15(2):83-90. 2013.
14. HeidiMoawad, M. D et al. Everything you need to know about stroke. Medical News Today. (2023).
15. Byeon H. Effect of the Masako manoeuvre and neuromuscular

electrical stimulation on the improvement of swallowing function in Jul;28(7):2069-71. Doi: 10.1589/jpts.28.2069. Epub 2016 Jul 29. PMID: 27512266; PMCID: PMC4968508.
16. Jayarajpandian et al. Fatality cases due to brain stroke higher in india. The Times of India. (2021)
17. Jong-Hoon Moon et al. Effects of Orofacial Muscles Exercise Program on Swallowing Function and Satisfaction in Sub-Acute Stroke Patients with Dysphagia. Medico Legal Update. DOI Number: 10.5958/0974-1283.2019.00111.7. 2019.
18. JahanviBarot et al. Effect of Shaker Exercise and Masako Manoeuvre on Swallowing Function and Quality of Life in Patients with Dysphagia following Stroke: An Interventional Comparative Study. International Journal of Physiotherapy and Research, Int J Physiotherapy Res 2023, Vol 11(4):4611-20. ISSN 2321-1822 DOI: https://dx.doi.org/10.16965/ijpr.2023.144.
19. La Manna, Katelyn A et al. The Effect of the Masako Manoeuvre on Treatment of Swallowing in Parkinson‟sDisease.ProQuest. (2023).
20. Everton, L.F., Benfield, J.K., Hedstrom, A. et al. Psychometric assessment and validation of the dysphagi a severity y rating g scalp e I n stork e patients. Sci Rep 10, 726 8 (2020). https://doi.org/10.1038/s41598-020-64208-9
21. Leticia Segura et al. Oral Motor Speech Exercises. Springs Charter Schools. (2014).
22. Miwa& Chung et al. Masako Manoeuvre. Adult Speech Therapy. (2023).
23. Ming-Lin et al. Oral motor exercises: Key to better speech. WellnessHub. (2023).
24. Calve P, Shaker R. Dysphagia: current reality and scope of the problem. Nat Rev GastroenterolHepatol. 2015 May;12(5):259-70. Doi: 10.1038/nrgastro.2015.49. Epub 2015 Apr 7. PMID: 25850008.
25. Wirth R, Dziewas R, Beck AM, Clavé P, Hamdy S, Heppner HJ, Langmore S, Leischker AH, Martino R, Pluschinski P, Rösler A, Shaker R, Warnecke T, Sieber CC, Volkert D. Oropharyngeal dysphagia in older persons - from pathophysiology to adequate intervention: a review and summary of an international expert

meeting. ClinInterv Aging. 2016 Feb 23; 11:189-208. Doi: 10.2147/CIA.S97481. PMID: 26966356; PMCID: PMC4770066.

26. Speyer R, Heijnen BJ, Baijens LW, Vrijenhoef FH, Otters EF, Roodenburg N, Bogaardt HC. Quality of life in oncological patients with oropharyngeal dysphagia: validity and reliability of the Dutch version of the MD Anderson Dysphagia Inventory and the Deglutition Handicap Index. Dysphagia. 2011 Dec;26(4):407-14. Doi: 10.1007/s00455-011-9327-3. Epub 2011 Jan 29. PMID: 21279522; PMCID: PMC3224721.
27. Dziewas R, Michou E, Trapl-Grundschober M, Lal A, Arsava EM, Bath PM, Clavé P, Glahn J, Hamdy S, Pownall S, Schindler A, Walshe M, Wirth R, Wright D, Verin E. European Stroke Organisation and European Society for Swallowing Disorders guideline for the diagnosis and treatment of post-stroke dysphagia. Eur Stroke J. 2021 Sep;6(3): LXXXIX-CXV. Doi: 10.1177/23969873211039721. Epub 2021 Oct 13. PMID: 34746431; PMCID: PMC8564153.
28. Kamalakannan S, Gudlavalleti ASV, Gudlavalleti VSM, Goenka S, Kuper H. Incidence & prevalence of stroke in India: A systematic review. Indian J Med Res.2017 Aug;146(2):175-185. Doi: 10.4103/ijmr.IJMR_516_15. PMID: 29265018; PMCID: PMC5761027.
29. Jones SP, Baqai K, Clegg A, Georgiou R, Harris C, Holland EJ, Kalkonde Y, Lightbody CE, Maulik PK, Srivastava PM, Pandian JD, Kulsum P, Sylaja PN, Watkins CL, Hackett ML. Stroke in India: A systematic review of the incidence, prevalence, and case fatality. Int J Stroke. 2022 Feb;17(2):132-140. Doi: 10.1177/17474930211027834. Epub 2021 Jul 2. PMID: 34114912; PMCID: PMC8821978.
30. Farpour S, Asadi-Shekaari M, BorhaniHaghighi A, Farpour HR. Improving Swallowing Function and Ability in Post Stroke Dysphagia: A Randomized Clinical Trial. Dysphagia. 2023 Feb;38(1):330-339. Doi: 10.1007/s00455-022-10470-0. Epub 2022 Jun 17. PMID: 35715574; PMCID: PMC9205412.