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“Shaker Exercise Versus Masako Maneuver Combined With Conventional Therapy on Swallowing Function and Health-Related Quality of Life in Patients With Post-Stroke Dysphagia: A True Experimental Study”

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Abstract: **Background:** Post-stroke dysphagia is a common and potentially life-threatening complication associated with aspiration pneumonia, malnutrition, prolonged hospitalization, and reduced health-related quality of life (HRQoL). Exercise-based rehabilitative interventions such as the Shaker exercise and Masako maneuver are increasingly implemented; however, comparative evidence from randomized experimental studies remains limited.

Aim: To compare the effectiveness of Shaker exercise versus Masako maneuver, each combined with conventional swallowing therapy, on swallowing function and HRQoL in patients with post-stroke dysphagia.

Design: Prospective, parallel-group, true experimental randomized controlled study.

Methods: Thirty patients with videofluoroscopically confirmed oropharyngeal dysphagia within three months of stroke onset were randomly allocated into two groups (n=15 each). Group I received Shaker exercise plus conventional therapy, and Group II received Masako maneuver plus conventional therapy. Interventions were administered five days per week for four weeks. Swallowing function and HRQoL were assessed using the Eating Assessment Tool (EAT-10) at baseline and post-intervention. Data were analyzed using paired and independent t-tests.

Results: Both groups demonstrated statistically significant improvement in EAT-10 scores after four weeks ($p < 0.001$). The Shaker group showed greater mean improvement compared to the Masako group; however, between-group differences were not statistically significant ($p = 0.067$). Clinically meaningful reductions in dysphagia severity were observed in both groups.

Conclusion: Both Shaker exercise and Masako maneuver combined with conventional therapy significantly improve swallowing function and HRQoL in post-stroke dysphagia. The Shaker exercise demonstrated comparatively greater clinical benefit. Structured exercise-based swallowing rehabilitation should be incorporated into nursing-led stroke care programs.

Keywords: Stroke, Dysphagia, Shaker Exercise, Masako Maneuver, Swallowing Rehabilitation, Quality of Life, Randomized Controlled Trial

Introduction:

Stroke is a leading cause of adult disability worldwide and frequently results in oropharyngeal dysphagia. The incidence of dysphagia in acute stroke ranges from 37% to 78%, with a

substantial proportion of patients developing aspiration-related complications. Dysphagia contributes to increased morbidity, mortality, prolonged hospital stay, and diminished quality of life.^[1]



Traditional dysphagia management emphasizes compensatory strategies such as postural adjustments and dietary modifications.^[2] However, contemporary rehabilitation increasingly supports exercise-based rehabilitative approaches that directly target the underlying muscular and physiological deficits.^[3]

The Shaker exercise strengthens suprahyoid musculature to enhance upper oesophageal sphincter (UES) opening, whereas the Masako maneuver improves posterior pharyngeal wall movement by strengthening tongue base musculature.^[4] While both techniques have demonstrated individual benefits, direct comparison within a true experimental framework remains limited.^[5]

Need of the Study:

Post-stroke dysphagia is a highly prevalent and potentially life-threatening complication that occurs in a vast majority of stroke survivors.^[6] The inability to safely swallow leads to severe clinical consequences, primarily a drastically increased risk of aspiration pneumonia, which remains a leading cause of mortality in the acute recovery phase.^[7]

Standard clinical management for post-stroke dysphagia has historically relied upon compensatory strategies, such as modifying diet textures or utilizing postural adjustments.^[8] While these immediate interventions are necessary for airway protection, they merely alter the passage of food without actively resolving the underlying physiological nerve and muscle deficits.^[9]

While the independent biomechanical benefits of both the Shaker exercise and the Masako maneuver are well-documented, clinical data directly comparing their efficacy against each other within an interventional framework remains sparse. Therefore, this study is highly necessary to systematically compare these two techniques alongside conventional therapy to determine which yields superior functional and quality-of-life outcomes for stroke survivors.^[10]

Objectives:

1. To evaluate the effect of Shaker exercise combined with conventional therapy on health-related quality of

life (HRQoL) among patients with post-stroke dysphagia.

2. To evaluate the effect of Masako maneuver combined with conventional therapy on health-related quality of life (HRQoL) among patients with post-stroke dysphagia.
3. To compare the effectiveness of Shaker exercise versus Masako maneuver combined with conventional therapy in improving swallowing function among patients with post-stroke dysphagia.

Hypotheses:

Hypotheses Related to HRQoL

H₀₁: There is no significant difference in health-related quality of life before and after administration of Shaker exercise combined with conventional therapy among post-stroke dysphagia patients.

H₁₁: There is a significant improvement in health-related quality of life after administration of Shaker exercise combined with conventional therapy among post-stroke dysphagia patients.

H₀₂: There is no significant difference in health-related quality of life before and after administration of Masako maneuver combined with conventional therapy among post-stroke dysphagia patients.

H₁₂: There is a significant improvement in health-related quality of life after administration of Masako maneuver combined with conventional therapy among post-stroke dysphagia patients.

Hypotheses Related to Swallowing Function

H₀₃: There is no significant difference between Shaker exercise and Masako maneuver combined with conventional therapy in improving swallowing function among post-stroke dysphagia patients.

H₁₃: There is a significant difference between Shaker exercise and Masako maneuver combined with conventional therapy in improving swallowing function among post-stroke dysphagia patients.

Operational Definitions:



- 1. Shaker Exercise:** A structured supine head-lift exercise (three 60-second sustained lifts plus 30 isotonic lifts, three times daily for four weeks) to strengthen suprahyoid muscles and improve UES opening.
- 2. Masako Maneuver:** A tongue-hold swallowing exercise (three sets of 10 repetitions, three times daily for four weeks) to enhance tongue base retraction and pharyngeal wall contact.
- 3. Conventional Therapy:** Standard dysphagia management including supraglottic swallow, effortful swallow, postural adjustments, and oro-motor stimulation.
- 4. Swallowing Function:** The ability to safely and effectively swallow, measured using the EAT-10 score.
- 5. Health-Related Quality of Life (HRQoL):** The perceived well-being affected by dysphagia, assessed using the EAT-10 total score.
- 6. Post-Stroke Dysphagia:** Swallowing impairment occurring within three months of a first-ever stroke, confirmed by VFSS.

Methods:

Study Design: A true experimental, randomized, parallel-group design was adopted.

Study Setting: The study was conducted in selected hospital Narayan Medical College and Hospital, Rohtas Bihar.

Inclusion Criteria

1. Age 20–70 years.
2. First-ever ischemic or hemorrhagic stroke within 3 months (neuroimaging confirmed).
3. Oropharyngeal dysphagia confirmed by VFSS.
4. MMSE score >22.
5. Medically stable for rehabilitative exercises.

Exclusion Criteria

1. Previous or recurrent stroke.

2. Neurodegenerative disorders affecting swallowing.
3. Structural abnormalities interfering with swallowing.
4. Tracheostomy, gastrostomy, or ventilator dependence.
5. Severe cervical spine or musculoskeletal limitations.
6. Cardiopulmonary instability or uncontrolled illness.
7. MMSE ≤ 22 or inability to follow instructions.
8. Participation in another swallowing rehabilitation program.

Sample Size: Total Sample: The Study was conducted on 30 Participants. Group I (Shaker): 15 and Group II (Masako): 15 Participants in each group.

Randomization: Participants were randomly assigned using sealed opaque envelope technique to ensure allocation concealment.

Intervention Protocol

Conventional Therapy (Both Groups): All participants in both the experimental and control groups received standardized conventional swallowing therapy, which included:

Group I: Shaker Exercise (Experimental Group)

The participants assigned to the experimental group performed the Shaker exercise in addition to conventional therapy for about 3 sessions per day in a frequency of 5 days per week for a total duration of 4 weeks.

Group II: Masako Maneuver (Experimental Group)

The participants assigned to this group performed the Masako maneuver (Tongue-Hold Maneuver) in addition to conventional therapy in about 3 sets of 10 repetitions of 3 sessions per day in a continued duration for 4 weeks.

Outcome Measures: Eating Assessment Tool (EAT-10) was observed in which 10-item validated questionnaire. The Score range from 0–40 were higher scores indicate greater dysphagia severity.

Statistical Analysis

Data were analyzed using **SPSS** (Statistical Package for the Social Sciences), version 23.0.

- A **paired t-test** was applied to assess within-group differences between pre-test and post-test scores.



- An **independent t-test** was used to compare mean differences between the two groups.
- The level of statistical significance was set at $p < 0.05$.

Results

Table 1: Shows Age distribution of Participants between groups.

Group	N	Mean (Years)	Std. Deviation
Shaker Group	15	62.06	4.36
Masako Group	15	58.06	10.57

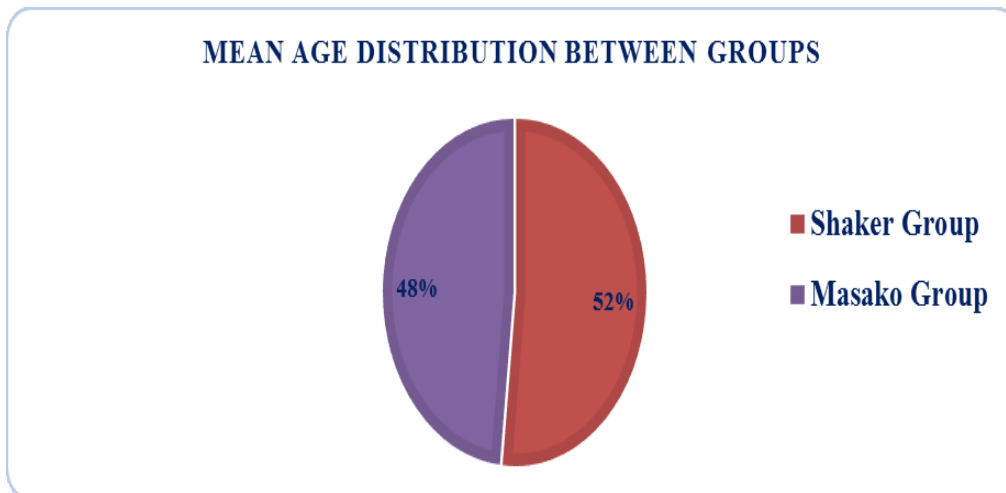


Figure 1: Shows Age distribution of Participants between groups.

Figure 1 - Represents the mean age of participants in the Shaker group was **62.06 ± 4.36 years**, whereas the Masako group had a mean age of **58.06 ± 10.57 years**. The Masako group showed greater variability in age compared to the Shaker group, as indicated by the higher standard deviation.

Group	Pre (Mean ± SD)	Post (Mean ± SD)	p-value
Shaker	18.93 ± 4.23	15.53 ± 4.67	<0.001
Masako	14.26 ± 5.47	12.13 ± 5.12	<0.001

Table 2: Shows Within-Group Comparison

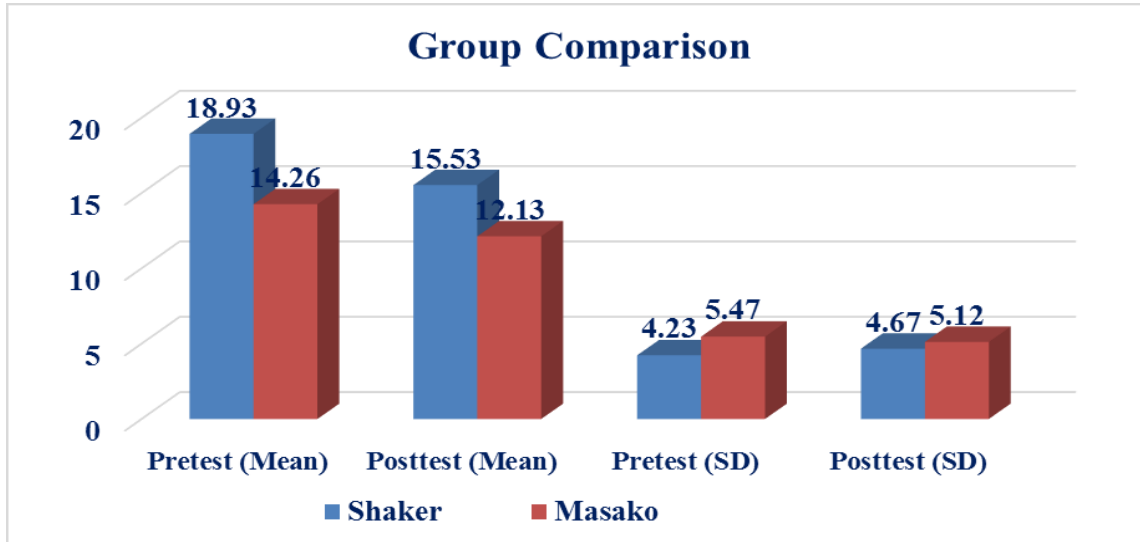


Figure 2: Shows Within-Group Comparison

Figure 2 – Represents the Shaker group demonstrated a significant reduction in mean scores from 18.93 ± 4.23 at pre-test to 15.53 ± 4.67 at post-test ($p < 0.001$). Similarly, the Masako group showed a significant decrease from 14.26 ± 5.47 to 12.13 ± 5.12 ($p < 0.001$). These findings indicate that both interventions were effective in improving the outcome measure within groups.

Table 3: Shows Pre- and Post-Intervention EAT-10 Scores in the Shaker Group (n = 15)

Variable	Mean	SD	t	df	p
Pre-test	18.93	4.23			
Post-test	15.53	4.67	—	14	< .001

Figure 3 – Represents that a paired-samples t test indicated that the reduction in EAT-10 scores following Shaker exercise was statistically significant, $p < .001$, demonstrating a significant improvement in swallowing function and health-related quality of life.

Table 4: Shows Pre- and Post-Intervention EAT-10 Scores in the Masako Group (n = 15)

Variable	Mean	SD	t	df	p
Pre-test	14.26	5.47			
Post-test	12.13	5.12	—	14	< .001

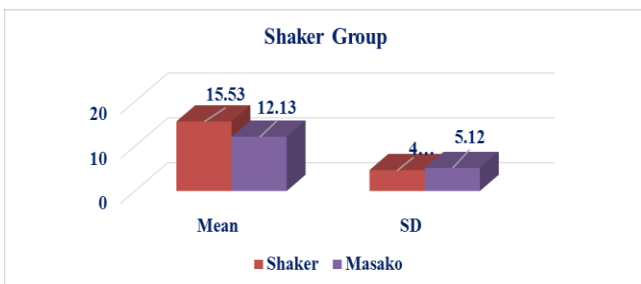


Figure 3: Shows Paired Samples t Test for Shaker Exercise Group

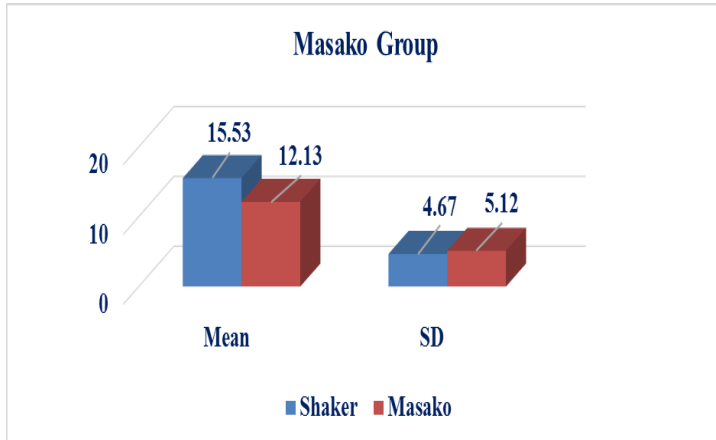


Figure 4: Shows Paired Samples t Test for Masako Maneuver Group

Figure 4 – Depicts that both groups demonstrated a statistically significant reduction in EAT-10 scores following

intervention ($p < .001$), indicating improved swallowing function and HRQoL. The Shaker group decreased from 18.93 ± 4.23 to 15.53 ± 4.67 , while the Masako group decreased from 14.26 ± 5.47 to 12.13 ± 5.12 (both $p < .001$). These results confirm the effectiveness of both interventions when combined with conventional therapy.

Table 5: Shows Independent Samples t Test Comparing Post-Test Scores Between Groups (n = 30)

Group	Mean	SD	t	df	p
Shaker	15.53	4.67			
Masako	12.13	5.12	—	28	.067

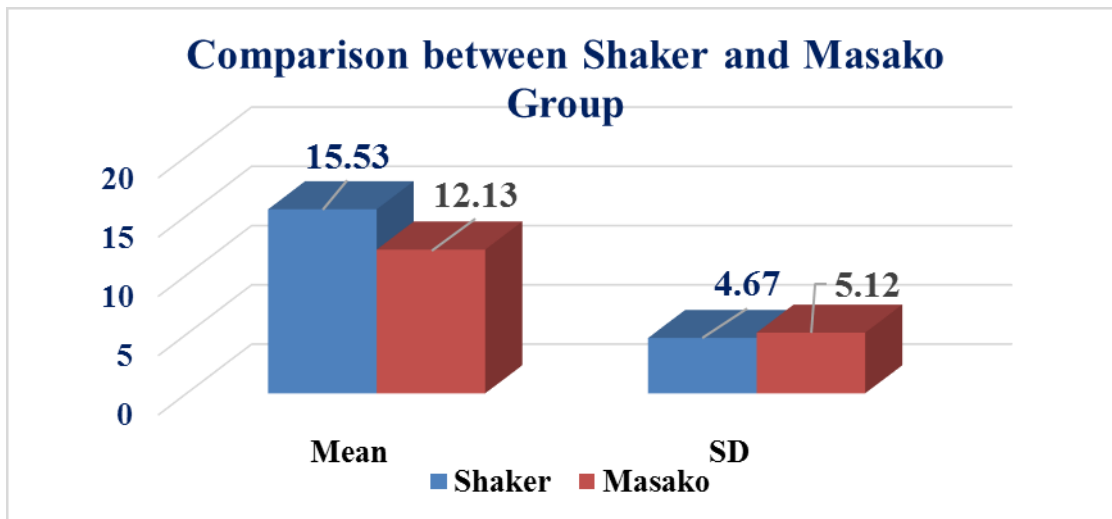


Figure 5 : Independent Samples t Test for Post-Intervention Comparison

Figure 5 – Depicts that an independent-samples t-test showed no statistically significant difference between the Shaker and Masako groups in post-intervention EAT-10 scores ($p = .067$). Although the Shaker group demonstrated greater mean improvement, the difference did not reach statistical significance at the 0.05 level.

Discussion

The findings indicate that both Shaker exercise and Masako maneuver significantly enhance swallowing function and HRQoL in post-stroke dysphagia.

The Shaker exercise likely produced greater benefit due to:

- Strengthening of suprahyoid musculature



- Improved anterior-superior hyoid excursion
- Enhanced UES opening
- Reduced pharyngeal residue

The Masako maneuver primarily targets tongue base retraction and pharyngeal wall contact, contributing to improved bolus propulsion.

From a rehabilitation nursing perspective, structured exercise-based swallowing programs may reduce reliance on long-term tube feeding and lower aspiration risk.

Clinical Implications for Nursing Practice

- Early dysphagia screening is essential in stroke units.
- Nurses can supervise structured swallowing exercises.
- Exercise-based rehabilitation enhances patient independence.
- Incorporating muscle-strengthening techniques may improve HRQoL.

Limitations: The present study had several limitations.

- The sample size was relatively small, which may limit the generalizability of the findings.
- The duration of the intervention was short (4 weeks), restricting the ability to assess long-term effectiveness.
- Additionally, no long-term follow-up was conducted to determine the sustainability of treatment outcomes.
- Furthermore, the absence of post-intervention confirmation using Videofluoroscopic Swallowing Study (VFSS) limits objective validation of functional improvement.

Recommendations

- Future research should focus on conducting large-scale, multicenter randomized controlled trials with a larger sample size and extended follow-up periods.
- Incorporating post-intervention instrumental assessments such as VFSS would provide stronger evidence regarding the long-term efficacy of the interventions.

Conclusion

Both Shaker exercise and Masako maneuver combined with conventional therapy significantly improve swallowing function and health-related quality of life in patients with post-stroke dysphagia. The Shaker exercise demonstrated comparatively greater clinical benefit. Structured exercise-based swallowing rehabilitation should be integrated into comprehensive stroke recovery programs.

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