

Effectiveness of Head Lift Exercise with Reclined Position Versus Chin Tuck Against Resistance Among Post-Stroke Dysphagia Patients: A Comparative Study

Tanvi Patel

Krishna School of Physiotherapy & Rehabilitation

Pragna Landge

pragna3609@gmail.com

Krishna School of Physiotherapy & Rehabilitation

Harsha Ramrakhiyani

Krishna School of Physiotherapy & Rehabilitation

Aaryan Maurya

Krishna School of Physiotherapy & Rehabilitation

Kamilmehdi Lafawala

Krishna School of Physiotherapy & Rehabilitation

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Abstract

Background

Post-stroke dysphagia is a common complication following stroke, resulting from impairment in the coordination and strength of the swallowing muscles. It can lead to serious complications such as aspiration pneumonia, malnutrition, dehydration, and reduced quality of life. Various therapeutic exercises focusing on strengthening the suprahyoid muscles are used in dysphagia rehabilitation. The present study aimed to compare the effectiveness of Head Lift Exercise (HLE) with reclined position versus Chin Tuck Against Resistance (CTAR) in improving swallowing function among post-stroke dysphagia patients.

Methods

The study included 30 post-stroke dysphagia patients who were randomly divided into two groups. Group A received Head Lift Exercise in a reclined position, while Group B performed Chin Tuck Against Resistance exercises. Outcome measures included the Eating Assessment Tool-10 (EAT-10) and Functional Oral Intake Scale (FOIS), assessed before and after the intervention period. Both group A & group B received intervention for 4 weeks.

Results and Conclusion

Data analysis was conducted using SPSS version 23. Both groups demonstrated significant improvement in swallowing function as indicated by improved EAT-10 and FOIS scores after the intervention. However, Group A, which received HLE in a reclined position, showed comparatively greater improvement than Group B CTAR exercise among post-stroke dysphagia patients.

INTRODUCTION

Stroke is a sudden neurological deficit resulting from interruption of cerebral blood flow due to ischaemia or haemorrhage, leading to brain cell death and functional impairment [1]. It remains a leading cause of mortality and long-term disability worldwide, accounting for approximately 12.2 million new cases and 6.55 million deaths annually [2, 3]. In India, stroke incidence ranges from 119 to 145 per 100,000 population per year, with the burden disproportionately affecting those aged above 55 years [4, 5]. Major modifiable risk factors include hypertension, diabetes mellitus, and smoking [6, 7].

Among post-stroke complications, dysphagia is particularly prevalent and clinically significant. Post-stroke dysphagia (PSD) affects approximately 19–81% of stroke survivors depending on the timing and method of assessment [13, 14]. It results from disruption of neural control in cortical, subcortical, or brainstem swallowing centres, leading to impaired tongue propulsion, delayed swallowing reflex, and reduced laryngeal elevation, thereby increasing the risk of aspiration pneumonia, malnutrition, and dehydration [10, 16, 17]. Early identification and intervention are essential to prevent life-threatening complications and improve rehabilitation outcomes [15].

Rehabilitative dysphagia management focuses on strengthening the muscles involved in swallowing. The Head Lift Exercise (HLE), also known as the Shaker exercise, is widely used to activate the suprahyoid muscles responsible for hyolaryngeal elevation and upper oesophageal sphincter (UES) opening [20]. However, performing HLE in the traditional supine position may cause cervical fatigue and poor compliance among elderly or post-stroke patients. A reclined (30–45°) modification of HLE has been proposed to reduce neck strain while preserving therapeutic effectiveness [22]. Chin Tuck Against Resistance (CTAR) is another rehabilitative approach involving chin pressure against a resistance device to strengthen the submental and suprahyoid musculature, thereby improving swallowing biomechanics [19].

Despite growing evidence supporting both HLE and CTAR individually, comparative research evaluating the reclined modification of HLE against CTAR particularly in post-stroke dysphagia populations in India remains limited. Therefore, the present study aims to compare the effectiveness of Head Lift Exercise with reclined position versus Chin Tuck Against Resistance in improving swallowing function among post-stroke dysphagia patients, as measured by the EAT-10 and FOIS scales.

MATERIALS AND METHODS

This comparative study was conducted at Vadodara Dysphagia Clinics, Vadodara, Gujarat, India over 10 months. Ethical approval for the study was obtained prior to data collection (CTRI Registration No: CTRI/2025/07/090801). All participants received a detailed explanation of the study procedures and provided written informed consent before participation. 30 post-stroke dysphagia patients were allocated equally into two groups using convenient sampling. Inclusion criteria was aged 40–70 years, MMSE ≥ 22 , MMT ≥ 3 of cervical muscle, stroke and exclusion criteria of patients who having the neck/back pain, tracheostomy, pharyngeal surgery, myopathy, head-and-neck cancer, cricopharyngeal dysfunction, or aphasia were exclude. Outcome measures the Eating Assessment Tool-10 (EAT-10) and Functional Oral Intake Scale (FOIS) were assessed at baseline and after 4 weeks. Both groups received conventional therapy (effortful swallow, oromotor ice stimulation, compensatory head repositioning) 3 sessions daily, 5 days per week.

Group A (n = 15) performed Head Lift Exercise (HLE) in a 45° reclined position using a wedge pillow, with arms resting at their sides and head supported. The protocol comprised an isometric phase requiring patients to lift their head toward their toes without raising the shoulders and sustain the position for one minute across three repetitions with 60-second and isotonic phase involving 10 to 30 consecutive head-lift repetitions without rest.

Figure 1:- Head lift exercise with recline position exercise

Group B performed the Chin Tuck Against Resistance (CTAR) exercise in an upright seated position in the chair with feet supported on the floor, and a 12 cm rubber ball placed between the chin and sternum. And then CTAR protocol consisted of an isometric phase requiring sustained compression of the ball for

60 seconds accompanied by a hard swallow, repeated three times with rest intervals, followed by an isotonic phase of 10 to 30 consecutive compressions without rest.

Data were analysed using SPSS version 23; paired t-test for within-group and independent t-test for between-group comparisons (significance: $p < 0.05$).

RESULTS

Among the 30 patients, 86.67% belonged to the 51–70 years age group, with an overall mean age of 57.43 years. Group A consisted of 8 males (53.3%) and 7 females (46.7%); Group B included 9 males (60%) and 6 females (40%) ($p = 0.712$).

Table 1
Pre- versus post-intervention comparison within Group A

Outcome	Pre-Mean $\pm$ SD	Post-Mean $\pm$ SD	Mean Diff.	t-value	p-value
EAT-10	27.33 $\pm$ 3.10	13.06 $\pm$ 2.73	14.27	14.30	< 0.001*
FOIS	2.80 $\pm$ 0.86	5.93 $\pm$ 0.70	-3.13	-12.25	< 0.001*

*Statistically significant ($p < 0.001$); FOIS Functional Oral Intake Scale; EAT-10 Eating Assessment Tool-10.

Table 2
Pre- versus post-intervention comparison within Group B

Outcome	Pre-Mean $\pm$ SD	Post-Mean $\pm$ SD	Mean Diff.	t-value	p-value
EAT-10	24.86 $\pm$ 3.60	16.06 $\pm$ 2.25	8.80	12.85	< 0.001*
FOIS	2.80 $\pm$ 0.86	5.20 $\pm$ 1.01	-2.40	-14.69	< 0.001*

*Statistically significant ($p < 0.001$); FOIS Functional Oral Intake Scale; EAT-10 Eating Assessment Tool-10.

Table 3
Between-group comparison of mean change in EAT-10 and FOIS scores (independent t-test)

Outcome	Group A Mean Change $\pm$ SD	Group B Mean Change $\pm$ SD	t-value	p-value
EAT-10	14.27 $\pm$ 4.03	8.80 $\pm$ 2.55	4.44	< 0.001*
FOIS	3.13 $\pm$ 0.99	2.40 $\pm$ 0.63	2.41	0.024*

*Statistically significant; FOIS Functional Oral Intake Scale; EAT-10 Eating Assessment Tool-10; SD standard deviation.

DISCUSSION

The present study compared the effectiveness of HLE with reclined position (Group A) and CTAR (Group B) in improving swallowing function among post-stroke dysphagia patients over four weeks. Both outcome measures the EAT-10 and FOIS demonstrated statistically significant improvements in both groups, confirming that exercise-based dysphagia rehabilitation is effective in this population.

In the Table 1 Group A demonstrated a clinically and statistically significant reduction in EAT-10 scores (27.33 ± 3.10 to 13.06 ± 2.73 ; mean difference = 14.27; $t = 14.30$; $p < 0.001$) and a marked improvement in FOIS scores (2.80 ± 0.86 to 5.93 ± 0.70 ; $t = -12.25$; $p < 0.001$). These findings align with previous research confirming that HLE strengthens the suprahyoid muscles, improves anterior-superior hyoid displacement, and facilitates UES opening, thereby enhancing bolus transit and reducing aspiration risk[20, 30]. The reclined (45°) position modification likely contributed to the superior outcomes by reducing gravitational load on the cervical musculature, improving exercise tolerance, and allowing greater repetition volume factors that collectively promote neuromuscular adaptation[31]. Improved patient compliance in the reclined position may further explain the larger mean change observed in Group A compared to traditional supine HLE reported in prior studies [31].

And Table 2 Group B also demonstrated significant improvements in EAT-10 (24.86 ± 3.60 to 16.06 ± 2.25 ; mean difference = 8.80; $t = 12.85$; $p < 0.001$) and FOIS scores (2.80 ± 0.86 to 5.20 ± 1.01 ; $t = -14.69$; $p < 0.001$), confirming that CTAR effectively strengthens the submental and suprahyoid musculature involved in swallowing. This demonstrated CTAR produces suprahyoid muscle activation comparable to the Shaker exercise while being easier to perform across positions[32,34]. The resistance-based isometric and isotonic contractions in CTAR promote progressive overload of the swallowing musculature, resulting in improved hyoid elevation, laryngeal closure, and pharyngeal clearance.

Table 3 the between-group analysis revealed that Group A achieved significantly greater improvement than Group B on both EAT-10 ($t = 4.44$; $p < 0.001$) and FOIS ($t = 2.41$; $p = 0.024$). The superiority of HLE in the reclined position may be attributed to its direct activation of both suprahyoid and infrahyoid muscle groups through a greater biomechanical range of motion, compared to the more localised submental contraction elicited during CTAR. Furthermore, the isotonic component of HLE in the reclined position provides dynamic loading across the entire anterior neck musculature, potentially yielding broader neuromuscular strengthening effects. So this Both Head Lift Exercise with reclined position and Chin Tuck Against Resistance were effective in improving swallowing function in patients with post-stroke dysphagia [31, 33].

CONCLUSION

Both Head Lift Exercise with reclined position and Chin Tuck Against Resistance were effective in improving swallowing function in patients with post-stroke dysphagia after four weeks of intervention. Significant improvements were observed in both EAT-10 and FOIS scores in each group. However, patients who performed Head Lift Exercise with reclined position demonstrated greater improvement

compared to those performing CTAR. Therefore, Head Lift Exercise with reclined position may be a more effective rehabilitation technique for post-stroke dysphagia management.

LIMITATION

The study had a relatively small sample size ($N = 30$), which may limit the generalizability of the findings to a larger population. Additionally, instrumental assessments such as videofluoroscopic swallowing study (VFSS) or fiberoptic endoscopic evaluation of swallowing (FEES) were not included, which may limit detailed physiological evaluation of swallowing.

Declarations

Ethical approval:

Ethical approval for this study was obtained through registration with the Clinical Trials Registry of India (CTRI) (Registration No.: CTRI/2025/07/090801). Written informed consent was obtained from all participants prior to their inclusion in the study.

Consent for publication:

Written informed consent for publication of anonymized data was obtained from all participants.

Competing interests:

The authors declare no competing interests.

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Author Contribution

TP: Wrote Manuscript
PL: Reviewed Manuscript
HR: Reviewed Manuscript
AM: Data Analysis
KL: Data Analysis

Data Availability

The datasets generated during and analyzed in the current study are available from the corresponding author upon reasonable request.

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Figures



Figure 1

Head lift exercise with recline position exercise



Figure 2

Chin tuck against resistance exercise