

"COMPARATIVE EFFECTIVENESS OF CHIN TUCK VERSUS RESISTANCE EXERCISES IN ENHANCING SWALLOWING ABILITY IN STROKE PATIENTS WITH DYSPHAGIA: A STUDY CONDUCTED IN SELECTED HOSPITALS IN HISAR, HARYANA"

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Abstract

Background: Stroke represents a significant life-altering event, with 65% of stroke patients experiencing dysphagia. To enhance post-stroke recovery, it is crucial to improve swallowing and feeding capabilities through the Chin Tuck against Resistance (CTAR) exercise. **Objective:** This study assessed the effectiveness of CTAR exercise in improving swallowing ability among CVA patients. **Methodology:** The research was conducted in selected hospitals in Hisar, employing a quasi-experimental design. A total of 30 participants were purposively sampled and assigned to intervention and comparison groups. Pre-test data were collected through interviews and observations. Starting the following day, the intervention group underwent the CTAR exercise thrice everyday for eight successive days, whereas the comparative group received standard treatment. Post-assessment evaluations of deglutition capability were conducted using the Gugging Swallowing Screen (GUSS) during the next feeding time after the exercise. **Results:** Data were analyzed using descriptive and inferential statistics. The experimental group showed a post-test mean dysphagia score of 11.67 (SD = 4.337), with a mean difference of 4.34. The independent t-test revealed a significant difference ($t = 2.879, p < 0.005$) in dysphagia scores between the experimental and control groups. **Conclusion:** The findings indicate a significant improvement in dysphagia scores among patients in the intervention group compared to the control group.

Keywords: - Comparative Effectiveness, Chin Tuck versus Resistance Exercise, Stroke, Dysphagia.

Introduction

Any trouble moving a bolus from the mouth to the stomach during the eating process is called dysphagia.(1) Dysphagia persists as a chronic condition in approximately 50% of post-stroke patients, potentially leading to heightened mortality, mobility issues, and increased rates of institutionalisation as a consequence of aspiration pneumonia and malnutrition. Dysphagia patients have an approximately fivefold increased risk of developing pneumonia compared to nondysphagia patients.(2)

The early identification and management of dysphagia could substantially reduce complications, improve the quality of life of patients, and improve patient outcomes. Consequently, it should be a high priority (3). Currently, the majority of interventions concentrate on the treatment delivered by physicians and do not actively engage nurses, who are available 24 hours a day in hospitals and are in an ideal position to conduct dysphagia identification and management. Four (4)

Therapeutic exercises that actively stimulate and strengthen the muscles involved in swallowing are essential for effective dysphagia rehabilitation.(5) The chin tuck against resistance (CTAR) exercise was proposed by Yoon et al. as a novel rehabilitative exercise that could serve as an alternative to the Shaker exercise.(6) For stroke survivors, the application of neuroplasticity principles suggests that consistent Repetitive resistance training can improve the strength of the swallowing muscles. This method may be advantageous for the rehabilitation of the sensorimotor control mechanisms related to swallowing. (7)

Numerous studies have examined rehabilitation training targeting the muscles associated with swallowing function. The Shaker exercise, developed by Professor Shaker, has gained recognition as an effective rehabilitation method for dysphagia. This exercise is designed to enhance the strength of the upper esophageal sphincter, thereby improving overall swallowing functionality.(8) Much like the Shaker exercise, the CTAR exercise consists of both isometric and isokinetic activities. The isokinetic component involves squeezing the ball with maximum effort for a series of repetitions, whereas the isometric component entails squeezing the ball and maintaining that pressure for a certain duration.(9) According to four studies, CTAR exercise engaged the suprahyoid muscle and In normal people, the sternocleidomastoid muscle is less than Shaker exercise. Five studies also revealed that CTAR exercise less airway aspiration in stroke patients and enhanced swallowing skills and oral feeding stage in the pharyngeal phase. CTAR training enhances swallowing for those with dysphagia by preferentially activating the suprahyoid muscle. Compliance is higher because it's simpler than Shaker exercise.(10)

This research evaluated how effective CTAR exercise is in enhancing swallowing capability in patients who have experienced a cerebrovascular accident (CVA). who have experienced a cerebral vascular accident (CVA). Additionally, it sought to provide evidence for the development of policies and practices related to post-stroke dysphagia rehabilitation.

Methodology:

This research utilized a quantitative methodology with a quasi-experimental design, carried out in the Neurology departments of certain NABH-accredited hospitals in Hisar. The sample included 30 CVA dysphagia patients, chosen through purposive sampling based on specific inclusion criteria. Data collection instruments comprised demographic information, medical history, and the Gugging Swallowing Screen (GUSS) to evaluate swallowing capabilities. Over the course of eight days in a row, the intervention group engaged in three sessions of The Chin Tuck against Resistance (CTAR) exercise includes doing 10 reps each time you try it out. The assessment of swallowing examined several factors, such as drooling, coughing, and challenges in swallowing. The GUSS, created by Trapl M and Michael Brainin in 2007, was applied to

evaluate swallowing proficiency and to understand the severity of dysphagia. The data collection process incorporated obtaining necessary permissions, selecting patients, securing informed consent, allocating patients into groups, gathering data, performing pretest evaluations, giving the intervention group the CTAR exercise while providing the control group with conventional medical care. Statistical analysis was performed utilising both descriptive and inferential methods.

Result

Table – I: Demographic Variables: Frequency and Percentage Distribution of Subjects in the Experimental and Control Group

(n = 15)

S. No	Demographic Variable	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)	
1.	Age (Years)	30-45years	5	33.3	2	13.3
		46-55years	5	33.3	1	6.7
		56-65 years	3	20.0	5	33.3
		66-75 years	6	40.0	4	26.7
		76-85 years	1	6.7	3	20.0
2.	Sex	Male	8	53.3	11	73.3
		Female	7	46.7	4	26.7
3.	Education	No formal education	7	46.7	10	66.7
		Elementary education	3	20.0	3	20.0
		Senior secondary education	4	26.7	2	13.3
		Up to graduation and post-graduation	1	6.7	0	0.0
4.	Income (Rs)	< Rs10000/- per month	6	40.0	5	33.3
		Rs10000-30000/- per month	5	33.3	5	33.3
		Rs 31000 – 50000 /-	0	0,00	1	6.7
		Above Rs 50001	0	0.00	1	6.7
		Nil	4	26.7	3	20.0

5.	Occupation	Farmer/ labourer	8	53.3	2	13.3
		Business	1	6.7	8	53.3
		Professional	6	40.0	5	33.3
6	Associated Illness	Diabetes Mellitus	12	80.0	15	100.0
		Hypertension	3	20.0	0	0.00
7.	Cause of the stroke	Ischemic	2	13.3	3	20.0
		Hemorrhagic	13	86.7	12	80.0
8.	Duration of Stroke	<5 days	11	73.3	11	73.3
		5-10 days	4	26.7	4	26.7
9.	Family History of Stroke	Yes	0	0.0	4	26.7
		No	15	100.0	11	73.3

Table I displays the frequency and percentage distribution of participants in the experimental and control groups based on demographic data. Six (40%), the bulk of the subjects in the experimental group, were between the ages of 66 and 75. Five subjects (33.3%) were between the ages of 46 and 55. The majority of the subjects in the control group, five (33.3%), were between the ages of 56 and 65. Four (26.7%) of the subjects were between the ages of 66 and 75. According to the distribution of subjects by sex in the experimental group, there were eight (53.3%) male subjects and seven (46.7%) female subjects. The distribution of subjects by sex in the control group shows that 4 (26.7%) were female and the bulk, 11 (73.3%), were male. Seven (46.7%) of the participants in the experimental group had no formal education, whereas four (26.7%) had senior secondary education. This is the distribution of subjects' educational backgrounds. In the control group, the subjects' educational backgrounds were as follows: 10 (66.7%) had no formal education, whereas 3 (20%) had completed senior elementary school. The study's participants' incomes reveal that six out of them, or 40%, made less than Rs 10,000 each month. Five (33.3%) of them made between Rs 10,001 and Rs 30,000 each month. Five (33.3%) of the survey participants had monthly incomes below Rs 10,000 and between Rs 10,001 and Rs 30,000, respectively, according to their income data. The majority of the subjects in this group—eight, or 53.3%—were farmers or labourers, while six, or 40%, were professionals. The majority of the subjects in this group—eight, or 53.3%—were farmers or labourers, while six, or 40%, were professionals. Subjects were assigned to the experimental group based on the related ailment. Twelve (80%) of them had diabetes mellitus, and three (20%) had hypertension as their comorbid condition. The distribution of participants in the control group by associated illness reveals that diabetes mellitus was the associated ailment for all 15 (100%) of the subjects. 13 (86.7%) of the participants in the experimental group had haemorrhage as the cause of their stroke, which is the vast majority of the subjects. Two (13.3%) of the others experienced ischaemia. Among the participants in the control group, the

cause of stroke revealed that haemorrhage was the reason for 12 (80%) of the subjects. Three (13.3%) of the others had ischaemia. 11 (73.3%) of the participants in the experimental group had a stroke that lasted shorter than five days, which is the majority. The remaining four (26.7%) remained for five to ten days. In terms of stroke duration, 11 (73.3%) of the participants in the control group stayed for less than 5 days. The remaining four (26.7%) remained for five to ten days. Regarding the experimental group's subjects' family history of stroke, it reveals that all 15 (100%) of the subjects had no family history of stroke. When it comes to the control group individuals' family history of stroke, it reveals that 4 (26.7%) had a family history of stroke, while the majority, 11 (73.3%), had none.

Table – III: Dysphagia Level Frequency and Percentage Distribution in Experimental and Control Groups

(N = 30)

Group	Test	Mild to nonexistent dysphagia and little to no aspiration risk		A little dysphagia with aspiration risk		Aspiration risk for moderate dysphagia		High risk of aspiration due to severe dysphagia	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Experimental Group	Pre-Test	0	0.0	1	6.7	4	26.7	10	66.6
	Post-Test	1	6.7	3	20.0	6	40.0	5	33.3
Control Group	Pre-Test	0	0.0	1	6.2	1	6.2	13	81.2
	Post-Test	0	0.0	0	0.0	3	20.0	12	81.2

In Table II, you can see how many people in the study group and the control group had dysphagia and what percentage of those people had it.

In experimental group, during pre – test assessment for dysphagia shows majority 10 (66.6 %) had severe dysphagia with high risk for aspiration, moderate dysphagia with aspiration risk was found in 4 (26.7 %) of the subjects. Those who had slight dysphagia with aspiration risk was 1 (6.7 %). None of the subjects had slight / ni dysphagia with no or minimal risk of aspiration.

During post-test assessment, 40% of experimental group subjects had moderate dysphagia with aspiration risk. Five (33.3%) had severe dysphagia with considerable aspiration risk. Three subjects (20%) showed mild dysphagia with aspiration risk. One individual (6.7%) had faint dysphagia with no aspiration risk.

In the control group, 13 (83.2%) had severe dysphagia with high aspiration risk pre-test. A similar number of participants (6.2%) had moderate and minor dysphagia with aspiration risk. None of the participants had mild dysphagia with low aspiration risk. The majority 12 (81.2%) in the control group exhibited severe dysphagia with substantial

aspiration risk at post-test. One subject (6.7%) had slight dysphagia with aspiration risk, whereas two (12.8%) had significant. None of the participants had mild dysphagia with low aspiration risk.

Table III: Comparison of Pre-test and Post – test Level of Dysphagia of Subjects in Experimental Group Using Paired ‘t’ test

(n = 15)

Interventional Group	mean	Mean differences	SD	Paired ‘t’ test Value	‘P’ Value
Pre - Test	8.93	2.74	3.306	5.16 (df = 14)	0.001* Significant
Post - Test	11.67		4.337		

Table – III depicts the Comparison of Mean, Mean %, Standard Deviation and Variance Levels of Dysphagia Score Among Subjects in Experimental Group using paired ‘t’ test.

The pre – test mean and standard deviation scores of dysphagia was 8.93 ± 3.306 . the mean percentage was 16 and the variance level was 10.92. The variance level was 10.02. The post-test mean score for dysphagia was 11.67, with a standard deviation of 4.337. Mean difference was 2.74. for the degree of freedom 14, the paired 't' test value was 5.16. At a 'P' value of less than 0.001, it was statistically significant.

Table IV: Comparison of Pre-test and Post-test Level of Dysphagia of Subjects in Control Group Using Paired ‘t’ test

(n = 15)

Control Group	mean	Mean Differences	SD	Paired ‘t’ test Value	‘P’ Value
Pre - Test	7.13	0.2	3.833	1.382 (df = 14)	0.189 Not Significant
Post - Test	7.33		3.922		

Table – IV depicts the Comparison of Mean, Mean %, Standard Deviation and Variance Levels of Dysphagia Score Among Subjects in Control Group using paired ‘t’ test.

The pre – test mean and standard deviation scores of dysphagia was 7.13 ± 3.833 . The average mean and standard deviation scores for dysphagia after the test were 7.33 with a standard deviation of 3.922. Mean difference value was 0.2 the paired ‘t’ test value was 1.382 for the degree of freedom 14. It was not statistically significant at the ‘P’ Value < than 0.189.

Table VI: Analysis of the post-test level of dysphagia in the experimental and control groups using an independent t-test

(N = 30)

Post - Test	mean	Mean Differences	SD	Independent ‘t’ test Value	‘P’ Value

Experimental Group	11.67	4.34	4.337	2.870 (df = 28)	0.005* Significant
Control Group	7.33		3.922		

The results of an independent t-test are presented in Table VII, which illustrates a comparison of the levels of dysphagia experienced by subjects in the experimental group and those in the control group before and after the test.

In experimental group the post - test mean and standard deviation of dysphagia score was 11.67 ± 4.337 . in control group at the time of post-test mean and standard deviation scores were 7.33 ± 3.922 . The average difference was 4.34. The independent 't' test result was 2.879 for 28 degrees of freedom. The 'p' value was < 0.005 , indicating statistical significance. Thus, experimental and control groups had significantly different dysphagia scores.

Discussion

The CTAR exercise aids dysphagic CVA patients' swallowing. The Chin Tuck Against Resistance (CTAR) exercise is assessed for dysphagia in CVA patients. Stroke patients aged 35 to 85 were studied, with 40% in the experimental group aged 66 to 75. Most control group members (33.3%) were 56–65. Males were 53.3% in the experimental group and 73.3% in the control group. Both groups had little formal education: 46.7% in the experimental group and 66.7% in the control group. About 40% of the experimental and control groups earned less than Rs10,000. Both groups were mostly farmers or labourers (53.3%). With 80% in the experimental group and 100% in the control, diabetes was common. Hemorrhagic stroke affected 86.7% of experimental and 80% of control subjects. Both groups had 73.3% strokes under 5 days. 100% of experimental and 73.3% of control families had no stroke history. At the post-test, 40% of the experimental group had moderate dysphagia with aspiration risk, while 81.2% of the control group had severe dysphagia with high risk. This study agrees with Biswal S, Khosla P, and MI S. (2022), who examined the Chin Tuck Against Resistance (CTAR) exercise's effects on swallowing in neurologically dysphagic patients at IMS SUM Hospital in Bhubaneswar, Odisha. In the experimental group, the mean pre-test score was 5.40 ± 0.814 , which dramatically improved to 15.23 ± 2.285 by the eighth day, showing no dysphagia. Thus, the Chin Tuck Against Resistance exercise helped neurological condition patients with dysphagia swallow.(11)

The findings of the current study indicate that the mean dysphagia score post-test for the experimental group was 11.67, accompanied by a standard deviation of 4.337. The mean dysphagia score following the test in the control group was recorded at 7.33, accompanied by a standard deviation of 3.922. The average difference in scores was calculated to be 4.34. The independent t-test yielded a score of 2.879, accompanied by a p-value of less than 0.005, indicating statistical significance. As a result, one can deduce that there was a notable disparity in the dysphagia scores between the experimental group and the control group. This discovery aligns with the research findings of K V, G K, D S, K V, and Venkatesan L. (2022). This investigation aimed to evaluate the effectiveness of the Chin Tuck Against Resistance (CTAR) exercise in improving the nutritional performance of patients with cerebrovascular accidents

(CVA). The results of the study indicated that the mean pretest score of feeding performance did not differ significantly between with a 't' value of 1.95 ($p>0.05$) between the experimental group ($M=2.05$, $S.D+1.28$) and the control group ($M=2.63$, $S.D+1.12$). In contrast to the control group ($M=3.13$, $S.D=1.23$), the experimental group ($M=6.4$, $S.D=3.25$) exhibited a statistically significant disparity in posttest scores pertaining to feeding performance, evidenced by a t-value of 18.22 ($p<0.001$). The efficacy of CTAR exercises in enhancing tongue pressure and stimulating suprahyoid muscle activity is elucidated.(12)

Conclusion

The Chin Tuck Against Resistance (CTAR) exercise is an effective and inexpensive method for improving swallowing ability in CVA patients with dysphagia. A study conducted in selected hospitals in Hisar, Haryana, found that patients in the intervention group showed faster improvements in swallowing ability within 8 days compared to those in the comparison group.

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