

A study to assess the effectiveness of Chin Tuck Against Resistance (CTAR) Exercise in Improving Swallowing Ability among Cerebrovascular Accident Patients with Dysphagia at a Selected Hospital, Coimbatore

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Abstract

Stroke is a life changing event and among them 65% could be presented with dysphagia. Dysphagia means an impairment of the swallowing mechanism due to physiological weakness or deficits of structure or neurological function (Ekberg, 1982; park et al., 2012;). It can cause negative impact on the person's ability to maintain adequate hydration and nutrition. (Logemann, Nilsson et al., 1998;). Stroke guidelines of UK, US and Australia also stressing on early detection of dysphagia. So, In order to improve the overall outcome after stroke it is essential that the swallowing and feeding performance need to be improved through Chin Tuck Against Resistance (CTAR) Exercise which is helpful in strengthening the suprahyoid muscles that are responsible for swallowing. Thus the study is focused to evaluate the effectiveness of Chin Tuck Against Resistance (CTAR) exercise in improvement of swallowing ability among CVA patients of intervention group. The study was conducted in tertiary care center, Coimbatore and the research design adopted was Quasi-experimental Time series design with multiple institution of treatment. As per the inclusion criteria, 32 samples were selected by purposive sampling and were divided into intervention and comparison group. Pre test data was collected from both the groups then, from next day onwards Chin Tuck Against Resistance Exercise was administered for 8 consecutive days, 3 times a day to the CVA patients who belonged intervention group and the comparison group received the routine care. Post test assessment of swallowing ability among CVA patients was assessed using GUSS (Gugging Swallowing Screen) & FOIS (Functional Oral Intake scale) in both the groups after the exercise during their next feeding time for 8 consecutive days, 3 times a day. The study finding revealed that in the pre test assessment of swallowing ability among CVA patients showed all 16 (100%) patients in the intervention group were having severe dysphagia. After administration of CTAR exercises gradually at the end of eight days of observation mostly 9 (56.25%) of them progressed to mild dysphagia and 5 (31.2%) of them progressed to no dysphagia category. In the intervention group, on day 1 the CVA patients were having severe dysphagia with the post test mean score of 4.38, they progressed to moderate dysphagia at the end of 6 days with the mean score of 11.56 and at the end of day 8 they progressed to mild dysphagia with a mean score of 16.36 which is also statistically significant with a 't' value 17.347 at the level of $p < 0.001$. Thus it concludes, in the intervention group CTAR exercise is effective in improving the swallowing ability among CVA patients with dysphagia.

Keywords: Effectiveness; Chin Tuck Against Resistance Exercise; CVA Patients; Dysphagia.

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Introduction

"Trouble never comes in ones"

Stroke is a major health problem in both the developed and developing countries. It is the

second most leading cause of death above 60 years. The world heart federation states that every year 15 million people suffer with stroke globally. Stroke prevalence is higher among the Asians. The global burden of disease study estimated that the annual stroke incidence of India will increase from 91/100,000 in 2015 to 98/100,000 in 2030 (Ezzati *et al* 2004). Dysphagia can be seen in 65% of the patients with stroke. Dysphagia, an impairment of the swallowing mechanism due to physiological weakness, deficits of structure or neurological function. It can cause negative impact on the person's ability to maintain adequate hydration and nutrition. Stroke guidelines of UK, US and Australia also stressing on early detection of dysphagia using validated tool like GUSS. Dysphagia fosters the risk of aspiration which leads to pulmonary function disability due to chest infections thereby which increases the mortality. (Kidd *et al.*, 1993)

Dysphagia is also a stigma of being unable to eat. In order to improve the overall outcome after stroke it is essential that the swallowing and feeding performance need to be improved. There are Various swallowing techniques like oral motor exercise, hard swallowing techniques, positioning and Shaker exercise which especially pose physical challenge for elderly. (yoshida, *et al*, 2007). Thus finding a way to resolve dysphagia is the need of the hour. There is a present clinical need for effective efficient rehabilitative swallowing exercise. The Chin Tuck Against Resistance (CTAR) Exercise is less strenuous and could be performed in a seated position which is convenient for dysphagic patients, thereby will improve the compliance. It will improve the swallowing and feeding performance of stroke patients so invariably the overall outcome following stroke are also improved through Chin Tuck Against Resistance (CTAR) Exercise.

Objective: The main objective of the study was to evaluate the effectiveness of Chin Tuck Against Resistance (CTAR) exercise in improvement of swallowing ability among CVA patients of intervention group.

Materials and methods

The study was conducted in tertiary care center, Coimbatore and the research method adopted was Quasi- experimental Time series design with multiple institution of treatment. As per the inclusion criteria, 32 samples were selected by purposive sampling and were divided into intervention and comparison group. The tool consists of various sections dealing with demographic data, baseline clinical data,

swallowing assessment, nutritional assessment, Gugging Swallowing Screen scale (GUSS) and Functional Oral Intake Scale (FOIS). The reliability of the GUSS and FOIS tools were found to be 0.9. The tools were found to be highly reliable for the study. Pre test assessment of the swallowing ability among CVA patients with dysphagia was carried out using Gugging Swallowing Screen scale and Functional Oral Intake Scale. The data was collected from both the groups by interview and observation method. Then from next day onwards Chin Tuck Against Resistance Exercise was administered to the patients by assuming upright position. Then, a rubber ball with 12 cm diameter is placed between the patient's chin and base of neck to provide resistance. They are asked to Tuck the chin against the ball and sustaining it for 10 sec (isometric) and for 10 repetitions (isokinetic), three times a day for 8 consecutive days. The ongoing assessment of the effectiveness of Chin Tuck Against Resistance Exercise done every day in the morning, afternoon and evening using GUSS and FOIS scales. Post test assessment of swallowing ability among CVA patients was assessed using GUSS (Gugging Swallowing Screen) & FOIS (Functional Oral Intake scale) in both the groups after the exercise during their next feeding time for 8 consecutive days, 3 times a day.

Results & Discussion

Frequency and percentage distribution of patients according to demographic profile and clinical condition.

Half of the patients in the intervention group, 6 (37.5%) in comparison group belongs to 45-55 years of age. Most of the patients 28 (87%) were males. Most of the patients 11 (68.75%) in intervention group and 6 (37.5%) from comparison group had completed their elementary school education. Majority of their family monthly income falls into the category of Rupees 5000 - 10000. Both in intervention 8 (50%) and comparison group 5 (31.2%) most of them were coolie. Most of them (43.75%) in the intervention group were diagnosed as right hemiplegia and in the comparison group, 8 (50%) of them were with right hemiparesis. Among 16 (100%) patients in the intervention group, 13 (81.2%) of them were found with ischemia as a cause of stroke. In the intervention group among 16 patients, drooling was absent in 15 (93.8%) patients so choking was also absent among all patients. All of them were having cough and mostly difficulty in swallowing semisolid diet 15 (93.8%). None of them had a history of aspiration. All 16 patients (100%) in the intervention group were on nil per oral and completely dependent for feeding.

Table 1: Comparison of pretest and post test mean and standard deviation scores of swallowing ability among CVA patients in intervention group using paired 't' test at various time intervals.

Days	Intervention group	Mean ± SD	Overall mean	't' value	Table value
	Pretest	4.38 ± 0.48			
Posttest					
	M	4.38 ± 0.48			
Day 1	A	4.38 ± 0.48	4.38 ± 0.48	0	
	N	4.38 ± 0.48			
	M	4.68 ± 1.23			
Day 2	A	4.75 ± 1.19	4.73 ± 1.19	1.45	2.131
	N	4.75 ± 1.19			
	M	6.25 ± 2.56			
Day 3	A	6.56 ± 2.71	6.46 ± 2.58	3.91	
	N	6.62 ± 2.66			
	M	6.75 ± 2.54			
Day 4	A	6.94 ± 2.51	6.75 ± 2.54	4.82***	4.073
	N	6.94 ± 2.51			
	M	9.38 ± 3.48			
Day 5	A	9.38 ± 3.48	9.38 ± 3.48	6.46***	
	N	9.38 ± 3.48			
	M	11.56 ± 3.40			
Day 6	A	11.56 ± 3.40	11.56 ± 3.40	9.32***	
	N	11.56 ± 3.40			
	M	12.48 ± 3.37			
Day 7	A	12.44 ± 3.37	12.44 ± 3.37	11.33***	
	N	12.75 ± 3.34			
	M	16.25 ± 3.09			
Day 8	A	16.31 ± 3.16	16.36 ± 3.16	17.347***	
	N	16.31 ± 3.16			

n=16

Note: *** denotes significant at the level of p<0.001

Scoring:

15- 19 - Mild Dysphagia

10 - 14 - Moderate Dysphagia

0- 9 - Severe Dysphagia

In the intervention group, the pre test assessment shows that the patients were having severe dysphagia with the mean score of 4.38±0.48 before administering CTAR exercise. Then from

day 6 onwards they are gradually progressed to moderate dysphagia with a mean post test score of 11.56±3.40 and by day 8 they are progressed to mild dysphagia with a mean post test score of 16.31±3.16. The calculated t value is 17.347 which is greater than the table value (4.073) at the level of p<0.001. This indicates that there is a significant difference between the pretest and the post test scores of swallowing ability among CVA patients who received CTAR exercise. There was a remarkable progress in the mean CTAR score from day 1 (4.38 ±0.48) to day 8 (16.31±3.16).

Table 2: Comparison of pretest and post test mean and standard deviation scores of functional oral intake among CVA patients in intervention group using paired 't' test at various time intervals.

Days	Intervention group	Mean ± SD	Overall mean	't' value	Table value
	Pretest	1.25 ± 0.42			
Posttest					
	M	1.25 ± 0.42			
Day 1	A	1.25 ± 0.42	1.25 ± 0.42	0	
	N	1.25 ± 0.42			

n=16

Days	Intervention group	Mean \pm SD	Overall mean	't' value	Table value
Day 2	M	1.37 \pm 0.60	1.5 \pm 0.74	2.27*	2.131
	A	1.5 \pm 0.74			
	N	1.5 \pm 0.74			
Day 3	M	1.93 \pm 0.82	2.06 \pm 0.90	5.612***	
	A	2.06 \pm 0.90			
	N	2.06 \pm 0.90			
Day 4	M	2.25 \pm 0.74	2.31 \pm 0.84	8.188***	
	A	2.31 \pm 0.84			
	N	2.31 \pm 0.84			
Day 5	M	2.81 \pm 0.90	2.93 \pm 0.74	13.418***	4.073
	A	2.93 \pm 0.74			
	N	2.93 \pm 0.74			
Day 6	M	3.44 \pm 0.86	3.44 \pm 0.86	14.355***	
	A	3.44 \pm 0.86			
	N	3.44 \pm 0.86			
Day 7	M	3.68 \pm 0.92	3.87 \pm 0.93	15.339***	
	A	3.81 \pm 0.94			
	N	3.88 \pm 0.92			
Day 8	M	4.75 \pm 0.96	4.87 \pm 1.05	17.965***	
	A	4.88 \pm 1.05			
	N	4.88 \pm 1.05			

Note: * denotes significant at the level of $p < 0.05$;
*** denotes significant at the level of $p < 0.001$

Scoring:

- 1 - Patient on total NG feeding.
- 2 - Patient on NG feed with minimal food trials of semisolid consistency and can move on to liquids if tolerated.
- 3 - Patient on NG feed with consistent oral intake, can use water to wash the food through the throat. Meals take extra time (> 1 hour).
- 4 - Patient on diet with single consistency (ground/pureed form otherwise called semisolid) but can drink water.
- 5 - Patient on diet with multiple consistencies, Diet can be prepared using blender.

The table 2 indicates that in the pre test functional oral intake assessment the CVA patients are in total NG feeding state with the mean score of 1.25 ± 0.42 . Then after administration of CTAR exercise gradually they are progressed to total oral diet with single or multiple consistency at the end of 8 days with the post test mean score of 4.88 ± 1.05 . The calculated t value is 17.965 in day 8 which is greater than the table value (4.073) at the level of $p < 0.001$. This indicates that there is a significant difference between the pretest and the post test scores of functional oral intake among CVA patients who received CTAR exercise. There was a remarkable progress in the post test mean score from day 1 (1.25 ± 0.423) to day 8 (4.875 ± 1.053). It can be inferred that CTAR exercise is effective in improving the functional oral intake assessment among CVA patient.

Table 3: Comparison of post test mean and standard deviation scores of swallowing ability among CVA patients in intervention group and comparison group using independent 't' test at various time intervals. n=32

Post test	Intervention group Mean \pm SD	Comparison group Mean \pm SD	Calculated 't' value	Table value
Day 1	4.375 \pm 0.4841	5.1875 \pm 3.5039	0.4575	
Day 2	4.7313 \pm 1.1972	5.1875 \pm 3.5039	0.4837	
Day 3	6.4563 \pm 2.5855	5.5 \pm 3.2977	0.9033	
Day 4	6.75 \pm 2.5372	5.7688 \pm 3.1228	1.0167	1.75
Day 5	9.375 \pm 3.4799	6.2313 \pm 3.2075	2.5572*	
Day 6	11.5625 \pm 3.402	6.5375 \pm 3.4108	4.0134***	3.646
Day 7	12.4375 \pm 3.3348	7.1313 \pm 3.4278	4.4109***	
Day 8	16.3688 \pm 3.1658	7.75 \pm 4.0389	6.5009***	

Note: * - significant at the level of $p < 0.05$; *** - significant at the level of $p < 0.001$

A similar report shows that CTAR exercise significantly improves surface electromyography (sEMG) values which in turn helps to increase functional oral intake (Wai Lam Yoon et al,2014). H₁: There will be a significant difference in the post test swallowing ability between intervention group and comparison group after CTAR exercise at 0.05 level of significance.

The table 3 describes that the mean value of intervention group gradually increased till day 6, then it resulted in faster improvement in swallowing ability at the end of day 8, with the mean score of 16.3688. so this concludes that minimum 8 days of CTAR exercise is necessary to show good improvement in swallowing ability among CVA

patients with dysphagia. In comparison group, even at the end of 8 days of therapy they remained in severe dysphagia state with a mean post test score of 7.75±4.0389. The calculated t value is 6.5009 which is greater than the table value (3.646) at the level of p<0.001. Thus research hypothesis was accepted. This showed that CTAR exercise significantly improves the swallowing ability of CVA patients with dysphagia in the intervention group than who received the routine care in the comparison group. Hence it can be concluded that CTAR is effective in improving the swallowing ability as compared to routine care among CVA patients.

Table 4: Association between pre test level of dysphagia (swallowing ability) and selected demographic variables among CVA patients in intervention group.

H₃: There will be significant association of swallowing ability among CVA patients with demographic variables in intervention group. n = 16

Demographic variables	Level of Dysphagia		Chi square value		
	Severe dysphagia f (%)	Moderate dysphagia f (%)	χ ²	Df	Table value
Age					
45 - 55 years	8 (50%)	-			
56 - 65 years	3 (18.75%)	-	0 ^{NS}	3	7.81
66 - 75 years	3 (18.75%)	-			
76 - 85 years	2 (12.50%)	-			
Gender					
Male	14 (87.50%)	-	0 ^{NS}	1	3.84
Female	2 (12.50%)	-			
Education					
Illiterate	1 (6.25%)	-			
Elementary	11 (68.75%)	-	0 ^{NS}	3	7.81
SSLC	3 (18.75%)	-			
Degree	1 (6.25%)	-			
Income(per month)					
<5000	2 (12.50%)	-			
5000 - 10000	11 (68.75%)	-	0 ^{NS}	2	5.99
10000 - 15000	1 (6.25%)	-			
>15000	2 (12.50%)	-			
Occupation					
House wife	2 (12.50%)	-			
Coolie	8 (50%)	-			
Farmer	4 (25%)	-	0 ^{NS}	4	9.49
Professional	1 (6.25%)	-			
Business	3 (18.75%)	-			

Note: NS - denotes non significant

It is observed from the Table 4 that the chi square value was lower than table value for demographic variables age, gender, education, income and occupation with pre test level of dysphagia among CVA patients at the level of p<0.05. Thus null

hypothesis was accepted. There was no significant association between pre test level of dysphagia and demographic variables such as age, gender, education, income, occupation among CVA patients of intervention group at the level of p<0.05. Hence the research hypothesis was rejected.

Another study results supports that there is no significant association between the swallowing and feeding performance of the post stroke dysphagia patients with selected demographic variables like age, gender and education at the level of $p < 0.05$. (Sujisusan Jasmes et al. 2015).

Conclusion

Chin Tuck Against Resistance (CTAR) exercise was an effective, inexpensive measure for improving swallowing ability among CVA patients with dysphagia. The present study was intended to assess the effectiveness of Chin Tuck Against Resistance (CTAR) exercise in improving swallowing ability among CVA patients with dysphagia at a tertiary care hospital, Coimbatore. The report of this study was found that there was faster improvement within 8 days in the swallowing ability among CVA patients with dysphagia in the intervention group than comparison group.

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