A Study to Compare the Effects of Palatal Stimulation and Swallowing Exercises Among Stroke Patients with Dysphagia

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Stroke, Dysphagia, Palatal stimulation, Swallowing exercises, Gugging swallow screen

ABSTRACT
Background: To evaluate the combined effect of palatal stimulation with swallowing exercises in patients with dysphagia following stroke along with conventional exercises. There are many positive results regarding treatment effects of dysphagia has been published, still lots of unanswered questions emerge regarding the physiotherapy management for dysphagia, there are no studies which highlighted the prognosis of the patients with dysphagia from moderate/severe category to mild and normal based on the GUSS score. **Methods:** The patients who were referred for palatal stimulation by the Neuro physician were considered for experimental group and the other group of patients with dysphagia were taken as control group. Each patient in the experimental group received palatal stimulation with faradic current, 90 contractions was encouraged followed by session of swallowing exercises for 30 min, for 6 days per week for 2 weeks whereas the patient in the control group received sham stimulation, followed by conventional rehabilitation treatment, on the same time schedule. **Results**: Data was compared within the groups by wilcoxon test and proved to be highly significant in the experimental group and significant in the control group. The post-test mean value for experimental value and control group was 11.71 and 7.38 respectively. Thus, proving that experimental group showed significant change in the GUSS score than the control group. **Conclusion**: The results of this study suggests that stroke patients with dysphagia benefit significantly with combined method of palatal stimulation and swallowing exercises. This method had considerably improved the GUSS scores on patients with dysphagia.

1. Background

Dysphagia following stroke is one of the common clinical symptom which has a negative impact on quality of life. The most common complication of dysphagia is risk of aspiration pneumonia, increased days of hospitalization and increased mortality. Dysphagia occurs due to either neurological or physical impairment of oral and pharyngeal mechanism and it is one of the independent markers of poor outcome following stroke. (1)

There are numerous compensatory treatment strategies are available for treatment of dysphagia, but they are found to be less effective. However, certain rehabilitative techniques like electrical stimulation, exercises have been proved and enabled the person to swallow at a stronger or faster rate. These exercises aim to strengthen isolated muscles used in swallowing and there is a very limited knowledge regarding parameters of swallowing exercises and conduct of electrical stimulation. (2)

Doeltgen et al identified those active swallowing exercises for the submental musculature improves corticobulbar excitability which may further improve swallowing biomechanics. (3) Fraser et al also emphasised when palatal stimulation is applied over the pharynx, it increases the cortical excitability and reorganization. (4) Thus both electrical stimulation and swallowing exercises found to be beneficial for the patients with dysphagia following stroke.

Various paramedical treatments for swallowing disorders usually are carried out by physiotherapist currently. It is expected and understood that these treatment methods will enhance recovery of swallowing functions. (5) Even though many number of positive results regarding treatment effects of dysphagia has been published, still lots of unanswered questions emerge regarding the physiotherapy management for dysphagia, there are no studies which highlighted the prognosis of the patients with dysphagia from moderate/severe category to mild and normal based on the GUSS score.The prognosis

of the swallowing ability among stroke can be measured using Gugging Swallow Screen (GUSS) scale. The Gugging swallow screen **is** a simple screening method that allows rating with two different evaluations for non-fluid and fluid nutrition. (6)

Therefore, the present study was aimed to evaluate the combined effect of electrical stimulation with swallowing exercises in patients with dysphagia following stroke along with conventional exercises. The objective of this study was to show significant improvement on the GUSS score.

2. Methods

This is a randomized study and it was approved by the ethical committee (CSP/12/SEP/25/143), 27 stroke patients between the age group 30-75 years were recruited. The subjects were screened for eligibility to participate in the study. After screening the subjects, they were asked to sign the informed consent. The patients who were referred for palatal stimulation by the Neuro physician were considered for experimental group and the other group of patients with dysphagia were taken as control group. The patients with poor cognition, seizure disorder, brain surgeries were excluded. All the patients were initially screened with GUSS and the initial score was documented.

Procedure

Each patient in the experimental group received palatal stimulation with faradic current, 90 contractions was encouraged followed by session of swallowing exercise for 30 min, for 6 days per week for 2 weeks whereas the patient in the control group received sham stimulation, followed by conventional rehabilitation treatment, on the same time schedule. For experimental group, 14 patients were assigned. The patient were positioned in supine lying after skin resistance lowering 2 electrodes were placed on the either side sub-mentally and over the side of the thyroid cartilage, in order to activate suprahyoid and infrahyoid muscles. Intensity was set to the maximum tolerable by the patient. The control group patients with the total number 13 were positioned in the similar way, placebo stimulation and exercises were given.

S. No	**Experimental group**	**Control group**
1.	Palatal stimulation	Sham Treatment
2.	Shaker exercise	Jaw thrust
3.	Lip press	Masako maneuver
4.	Tongue Push Up	Mendelsohn Maneuver
5.	Tongue Push Side to Side	Supraglottic Maneuver
6.	Tongue Push Forward	Hyoid Lift Maneuver

After the treatment duration of 2 weeks, GUSS was re-evaluated and score was documented.

3. Results

The following are the results obtained by comparing the scores of experimental and control groups.

Table 1. Comparison Between Experimental & Controls by Mann-Whitney Test

Groups	Variables	Mean	S.D	Mann-Whitney	P-Values
POST-TEST	EXPERIMENTAL	11.71	5.455	2.335	0.025
	CONTROL	7.38	.506		

Table -1 shows the values are highly significant in the experimental group and significant in the control group.

Table 2. Comparison Between Pre & Post Test by Wilcoxon Test

Groups	Variables	Mean	S.D	Wilcoxon	P-Values
EXPERIMENTAL	PRE-TEST	5.86	1.703	3.192	0.001
	POST-TEST	11.71	5.455		
CONTROL	PRE-TEST	6.08	1.441	2.515	0.01
	POST-TEST	7.38	.506		

Table -2 comparison shows experimental group improved better than control group

Table 3. Comparison Between Experimental & Controls by Chi Square Test

	Patients with GUSS score change of 3 and above	Patients with GUSS score change of less than 3	Total	P value
Experimental	11	3	14	0.03
Control	4	9	13	
Total	15	12	27	

Table -3 shows significant change in the scores of the GUSS scale. Those patients in experimental group showed change in the score of 3 and above had improvement in the swallowing capacity in food consistency.

4. Discussion

The primary aim of this study was to analyse the combined effect of palatal stimulation along with swallowing exercises in order to activate the pharyngeal/laryngeal musculature and show prognosis on the GUSS score. Palatal stimulation combined with the exercises is found to enhance recruitment of muscles which is also supported by the study, which insisted that by giving electrical stimulation and exercises the duration of hospital stay reduced and nutritional status had improved for the patients. (7)

In this study, both haemorrhage and infarct stroke patients were included and the proportion of infarct patients was found to be more. Common areas of lesion observed in the stroke patients are frontal lobe, parietal lobe, gangliocapsular region, caudate nucleus, internal capsule and corona radiata.Therefore, it was heterogenous group of patients which can be refined more in future studies.

Results further indicated that change in the score value of 3 or more in the GUSS scale was considered as good prognosis and the many patients also clinically showed improvement in the swallowing capacity, consistency of food taken. The previous studies had also suggested that GUSS is one best and easiest clinical method to identify to dysphagia and also the most reliable tool. (8)

The GUSS scale which is used as an outcome measure to indicate the prognosis helps us to evaluate the following. The experimental group patients with dysphagia showed significant changes in individual components in GUSS scale. Those were deglutition 75%; cough 37%, drooling 37% and voice change 25%. In control group, the improvement noted in individual components in GUSS scale were deglutition 46.1% and droolingv23%. On comparing both the groups after the treatment clinically, it was found that the experimental group achieved greater improvement in the swallowing capacity.

The placement of electrodes during palatal stimulation for treating dysphagia patients is an area of huge controversy, reason being the muscles involved in swallowing are very small and many are overlapping in nature. In the recent study it was suggested that horizontal placement of the electrodes superior and inferior to the hyoid bone is found to be more effective than other placements of

electrodes. (9) The intensity of the current is adjusted according the individual tolerance to enhance contraction. Another factor which contributed for the improvement is the motivation from the care givers and patients who were more motivated gained better control over swallowing.

The patients who received sham treatment, even though everything was identical in appearance the patients in control group showed small changes in GUSS score and clinically mild to moderate improvement in swallowing.Therefore, we also need to focus on sham treatment in future studies. Combined effect of electrical stimulation and exercises increases the recruitment of both I and II type of muscle fibres and enhances larger swallowing muscle contraction.

5. Limitations

Limitations of this study include a relatively smaller sample size. The sampling technique for recruiting patients in the study is convenient sampling. More homogenous group of patients and duration of recovery can be considered in future studies.

6. Conclusion

The results of this study suggested that combined method of palatal stimulation and exercises was better than the conventional method. However, we still need to know more about the duration of recovery, appropriate placement of electrodes, selection of homogenous group of participants.

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