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Revolutionizing Swallowing: CTAR Exercise Reshapes Dysphagia

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Abstract:

Introduction: This study aimed to assess the effectiveness of CTAR Exercise in improving the swallowing ability of dysphagia patients among neurologically deficit patients. **Methods:** Utilizing a non-probability simple random sampling technique, 40 dysphagia subjects were selected and randomly allocated to experimental and control groups. A thorough collection of sociodemographic and clinical data preceded the intervention. A pre-test using the GUSS and FOIS Scale assessed swallowing and feeding abilities, followed by eight days of supervised CTAR and routine exercises thrice daily. A post-test, employing GUSS and FOIS Scale, evaluated the post-intervention status of swallowing and feeding capabilities. The results were analysed using descriptive & inferential statistics (Mann-Whitney Z test, Wilcoxon signed rank test & Kruskal Wallis Chi-square test.) **Results:** Post-test scores showed a notable contrast. Experimental group (Mean: 17.60±3.218) significantly outperformed the control group (Mean: 7.95±4.571) ($Z=4.75$, $p<0.001$), indicating CTAR exercise effectiveness in enhancing swallowing ability through muscle activity and tongue pressure improvement. **Conclusion:** The current study reveals a noteworthy enhancement in swallowing ability following the implementation of the CTAR Exercise among neurogenic dysphagic patients. Therefore, it is recommended that the CTAR Exercise be incorporated as a regular practice.

Keywords: CTAR Exercise, Dysphagia, Neurologic deficit

Introduction:

Dysphagia, a term that resonates with the struggle to swallow, is a pervasive and debilitating condition that confronts millions around the world. Its impacts ripple through diverse clinical

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contexts, but the challenge intensifies when intertwined with the complex narrative of neurological deficit patients. This population, encompassing individuals afflicted by strokes, traumatic brain injuries, and degenerative neurological disorders, experiences a confluence of challenges that obstruct the ordinary orchestration of swallowing, leading to the relentless grip of dysphagia. Within this context, the affliction often yields more profound consequences, including malnutrition, recurring bouts of aspiration pneumonia, and a profound diminishment of the quality of life. Thus, the urgency of addressing dysphagia in neurological deficit patients emerges as a poignant clinical imperative.

Dysphagia is resulted among neurologically impaired patients who had occlusion in the middle cerebral artery or internal carotid artery or vertebral or basilar artery. Dysphagia can be seen in 65% of the patients with such deficits. Aspiration is the most common in the early period following any neurological disorders as a result of dysphagia**.** [1]

If dysphagia is effectively managed patients will be better nourished, which can improve rehabilitation rates and reduce the length of hospital stay. It reduces the incidence of complications such as chest infections and pressure sores. Early detection and management of dysphagia in neurological patients is necessary to prevent complications and decrease number of deaths associated with dysphagia. [2]

Thus, developing a less strenuous therapeutic exercise would potentially benefit the patients who find shaker exercise physically challenging. The Chin Tuck Against Resistance (CTAR) Exercise, performed in a seated position, is less strenuous as the patient is not required to lift the weight of her head. So, performing CTAR in a seated position would make it convenient for dysphagic patients, thereby will improve the compliance. 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. In order to improve the overall outcome following neurological disorders its essential that the swallowing and feeding performance are improved through Chin Tuck Against Resistance (CTAR) Exercise.

Methods

Study design: In this experimental study, 21 group pre-test and post-test design was used to assess the swallowing ability among dysphagic patients with neurological deficits in a selected tertiary care hospital in western Maharashtra.

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Chin tuck against resistance Exercise: CTAR exercise is an activity performed with a 12cm diameter inflatable rubber ball which is placed between chin and base of neck to provide resistance when the patient is seated in upright position. Chin tuck against the ball and sustained it for 10 sec and for 10 repetitions, three times a day for 8 consecutive days. After that, they were given a post-test.

Setting and samples: A total of 40 participants were included in this study. The participants were selected from acute wards & various neurology wards of tertiary care centre in western Maharashtra through Simple random sampling. The inclusion criteria were to select participants who are alert, cooperative, obeys command, & patients with brain & spinal cord injuries (eg: Stroke/ brain tumour/Cervical spine injury).

The sample size needed for the study was calculated using the formula
N = 2 Z2 p q / E2. 40 participants were selected through simple random sampling method and then was randomly allocated into experiment & control group through chit method.

Ethical considerations: This study was approved by the institutional Ethical Committee. Participants received information on the eligibility criteria, purpose, and procedures of the study. Furthermore, eligible participants signed informed consent and were assumed to be confidential. No harm was anticipated, or no compensation was offered.

Measurements: Swallowing ability was measured by GUSS Score by Trapl M and Michael Brainin at the Centre for Clinical Neurosciences, Danube University, Krems, Austria[4]. Sociodemographic data was made by the researcher. The tool was validated by 2 neurosurgeons, 1 neurologist, 2 neuroscience nursing faculty & 1 biostatistician. Modification was done as per suggestions received.

Data collection procedure: Measurements were performed pre intervention & post intervention. To protect the personal information of participants, they were given codes. Each participant was given ball & was instructed to keep the ball against the resistance for 10 secs which will be repeated for 10 times thrice a day. This was done for consecutive 08 days for 6 weeks. At the end of 6 weeks, the post-test was carried out.

Statistical analyses: All statistical analyses were performed using MS Excel, XL Stat, Jamovi and SPSS (Version 21.0). The general characteristics of the participants were calculated using

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the frequency, percentage, mean and standard deviation. The association of sociodemographic data and pre-intervention college adjustment was done with the Chi-square test.

Results:

GUSS scores before and after the intervention in Experiment Group

Fig 1, depicts the distribution of cases among intervention group based on the pre & post GUSS Score. In which a majority of 12 individuals (60%) initially had severe dysphagia, which improved to nil patients having dysphagia after CTAR Exercise.

(n=40)

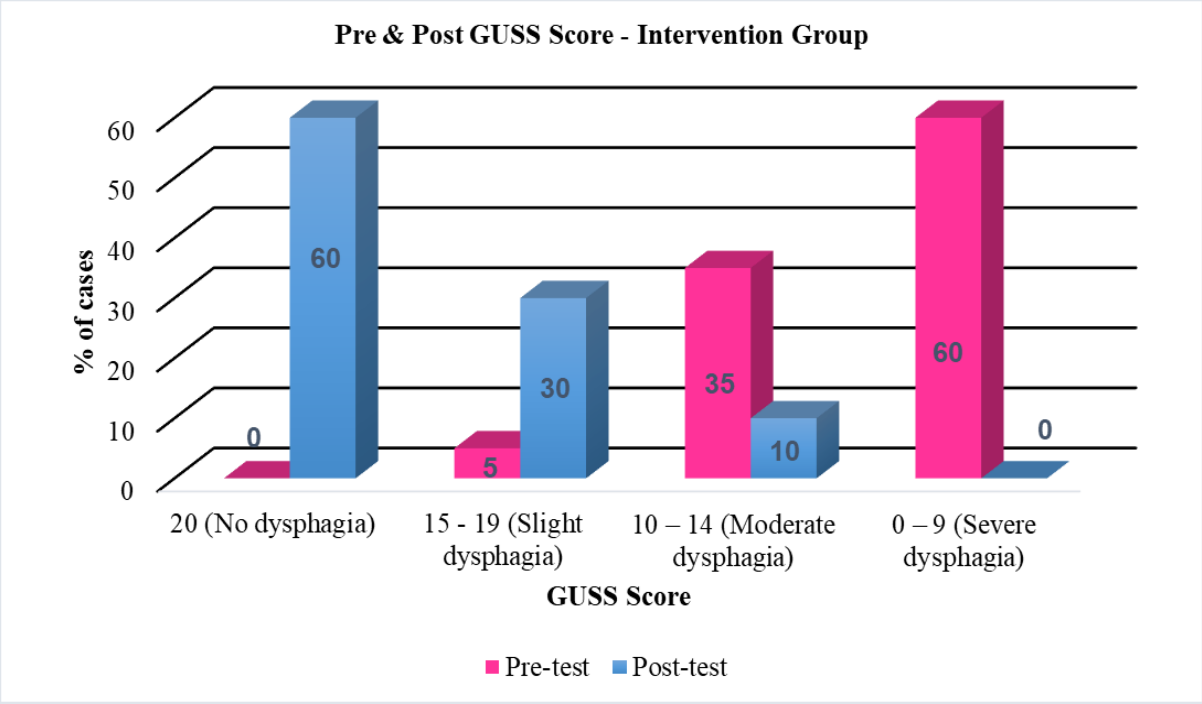

Fig 1 Distribution of sample as per pre and post-intervention GUSS score

Comparison of pre-interventional & post intervention GUSS Scores in intervention & control group

Fig 2, It depicts that the intervention group, after practicing the CTAR Exercise along with the routine exercises, the mean GUSS Score improves from 7.20±3.592 to 17.60±3.218 where the Z value is greater than that of the table value (1.96) which is highly significant at the at the level of significance of p value <0.0001.

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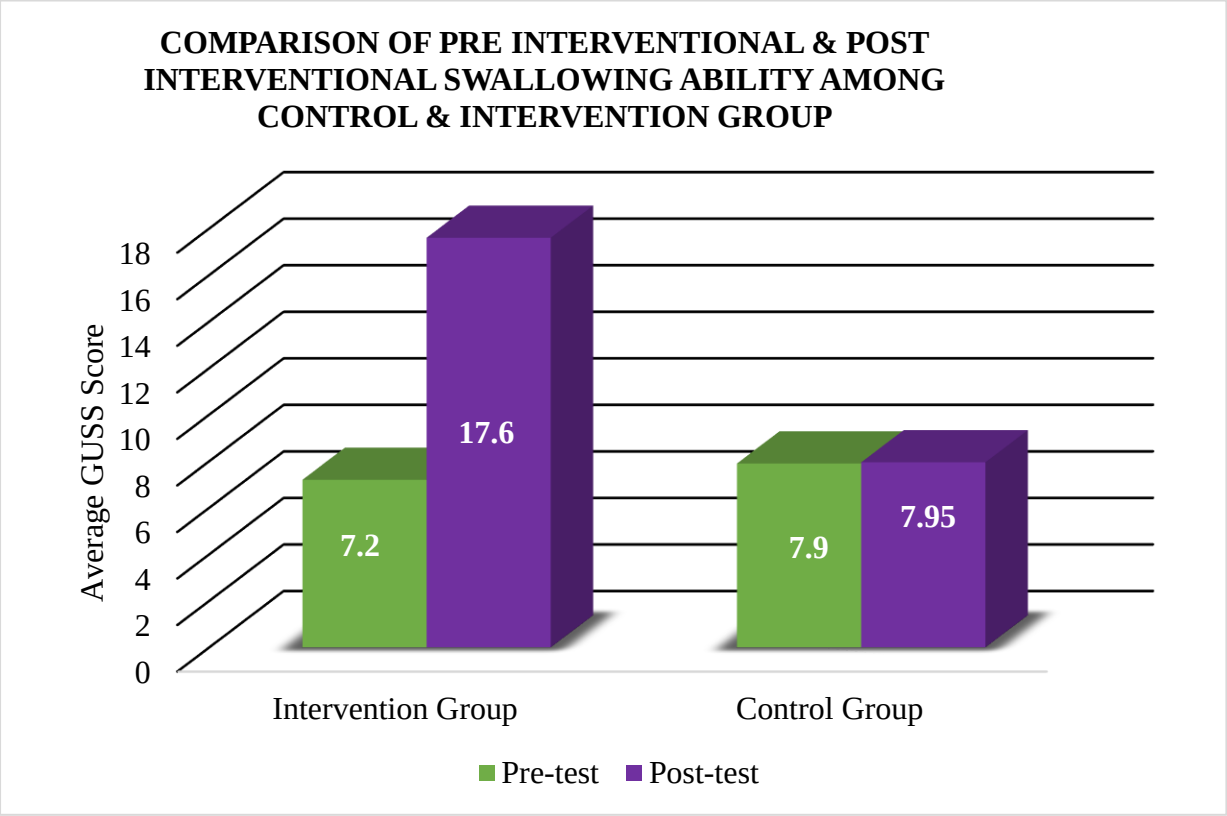
The Control group, the mean GUSS Score slightly increased to 7.95±4.571. The calculated Z value is lower than the critical table value (1.96), indicating a lesser degree of significance. The corresponding p-value is 0.32, suggesting that the observed changes are not statistically significant at the chosen significance level.

Fig 2 Comparison of pre and post-intervention swallowing ability among interventional & control group

(n=40)



Association of Socio-demographic variables

Association of the socio demographic data & clinical variable with the pre-intervention scores of both the groups were found to be non-significant as the p value was less than 0.001.

Hypothesis testing

The analysis suggested that after practicing the CTAR Exercise in Intervention group, the mean GUSS Score improves from 7.20±3.592 to 17.60±3.218 where the Z value is greater than that of the table value (1.96) which is highly significant at the at the level of significance of p value <0.0001. Hence the null hypothesis that there is no relation between the CTAR Exercise and

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swallowing ability among neurological deficit dysphagic patients in the study subjects was rejected at 5% level of significance.

The analysis also suggested that the calculated KW Test Chi-square value of pre-intervention GUSS Score is 1.34 which is less that the table value 1.96 and level of significance at 0.51 ($p > 0.05$) which indicates no significant association between the grade of dysphagia and the selected demographic variable (i.e. age) Hence the null hypothesis that there is no relation between the dysphagia grade and selected demographic variables among neurological deficit dysphagic patients in the study subjects was rejected at 5% level of significance.

Discussion

Effectiveness of CTAR Exercise on improving the swallowing ability among neurological deficit patients with dysphagia

In the present study out of 40 study subjects assessed during the period of study. The findings indicate that among the 20 study subjects who underwent CTAR Exercise, 12 individuals with severe dysphagia showed a significant improvement, reaching a state of no dysphagia after the CTAR Exercise.

The result is consistent with the study conducted by Vinnoli K et al (2022) The findings indicate that among the 20 study subjects who underwent CTAR Exercise, 12 individuals with severe dysphagia showed a significant improvement, reaching a state of no dysphagia after the CTAR Exercise. [3]

Similar study conducted by Liu Jing et al (2023) The results revealed that CTAR exercise is effective in improving swallowing safety (MD, −1.43; 95% CI, −1.81 to −1.06; $P < 0.0001$) and oral intake ability (SMD, −1.82; 95% CI, −3.28 to −0.35; $P = 0.01$) compared with no exercise intervention.[4]

Description of Socio-demographic variables

Age Distribution: In this study, comprising 40 participants, 40% of the intervention group and 50% of the control group belong to the age range of 35 to 54 years. The analysis reveals no significant correlation between age and the pre-intervention GUSS Score, as indicated by a P value > 0.05. This finding aligns with the results of a study by Muthulakshmi et al. (2018), in which 24% of the 30 study subjects fell within the age group of 30 to 40 years.[5]

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Description of Clinical Variables

BMI: In the present study, the association of pretest GUSS Score of both intervention & control group with the clinical variables suggest that there is no significant association between the swallowing ability & BMI as p value is > 0.05 (0.12 & 0.20)

Comorbidities: In the present study, the association of pretest GUSS Score of both intervention & control group with the clinical variables suggest that there is no significant association between the swallowing ability & comorbidities as p value is > 0.05 (0.46 & 0.53) which is congruent with the results of a study by Muthulakshmi et al. (2018), in which 60% of the 30 study subjects had comorbidities.[5]

Duration of illness: In the present study, the association of pretest GUSS Score of both intervention & control group with the clinical variables suggest that there is no significant association between the swallowing ability & Duration of illness as p value is > 0.05 (0.24 & 0.64) which is congruent to the results of a study by Muthulakshmi et al. (2018), in which 20% of study samples had duration of illness with less than 1 yr span, 12% of them had 2 – 3 yrs of duration & 28% samples had illness for 3 – 4 yr.[5]

Limitations

Certain limitations were present in the study, such as the designated time frame allocated for data collection.

Conclusion

The current study reveals a noteworthy enhancement in swallowing ability following the implementation of the CTAR Exercise among neurogenic dysphagic patients. Therefore, it is recommended that the CTAR Exercise be incorporated as a regular practice.

Conflict of interest

The researcher declares no conflict of interest.

Acknowledgement

This article is a revision of the first author's dissertation from MUHS.

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