

Evaluation of the Super-Supraglottic Swallow Maneuver on Swallowing Function in Stroke Patients

Hawraa Abd Alhesnawi^{1*}, Dr. Hassan Abdullah Athbi²

¹ Academic Nurse/Ministry of Health/ Kerbala Health Directorate/Iraq

² PhD/ Associate Professor/Adult Nursing Department/ College of Nursing/University of Kerbala/Iraq

ABSTRACT

Background: Dysphagia is a serious medical complication following stroke, often leading to significant morbidity and increased risk of aspiration pneumonia, malnutrition, and dehydration. Early management of dysphagia is crucial to reducing complications and improving functional recovery. The Super-Supraglottic Swallow Maneuver (SSGSM) is a therapeutic swallowing technique designed to enhance airway protection and swallowing coordination in stroke patients. This study aimed to evaluate the effect of SSGSM on dysphagia severity in post-stroke patients. **Methods:** A quasi-experimental study was conducted at Imam Al-Hussein Medical City in Holy Karbala from October 1, 2023, to May 18, 2024. A purposive sample of 60 stroke patients with dysphagia was recruited and divided into two groups: an intervention group (n = 30) and a control group (n = 30). The intervention group underwent SSGSM therapy three times daily for seven consecutive days, while the control group received standard care without the maneuver. The severity of dysphagia was assessed using the Gugging Swallow Screen (GUSS) scale. Data analysis was performed using descriptive and inferential statistical methods, including paired and independent sample t-tests, with a significance threshold set at $p < 0.05$. **Results:** After seven days of intervention, the SSGSM group demonstrated a significant improvement in swallowing function, with a marked reduction in dysphagia severity ($p = 0.000$). In contrast, the control group did not exhibit a statistically significant change in dysphagia levels between pretest and posttest assessments ($p = 0.067$). **Conclusion:** Early implementation of the Super-Supraglottic Swallow Maneuver, performed three times daily for one week, significantly improves swallowing function and reduces dysphagia severity in stroke patients. These findings suggest that incorporating SSGSM into post-stroke rehabilitation protocols may enhance recovery outcomes and reduce the risk of dysphagia-related complications. Further studies with larger sample sizes and long-term follow-up are recommended to validate these results.

Keywords: Stroke, Dysphagia, Super Supra Glottic Swallow Maneuver

INTRODUCTION

Stroke is the second major cause of disability and mortality around the world, raising serious concerns about global health [1]. It is occurring when the brain is deprived of blood flow because of a clot blocking an artery or a brain vessel burst, causing ischemia and bleeding in the brain's tissues [2, 3]. In the United States, over 80,000 people suffer from stroke annually, making it leading cause of morbidity and disability, and the third most prevalent reason for mortality [4, 5]. Stroke can have linked to a number of medical concerns that can result in prolonged hospital admission and high medical costs, and has an impact on various body systems functions, including neuromotor activity, elimination, cognitive, sensory, and communication skills [6]. Patients with stroke may experience of dysphagia, or trouble swallowing, in the early hours and days following their event [7-9].

Dysphagia is a significant and serious condition following stroke and that can be fatal [10]. After a stroke, dysphagia can occur in 29-81% of cases [11]. Dysphagia's clinical symptoms include the subjective perception of swallowing stagnation, pain during swallowing, or total lack of swallowing function [12]. Dysphagia following a stroke can cause issues with the pharyngeal and oral aspects of swallowing. A persistent dysphasia may cause an overabundance of drool, saliva, choking or coughing when eating, and even trouble speaking or a raspy voice [10]. Post-stroke dysphagia is accompanying with reduced oral, pharyngeal, and esophageal functioning, and a general decline in quality of life, in addition to significant issues that lead to airway obstruction, aspiration, aspiration pneumonia, dehydration, starvation, sepsis, and mortality. It can also

cause healthcare expenses to rise and rehabilitation to be delayed [11, 13-15]. It is widely advised to use sensitive, dependable, and validated bedside assessment instruments to identify and closely monitor swallow function in all patients diagnosed with stroke during the first day of the diagnosis [8, 16, 17]. The focus of dysphagia treatment often lies on compensating strategies, such as applying different stretch exercises or altering food consistency to improve oral intake safety. Moreover, several researches have confirmed the impact of the exercise-based intervention. However, there are differences in the time and type of therapies, along with a variety of outcome measures, which make it challenging to assess if therapy is actually helpful [10]. Early management of dysphagia in patients diagnosed with stroke has been shown to improve nutritional status, reduce the risk of respiratory aspiration, and improve the recovery process [18]. The dysphagia training program involves a variety of techniques, both direct and indirect.

The improvement of voluntary motor activities is the goal of direct techniques. It involves using electrical, chemical, and thermal applications to stimulate motor activity and speed through sensory means. By offering compensation through customized interventions, indirect approaches seek to improve swallowing safety and avoid respiratory aspiration without treating the underlying neuromuscular deficiency [19]. Nurses also use compensatory maneuvers (e.g., Mendelsohn maneuver, hard swallowing, viscous liquids, homogenized semi-solid foods), diet modification (such as viscous liquids), and postural arrangements (such as chin-to-chest, chin tuck posture, tilting the head backward, and rotating the head to the

strong/weak side) [19, 20]. Maintaining and ensuring a safe nutrition will not only shorten the time of the patient's hospital stay but also help avoid the progress of problems due to swallowing difficulties, increasing life expectancy and quality of life [21]. Elfetoh and Karaly, [22] highlighted that stroke patients with dysphagia who underwent a swallowing training program saw improvements in their ability to swallow.

Objectives

This study was conducted to investigate the degree of dysphagia in patients with stroke and determine how the Super Supra-Glottic Swallow Maneuver affects the level of dysphagia.

Study Design and Participants

A quasi-experimental study was conducted at the medical department of Imam Al-Hussein Medical City in Holy Kerbala, Iraq. The study was initiated from 1st October, 2023 to 18th May, 2024.

A purposive sampling method involves of 60 patients who diagnosed with stroke with symptoms of dysphagia were involved in this study, those who are alertness, obeys instructions with the ability to imitate the researcher, and those with voluntary agreement to participation in this study. Two groups were created out of the participants: the control group and the intervention group. Thirty patients were involving in each the intervention and control (Figure 1).

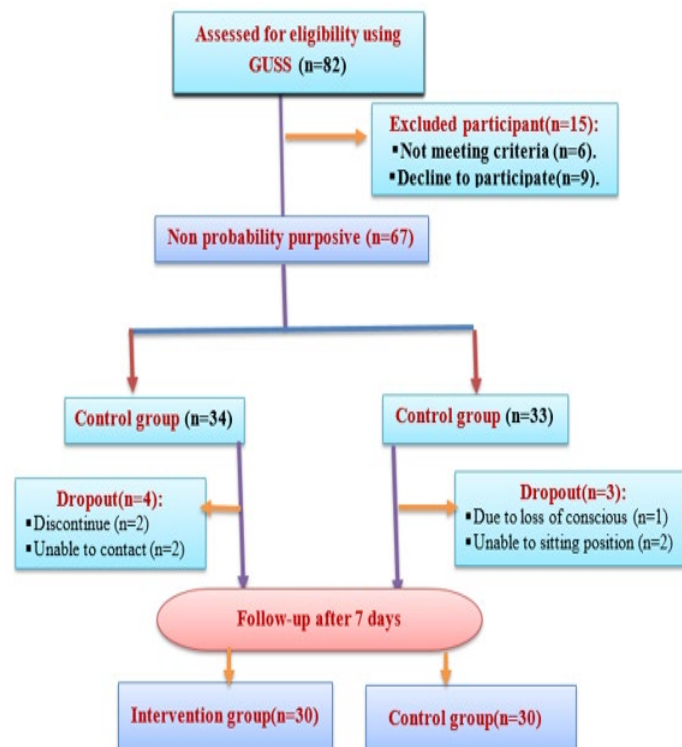


FIGURE 1: Eligibility Criteria for the Study

Data Collection Instruments

The data were gathered using an instrument which were divided into two categories: First part: socio-demographical information, and clinical data that consist of ages, gender, marital status, level of educational, occupation, pre-existing chronic diseases, type and location of stroke, and previously exposed to stroke; the second part was used to evaluate the dysphagia level using a Gugging Swallow Screen Scale (GUSS), which was developed by Trapl, et al., [23]. Two components are involved in the GUSS that's are: part 1 (indirect swallow test) also called the preliminary assessment, and part 2 (the direct swallow test). A point system was chosen, with a maximum of five points that can be scored in each subtest, where higher numbers indicate healthier performance. To move on to the next subtest, you have to reach this maximum. Every test item has a value of either one point (physiologic) or zero points (pathologic). We employed a new rating inside the direct swallowing test's scoring criteria for "deglutition." Pathologic swallowing receives 0 points, delayed swallowing receives 1 point, and normal deglutition receives 2 points. To receive the maximum score of five points on the subtest, patients

must successfully complete all repeats. The test has to end if a subtest yields less than five points. The highest possible score for a patient is twenty, which indicates normal swallowing skills without aspiration risk. Additionally, there are three subtests that make up the direct swallowing test: the semisolid diet, the liquid diet, and the solid textures diet. These subtests are conducted in order. The GUSS scores give up four categories of severity. 0-9 points are rated as a severe dysphagia, 10-14 points are considered as moderate level of dysphagia, 15-19 points are determined as mild level of dysphagia, and 20 points are rated as no dysphagia. The instrument validity was determined by a panel of thirteen experts, the GUSS is a reliable and sensitive tool for screening dysphagia.

Intervention

The researcher explained to each patient the significance of swallowing exercises, which are intended to teach patients safe swallowing practices and to strengthen and improve their swallowing abilities. Stroke patients who complained of dysphagia and were in the intervention group completed the exercise three times a day for seven days duration, whereas the control group only received the routine

therapy [6]. Patients in the interventional group are taught how to implement a super-supraglottic swallow maneuver, which involves taking a deep breath and holding it tightly while bearing down. They are also instructed to cough right after swallowing (before inhaling) and then swallow again with great force right away [24]. Pre-test evaluations of swallowing abilities were carried out using the Gugging Swallowing Screen. The patients were checked on three times a day by the researchers, who reminded them to complete the exercises and gave them instructions on the procedure. The follow-up approach involved calling patients and setting up WhatsApp groups on social media platforms in addition to speaking with them over the phone (using a SIM card). The researcher examined the patient's commitment and response to the intervention during this follow-up. All patients in the study received similar routine care, including those in the control group. Before the intervention and immediately after its end, the degrees of dysphagia were evaluated for all patients in the control and intervention groups. The data collection process was attained from January 27th to April 10th, 2024

Results

Table 1: Distribution of Patients in two Groups According to their Socio-Demographic Data

Socio-Demographic Data		Groups				X ² P-Value
		Intervention		Control		
		F	%	F	%	
Age Groups	40-60	6	20.0	8	26.7	
	61-80	19	63.3	19	63.3	
	>80	5	16.7	3	10.0	
	MS ± SD	70.13±10.153		67.57±11.434		
Gender	Male	14	53.3	21	70.0	
	Female	16	46.7	9	30.0	
	Married	19	63.3	24	80.0	
Marital Status	Widow/Widower	11	36.7	6	20.0	
	Divorced	0	0	0	0	
	No Reading and Writing	14	46.7	15	50.0	
Educational Level	Reading and Writing	6	20.0	5	16.7	
	Primary School	4	13.3	6	20.0	
	Secondary School	3	10.0	1	3.3	
	Institute	2	6.7	0	0	
	College and Above	1	3.3	3	10.0	
	Does not Work	11	36.7	14	46.7	
Occupation	Retired	5	16.7	7	23.3	
	Housewife	14	46.7	9	30.0	
	Rural Area	12	40.0	11	36.7	
Address	City	18	60.0	19	63.3	

f= frequencies; %=Percentages.

The sociodemographic data of the patients in both the control and intervention groups is presented in table (1). Most of patients (63.3%) in both groups belonged to the 61–80 age group. The majority of the sample under study was male (control group: 70.0%, intervention group: 53.3%). 63.3% and 80% of patients in the intervention and

Statistical Analysis

The IBM statistical software for social sciences (SPSS), version 26, was used for examining the data. The results of the study have been examined using descriptive statistical methods such as mean score, percentage, and frequency. In inferential analysis, Chi square tests were employed to look at group differences, and paired sample t-tests and independent sample t-tests have been used for within-group and between-group comparisons, respectively. A p-value of < 0.05 was used to determine a statistically significant result.

Ethical Concerns

The University of Kerbala's College of Nursing Ethical Committee approved an ethical authorization (code: uok.CON.23.98) on October ,15th, 2023. Additionally, the study was verified in the Iranian Registry of Clinical Trials (code: IRCT20240130060853N1). Moreover, informed consent was given by each patient who participated in this study, and it is assumed that they are free to take away at any time.

Table 2(a): Distribution of Patients in two Groups According to their Clinical Data

Clinical Data		Groups			
		Intervention		Control	
		f	%	f	%
Chronic Illness	HTN	8	26.7	9	30.0
	DM	2	6.7	1	3.3
	CKD	5	16.7	4	13.3
	IHD	1	3.3	1	3.3
	HTN, IHD	3	10.0	4	13.3
	HTN, CKD	4	13.3	10	33.3
	HTN, DM	7	23.3	1	3.3
Exposure to Previous Stroke	No	12	40.0	11	36.7
	Yes	18	60.0	19	63.3

Table 2(b): Distribution of Patients in two Groups According to their Clinical Data

Clinical Data		Groups			
		Intervention		Control	
		f	%	f	%
Time of Exposure to Previous Stroke	No	12	40.0	11	36.7
	1-2	14	46.7	15	50.0
Type of Stroke	More than 2	4	13.3	4	13.3
	Ischemic	25	83.3	21	70.0
Location of Stroke	Hemorrhagic	5	16.7	9	30.0
	Left side	10	33.3	10	33.3
	Right side	14	46.7	15	50.0
Smoking	Both sides	6	20.0	5	16.7
	Yes	6	20.0	9	30.0
	Previously	10	33.3	11	36.7
	No	14	46.7	10	33.3

Table 2 exposed that among intervention and control groups, hypertension have been predominated chronic disease. The proportion of patients in the intervention and control groups who had experienced a previous stroke was 60.0% and 63.3%, respectively. One or two previous stroke experiences are reported by 46.7% and 50.0% of patients in the intervention and control groups, respectively.

Between the intervention and control groups, ischemic stroke was shown to be the most common form, accounting for 83.3% and 70.0% of all stroke cases, respectively. Individuals in the intervention group and control group had a location for stroke that was on the right side 46.7% and 50.0%, while the left side 33.3% had a location for stroke.

Table 3: Comparison the Dysphagia Levels within Groups before and after the Intervention

Groups	Test	MS	S.D.	T-Value	Df	P-Value	Sig.
Control Group	Pre-Test	0.49	0.169	-2.333	29	0.067	NS
	Post-Test	0.53	0.192				
Intervention (Super Supraglottic Swallow) Group	Pre-Test	0.46	0.177	-17.672	29	0.000	S
	Post-Test	1.00	0.092				

MS=Mean of score; SD=Standard deviation; df=Degree of Freedom; P-value= Probability value; S= Significant (p-value ≤ 0.05), NS=Non-significant ((p-value >0.05))

The findings presented in table (3) revealed that, after 7 days of the application of the Super Supra Glottic Swallow maneuver, a significant statistical difference was found in the dysphagia level between the pretest and posttest periods at a p-value of 0.000. In contrast, the control group experienced a non-significant statistical difference in the dysphagia level between the pretest and posttest

periods at a p-value of 0.067. Table 4 results demonstrate that prior to the application of the super supraglottic swallow maneuver, there were no significant changes in the levels of dysphagia between the control and intervention groups, with a p-value of 0.51. However, after seven consecutive days, significant differences between the two groups were presented at a p-value of 0.000.

Table 4: Comparison the Dysphagia Level between Groups Before and after the Intervention

Groups	Pre-test						Post-test					
	MS	SD	T-Value	Df	P-Value	Sig.	MS	SD	T-Value	Df	P-Value	Sig.
Control group	0.49	0.16	0.65	58	0.51	NS	0.53	0.19	-11.89	58	0.000	S
Intervention group	0.46	0.17					1.0	0.09				

MS=Mean of score; SD=Standard deviation; df=Degree of Freedom; P-value= Probability value; S= Significant (p-value ≤ 0.05), NS=Non-significant ((p-value >0.05))

Discussion

Our results revealed a non-significant difference in the dysphagia level at a p-value of 0.067 between the pre-test and post-test for the control group. Conversely, a significant difference in the dysphagia level between the pre-test and post-test periods for the application of the super supra glottic swallow maneuver by the intervention group for 7 days at a p-value of 0.000.

In Gimhae, Korea, Park et al. [25] carried out a randomized controlled trial to investigate the impact of expiratory muscle strength training on oropharyngeal dysphagia in patients recovering from subacute stroke. When compared to the placebo group, the experimental group showed increased activity in the suprahyoid muscle group. The statistical analysis revealed that, after the intervention, there was a significant difference between the groups in terms of measured suprahyoid muscle activity (p-value 0.01), liquid penetration-aspiration scale outcomes (p-value 0.03), and functional oral intake scale results (p-value 0.06), but not in terms of semisolid type penetration-aspiration scale outcomes (p-value 0.32). Sonawane

and Singaravelan [26], conducted a study to measure the effect of swallowing maneuvers and lingual exercise in addition to the routine therapy on improving swallowing function and quality of life in patients with stroke. This study reported that among patients with stroke complaining from dysphagia, the improvement of suprahyoid muscle activity can be effectively managed by using the expiratory muscle strength training, which were attained using a t-test, exposed a significant difference in the functional oral intake scale and dysphagia handicap index between the intervention and control groups, with a p-value of 0.001. When compared the dysphagia levels over an intervention and control groups, as shown in table (4), the study's results revealed a non-significant difference at p-value of (0.51) in the level of dysphagia between the intervention and control groups before the application of intervention protocol; however, after seven days of intervention, a significant difference at p-value of (0.000) was found between the two groups [27]. Consequently, combining the super supra glottic swallow maneuver with traditional therapy can meaningfully improve dysphagia levels after stroke compared to using conventional therapy alone. In order to examine the effect of effortful swallowing training on tongue strength and oropharyngeal

swallowing function in stroke patients with dysphagia, Park et al. [28] conducted a double-blind, randomized controlled trial. The experimental group confirmed higher enhancements in the oral phases of the Video-fluoroscopic Dysphagia Scale (p-value of 0.017) and larger increases in anterior and posterior tongue strength (p-values of 0.046 and 0.042, respectively) compared to the control group. Biswal et al., [29] conducted an experimental study to investigate if patients with neurological diseases who have dysphagia can improve their ability to swallow by using the Chin Tuck Against Resistance (CTAR) exercise. Based on this study results, the experimental group's pre-test mean score was 5.40 ± 0.81 , and by the end of the eighth day, their post-mean score had increased to 15.23 ± 2.28 , indicating that they had no dysphagia. Chin Tuck against resistance training was therefore useful in helping people with neurological problems who had dysphagia to swallow more easily. Elsaid and Shabaan, [6] conducted a quasi-experimental study in Egypt, to examine the effect of exercise-based dysphagia therapy on patients' ability to swallow after stroke. After seven days of swallowing exercises, there is a significant difference between the two groups based on the pretest and posttest mean score of the intervention group and the control group. From this, it can be determined that swallowing exercise helps stroke patients' functional oral eating assessment.

Conclusion

Performing super supra glottic swallow maneuver post-stroke for three times per day for 7 days, significantly decreases dysphagia level and enhance swallowing function in patients with stroke.

References

- [1] V. M. Pham, T. V. Nguyen, T. T. H. Nguyen, and T. H. Le, "Effect of thickeners combined with swallowing exercises for patients with post-stroke dysphagia," *World Academy of Sciences Journal*, vol. 6, no. 3, pp. 1-7, 2024.
- [2] H. Mirghani *et al.*, "Perception of stroke warning signs and knowledge of potential risk factors among medical students in Tabuk University," *Perception*, vol. 6, p. 140, 2022.
- [3] M. I. Youssef and B. Webster, "A multi-criteria decision making approach to the new product development process in industry," *Reports in Mechanical Engineering*, vol. 3, no. 1, pp. 83-93, 2022.
- [4] C. W. Tsao *et al.*, "Heart disease and stroke statistics—2022 update: a report from the American Heart Association," *Circulation*, vol. 145, no. 8, pp. e153-e639, 2022, doi: 10.1161/CIR.0000000000001052.
- [5] D. Mozaffarian *et al.*, "Heart disease and stroke statistics—2016 update: a report from the American Heart Association," *circulation*, vol. 133, no. 4, pp. e38-e360, 2016, doi: 10.1161/CIR.0000000000000015.
- [6] R. Elsaid and A. E. A. Shabaan, "Effectiveness of Exercises Based Dysphagia Therapy on Swallowing Ability for Patients with Cerebrovascular Accident," *IOSR Journal of Nursing and Health Science*, vol. 8, no. 6, pp. 27-34, 2019.
- [7] C. Palli *et al.*, "Early dysphagia screening by trained nurses reduces pneumonia rate in stroke patients: a clinical intervention study," *Stroke*, vol. 48, no. 9, pp. 2583-2585, 2017.
- [8] S. BOYRAZ, "İnmeli bireylerde yutma ve beslenme," *Türkiye Klinikleri İç Hastalıkları Henşireliği-Özel Konular*, vol. 1, no. 1, pp. 48-53, 2015.
- [9] H. S. Bonilha, A. N. Simpson, C. Ellis, P. Mauldin, B. Martin-Harris, and K. Simpson, "The one-year attributable cost of post-stroke dysphagia," *Dysphagia*, vol. 29, pp. 545-552, 2014.
- [10] L. Tuomi, H. Dotevall, H. Bergquist, K. Petersson, M. Andersson, and C. Finizia, "The effect of the Shaker head-lift exercise on swallowing function following treatment for head and neck cancer: Results from a randomized, controlled trial with videofluoroscopic evaluation," *Head & Neck*, vol. 44, no. 4, pp. 862-875, 2022.
- [11] K.-L. Huang, T.-Y. Liu, Y.-C. Huang, C.-P. Leong, W.-C. Lin, and Y.-P. Pong, "Functional outcome in acute stroke patients with oropharyngeal dysphagia after swallowing therapy," *Journal of Stroke and Cerebrovascular Diseases*, vol. 23, no. 10, pp. 2547-2553, 2014.
- [12] J. Barot, P. Landge, and H. Patel, "Effect of Shaker Exercise and Masako Maneuver on Swallowing Function and Quality of Life in Patients with Dysphagia following Stroke: An Interventional Comparative Study," *Int J Physiother Res*, vol. 11, no. 4, pp. 4611-4620, 2023, doi: 10.16965/ijpr.2023.144.
- [13] A. Alamer, H. Melese, and F. Nigussie, "Effectiveness of neuromuscular electrical stimulation on post-stroke dysphagia: a systematic review of randomized controlled trials," *Clinical interventions in aging*, pp. 1521-1531, 2020.
- [14] A. M. Mourão, E. O. Almeida, S. M. A. Lemos, L. C. C. Vicente, and A. L. Teixeira, "Evolution of swallowing in post-acute stroke: a descriptive study," *Revista Cefac*, vol. 18, pp. 417-425, 2016.
- [15] M. McFarlane, A. Miles, P. Atwal, and P. Parmar, "Interdisciplinary management of dysphagia following stroke," *British Journal of Neuroscience Nursing*, vol. 10, no. 1, pp. 13-20, 2014.
- [16] E. C. Jauch *et al.*, "Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association," *Stroke*, vol. 44, no. 3, pp. 870-947, 2013.
- [17] J.-H. Kang, R.-Y. Park, S.-J. Lee, J.-Y. Kim, S.-R. Yoon, and K.-I. Jung, "The effect of bedside exercise program on stroke patients with dysphagia," *Annals of rehabilitation medicine*, vol. 36, no. 4, p. 512, 2012.

Nursing Implications

Stroke patient sometimes report having numerous physical impairments. In order to improve the functional capacities and quality of life of stroke patients, nurses must act to provide holistic care. Optimizing the swallowing process, promoting a safe swallowing technique, and offering liquid food with the right texture are essential components of managing dysphagia and could raise the bar for nursing care as well as create a realistic nursing position for these patients.

Instructions on proper eating and drinking posture are given, such as to sit up straight and sip at a 90-degree angle, avoid eating and drinking just before bending over or going to bed, and consume little amounts.

Acknowledgments

Greatly appreciate all patient with stroke who took part in this study. Also, the researchers would like to express my thankfulness to all members of the research ethical committee at College of Nursing/Kerbala University for their guidance and support.

The Holy Kerbala Health Directorate and Imam AL-Hussein Medical City deserve special appreciation for their outstanding help and assistances.

Financial Disclosure

This study was a part from master's thesis in nursing that was approved and accepted by Kerbala University/College of Nursing/Iraq.

- [18] A. Sucipto and S. Ta'adi, "Application of Shaker Technique and Swallow Exercise Towards Dysphagia in Stroke Patients," *International Journal of Multidisciplinary Education and Research*, pp. 25-29, 2019.
- [19] G. H. McCullough, E. Kamarunas, G. C. Mann, J. W. Schmidley, J. A. Robbins, and M. A. Crary, "Effects of Mendelsohn maneuver on measures of swallowing duration post stroke," *Topics in stroke rehabilitation*, vol. 19, no. 3, pp. 234-243, 2012.
- [20] E. ARSAVA, İ. Aydoğdu, L. Gungor, C. TOGAY IŞIKAY, and E. Yaka, "Nutritional approach and treatment in patients with stroke, an expert opinion for Turkey," *Turkish Journal of Neurology*, vol. 24, no. 3, 2018.
- [21] C. Savcı and R. Acaroğlu, "Effects of swallowing training and follow-up on the problems associated with dysphagia in patients with stroke," *Florence Nightingale Journal of Nursing*, vol. 29, no. 2, p. 137, 2021, doi: 10.5152/FNJN.2021.19007.
- [22] E. E. A. Elfetoh and S. F. M. Karaly, "Effect of swallowing training program on dysphagia following cerebrovascular stroke," *Egyptian Nursing Journal*, vol. 15, no. 2, pp. 125-134, 2018.
- [23] M. Trapl *et al.*, "Dysphagia bedside screening for acute-stroke patients: the Gugging Swallowing Screen," *Stroke*, vol. 38, no. 11, pp. 2948-2952, 2007, doi: 10.1161/STROKEAHA.107.483933.
- [24] A. Vose, J. Nonnenmacher, M. L. Singer, and M. González-Fernández, "Dysphagia management in acute and sub-acute stroke," *Current physical medicine and rehabilitation reports*, vol. 2, pp. 197-206, 2014.
- [25] J. Park, D. Oh, M. Chang, and K. Kim, "Effects of expiratory muscle strength training on oropharyngeal dysphagia in subacute stroke patients: a randomised controlled trial," *Journal of Oral Rehabilitation*, vol. 43, no. 5, pp. 364-372, 2016.
- [26] A. P. Sonawane and R. Singaravelan, "Effects of Lingual Exercises, Swallowing Maneuvers Along With Conventional Therapy on Improving Swallowing Function and Quality of Life in Stroke Patients with Dysphagia."
- [27] V. Suresh, P. Sameer, and R. K. Susan, "A Clinical Trial of Venous Stent Placement for Post-thrombotic Syndrome: Current Status and Pandemic-related Changes," *Vascular & Endovascular Review*, vol. 5, 2022.
- [28] H. S. Park, D. H. Oh, T. Yoon, and J. S. Park, "Effect of effortful swallowing training on tongue strength and oropharyngeal swallowing function in stroke patients with dysphagia: a double-blind, randomized controlled trial," *International journal of language & communication disorders*, vol. 54, no. 3, pp. 479-484, 2019.
- [29] S. Biswal, "Effect of chin tuck against resistance (CTAR) exercise in improving swallowing ability among neurological disorders patients with dysphagia at IMS and sum hospital, Bhubaneswar, Odisha," doi: 10.33545/surgicalnursing.2022.v4.i2b.103



This is an open-access article distributed under the terms of the Creative Commons Attribution License.