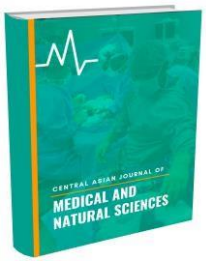

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Article

Efficacy of Hyoid Lift Maneuver on Dysphagia Level in Patients with Stroke

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Abstract: Dysphagia is a significant serious medical condition following stroke. Therapeutic exercises that enhance the functional and physiological changes in swallowing abilities are being used to treat dysphagia. This study was conducted to find out the efficacy of hyoid lift maneuver on swallowing ability in stroke patients with dysphagia. This study utilizing a quasi-experimental design, it was performed in the neurological units from 1st October, 2023 to 13th June, 2024. Sixty patients diagnosed with stroke were take a part in this study using a purposive sampling, and they were divided up into two groups: the control and the intervention groups. There were 30 patients in each group. Patients with stroke who had difficulty swallowing were enrolled in the intervention group are applied the Hyoid Lift Maneuver 3 times a day for 7 consecutive days, whereas the control group obtained just conventional care. The data collection instrument contains two section: the first section is related to socio-demographic and clinical data; the second section was used to measure the dysphagia level by using a Gugging Swallow Screen Scale. Both descriptive and inferential analysis methods were used to analyzed the study result (e.g., paired sample t-test, independent sample t-test); a p-value of <0.05 was determined to be significant result. The result exposed that's after 7 days of the application of Hyoid Lift Maneuver, a significant difference were found in the dysphagia level between the pretest and posttest periods at a p-value of 0.000 for patients in the interventional group. In contrast, the control group experienced a non-significant difference in the dysphagia level between the pretest and posttest periods at a p-value of 0.077. Performing Hyoid Lift Maneuver post-stroke alongside the medical treatment for three times per day for 7 days, significantly improve the swallowing ability in stroke patients with swallowing difficulties.

Keywords: Stroke, Dysphagia, Hyoid Lift Maneuver

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1. Introduction

Stroke is identified as a significant health concern, it is the major reason of infirmities, and the subsequent cause of death globally. The impact of stroke not affected only the patients, but also their families [1]. It occurs when a clot impairs a cerebral perfusion or a brain vessel ruptures, limiting the brain of its supply of blood and resulting in ischemia and tissue bleeding [2]. In the United States, more than 80,000 persons suffer from stroke each year, making it most important cause of disease and infirmity, and the third widespread cause of mortality [3, 4].

Strokes can affect the functioning of several functioning in the body, including neuromotor activity, elimination, cognitive, sensory, and ability to communicate. They are additionally associated with a number of health problems that can lead to extended hospital stays and significant healthcare costs [5].

Dysphagia, or swallowing problems, is frequently seen in stroke patients in the earliest hours and days after the event has occurred [6, 7, 8], it can develop in 29–81% of stroke patients [9]. Clinical symptoms of dysphagia include the subjective feeling of swallowing stagnation, total inability to swallow, or pain while swallowing [10]. Along with major problems that include airway occlusion, aspiration, pneumonia, malnutrition, dehydration, and mortality. Post-stroke dysphagia has been linked to decrease oral, pharyngeal, and esophageal functioning as well as an overall decrease in quality of life [9, 11, 12, 13]. It is usually suggested that all patients confirmed to have stroke be closely monitored for swallow functioning from the time of diagnosis using sensitive, reliable, and validated bedside assessment tools [7, 14, 15]. To avoid or minimize dysphagia-related complications, a comprehensive swallowing assessment is often included in the neurological disorder diagnosis process. This can help identify dysphagia before complications develop. Patients with strokes receive dysphagia exercises as therapy, which are designed to strengthen muscles and improve the physiological and functional changes in swallowing ability [5]. Detecting and treating swallowing difficulties early after a stroke is important since it can decrease the risk of aspiration pneumonia and improve recovery. Therefore, it could be considered a critical element of acute stroke management [16].

Treatment for dysphagia frequently focuses on compensatory techniques, like using various stretches or changing food composition to improve the safety of oral intake. Furthermore, a number of studies have verified the effectiveness of the exercise-based intervention. However, it can be difficult to determine whether therapy is truly beneficial due to variations in the length and type of therapies as well as a range of success measures [17]. It has been found that managing dysphagia promptly in stroke patients improves their nutritional status, lowers their risk of pulmonary aspiration, and improves their recovery [18].

The dysphagia training program uses a range of direct and indirect methods. The objective of direct approaches is to enhance voluntary motor actions. It entails stimulating motor activity and speed through sensory methods by applying heat, chemical, and electrical applications. Indirect techniques aim to prevent respiratory aspiration and enhance swallowing safety by providing compensation through personalized therapies, all without correcting the underlying neuromuscular deficit [19]. Additionally, nurses employ postural adjustments, diet modifications (such as chin-to-chest, tilting the head backward, and chin tuck posture), and compensated maneuvers (such as Mendelsohn maneuver, hard swallowing, homogenized semi-solid foods, viscous liquids) [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]. [22] highlighted that stroke patients with dysphagia who underwent a swallowing training program saw improvements in their ability to swallow. Hyoid lift maneuver is an enjoyable exercise that improves swallowing abilities and muscle strength. Additionally, the hyoid lift maneuver provides patients more control over their ability to swallow food and saliva. Because this is an activity-based exercise rather than a standard one, it helps the person with dysphagia [23].

Objectives

This study was conducted to find out the efficacy of hyoid lift maneuver on dysphagia in stroke patients.

2. Materials and Methods

Study design and participant

At Imam Al-Hussein Medical City in Holy Karbala, Iraq, a quasi-experimental study was conducted in the neurological units. The study was began from 1st October, 2023 to 13th June, 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 having the ability to replicate the researcher, and those with voluntary agreement to participation in this study. Two groups were created out of the participants: 30 patients were enrolled in each the control and the intervention groups (Figure 1).

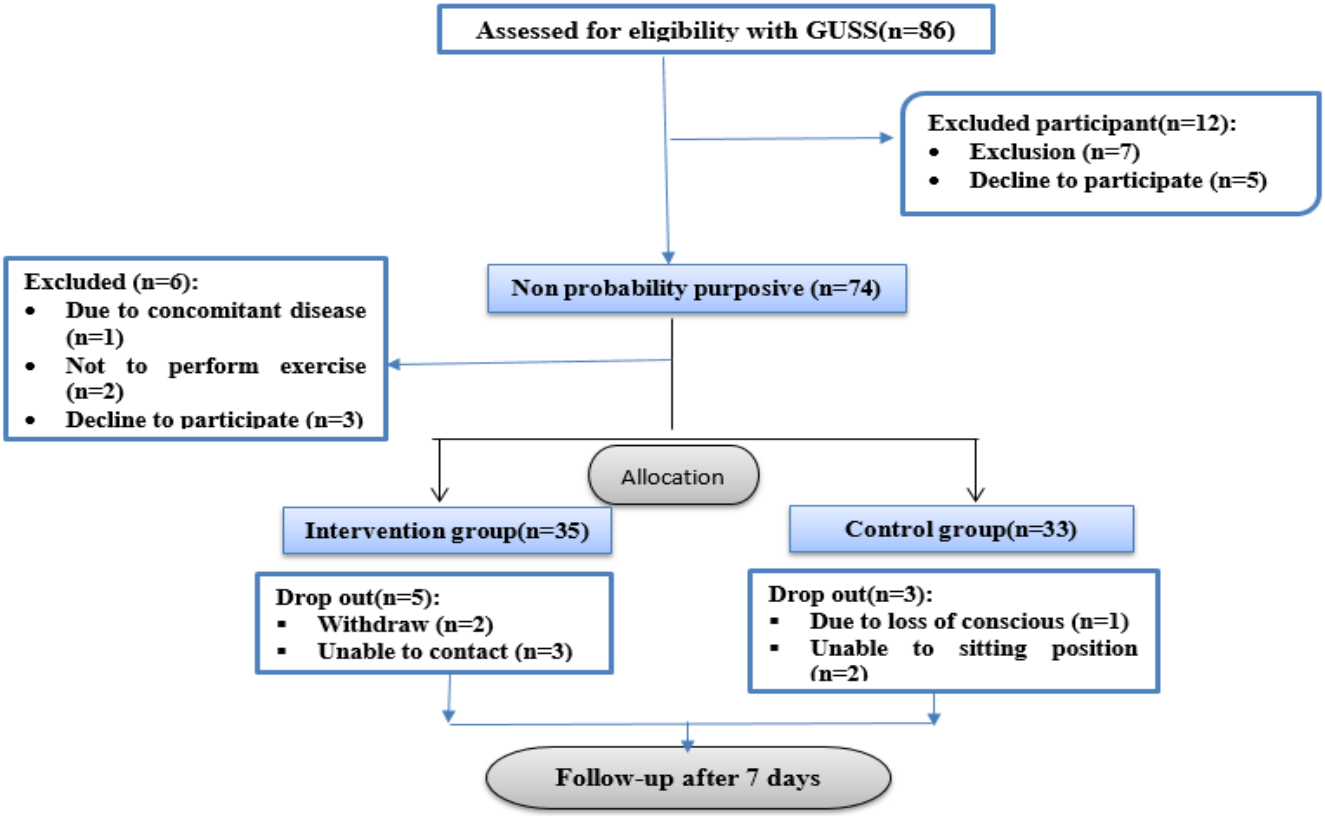

Figure 1. Eligibility Criteria

Data collection instruments

There were two forms of the instrument used to gather the data: The first section included clinical and socio-demographic information such as age, gender, level of education, marital status, occupation, pre-existing chronic medical conditions, stroke type and location, and history of stroke exposure; the second section used the Gugging Swallow Screen Scale (GUSS), developed by [24], to assess the degree of dysphagia. The GUSS is contain two parts, which are the indirect swallow test (part 1), that is also referred to as the initial assessment, and the direct swallowing test (part 2). Each subtest has a maximum score of five points, whereby higher scores correspond to better performance. To move on to the next subtest, you have to reach this maximum. Each item on the test has a value of either zero point (pathologic) or One point (physiologic). 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. In order to obtain the highest possible score of five points on the subtest, patients must effectively finish each repetition. If a subtest produces fewer than five points, the test must finish. A patient can score as high as twenty, which indicates normal swallowing abilities and no aspiration risk. Moreover, 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. There are four severity categories represented by the GUSS findings. A score of 0–9 indicates a severe form of dysphagia, 10–14 represents a moderate situation, 15–19 reveals a light case, and 20 suggests no sign of dysphagia. The GUSS is a useful and reliable instrument used to assess dysphagia; a group of thirteen experts verified the instrument's validity.

Intervention

Each patient received an explanation from the researchers regarding the need of swallowing exercises, which are intended to teach patients safe swallowing techniques as well as to strengthen and enhance their swallowing abilities. Patients with stroke who experienced dysphagia and were enrolled in the intervention group engaged in Hyoid Lift Maneuver three times a day for seven days, while the control group only given conventional therapy [5]. Patients in the interventional group are taught how to implement a Hyoid Lift Maneuver, this Maneuver help to strength and improve the swallowing muscles, [23] reported that's Hyoid Lift Maneuver can be performed using the following steps:

1. Step 1: Gather supplies: a cup, pieces of paper towel, and a drinking straw. The patient can work with up to 10 pieces of paper, beginning with three to five pieces.
2. Step 2: Instruct the patient to put the straw in his/her mouth.
3. Step 3: Using the suction that produces, pick up a piece of paper by sucking on the straw.
4. Step 4: Make sure the suction is strong enough to lift each paper piece into a cup.
5. Step 5: Allow the paper to drop into the cup by stopping sucking.
6. Step 6: Continue until all of the paper pieces are in the cup.

The GSSS was used to determine swallowing ability before and after the exercise. The researchers checked on the patients three times a day, encouraging them to complete the exercises and providing them with guidance about how to continue. The follow-up method included talking with patients on the phone (using a SIM card), as well as creating a group on WhatsApp on social media. During this follow-up, the researchers examined the patient's commitment to the hyoid lift maneuver and how well it performed. Every patient in this study, including those in the control group received the same conventional care. The data collection process was attained from January 27th to April 15th, 2024.

Statistical analysis

The data were examined using IBM's statistical software for social sciences (SPSS), version 26. The study's findings have been analyzed through the application of descriptive statistical methods like mean score, percentage, and frequency. Chi square tests were used in inferential analysis to examine group differences, and independent sample t-tests and paired sample t-tests were applied 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.

3. Results

Table 1. Comparing the patients in two groups according to their socio-demographic data

Socio-demographic data		Groups			
		Intervention		Control	
		f	%	f	%
Age groups	40-60	9	30.0	8	26.7
	61-80	12	40.0	19	63.3
	>80	9	30.0	3	10.0
	MS ± SD	69.73±14.0		67.57±11.4	
Gender	Female	15	50.0	9	30.0
	Male	15	50.0	21	70.0
Marital status	Widow/Widower	6	20.0	6	20.0
	Married	24	80.0	24	80.0
Educational levels	No read and write	15	50.0	15	50.0
	Read and write	6	20.0	5	16.7
	Primary school	4	13.3	6	20.0
	Secondary school	0	0	1	3.3
	Institute	2	6.7	0	0
	College and above	3	10.0	3	10.0
Occupation	Does not work	9	30.0	14	46.7
	Retired	7	23.3	7	23.3
	Housewife	14	46.7	9	30.0
Area of residence	Urban region	15	50.0	19	63.3
	Rural region	15	50.0	11	36.7

f= frequencies; %=Percentages.

The sociodemographic data of the patients in the control and interventional groups is presented in Table 1. Most of patients (40.0%, and 63.3%) of patients in the interventional and control groups respectively belonged to the 61–80 age group. The majority of the sample under study was male (control group: 70.0%, intervention group: 50.0%). 80% of patients in the interventional and control groups, were married. In terms of level of education, there was no predominance of reading and writing, accounting for 50.0% in both the interventional and control groups. In terms of occupation, 46.7% of patients in the interventional group were housewives, and 46.7% did not work.

Table 2. Comparing the patients in two groups by their medical data

Clinical data		Groups			
		Intervention		Control	
		f	%	f	%
Chronic illness	HTN	8	26.7	9	30.0
	DM,HF,HTN	1	3.3	1	3.3
	CKD,HTN,DM	4	13.3	4	13.3
	IHD,HTN,DM	2	6.7	1	3.3
	HTN,IHD	2	6.7	1	3.3

	HTN,CKD	4	13.3	4	13.3
	HTN ,DM	9	30.0	9	30.0
	HF	8	26.7	1	3.3
Exposure to previous stroke	No	13	43.3	11	36.7
	Yes	17	56.7	19	63.3
Time of Exposure to previous stroke	No	13	43.3	11	36.7
	1-2	17	56.7	15	50.0
	More than 2	0	0	4	13.3
Type of stroke	Ischemic	20	66.7	21	70.0
	Hemorrhagic	10	33.3	9	30.0
Location of stroke	Left side	12	40.0	10	33.3
	Right side	10	33.3	15	50.0
	Both sides	8	26.7	5	16.7

f= frequencies; %=Percentages.

Table 2 exposed that among interventional and control groups, hypertension have been dominated chronic disease. The proportion of patients in the interventional and control groups who had experienced a previous stroke was 56.7% and 63.3%, respectively. One or two previous stroke experiences are reported by 56.7% and 50.0% of patients in the interventional and control groups, respectively. Between the interventional and control groups, ischemic stroke was shown to be the most common form, accounting for 66.7% and 70.0% of all stroke cases, respectively. Patients in both groups had a location for stroke that was on the right side 33.3% and 50.0%, while the left side 40.0 % and 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	0.077	NS
	Post-test	0.53	0.192				
Intervention (Hyoid lift maneuver) group	**Pre-test**	0.47	0.137	-21.001	29	0.000	S
	Post-test	1.0020	0.098				

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 Hyoid lift maneuver, a significant statistical difference were 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 difference in the dysphagia level between the pre-test and post-test at a p-value of 0.077.

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	0.68	58	0.49	NS	0.53	0.19	-11.89	58	0.000	S
Intervention group	0.47	0.13					1.0	0.09				

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

Table 4 results reveal that prior to the application of the Hyoid lift maneuver, there were no significant changes in the levels of dysphagia between the control and intervention groups at p-value of 0.51. However, after seven consecutive days, significant differences among both groups were presented at a p-value of 0.000.

4. Discussion

During the course of seven days, patients in the interventional group in this quasi-experimental trial were instructed to perform the Hyoid Lift Maneuver three times a day, while they are not used for the control group. As per the data existing in table 2, our results propose that a majority of patients in both the intervention group (56.7%) and the control group (50.0%) had experienced a previous stroke. Regarding the site of stroke as shown in table 2, Patients in the intervention group and control group had a location for stroke that was on the right side 33.3% and 50.0%, while the left side 40.0 % and 33.3% had a location for stroke. [25] stated that 53.3% of patients in the control group had hemorrhagic strokes, compared to 63.3% in the experimental group. The right lobe of the brain was affected in 63.3% of the experimental group and approximately 50% of the control group. Concerning to the type of stroke for patients enrolled in this study, ischemic stroke was shown to be the most common form, accounting for 66.7% and 70.0% of all stroke cases, respectively. [26] found that out of 40 stroke patients, 27.5% suffered from hemorrhages and 72.5% of patient had ischemic strokes. In terms of previous stroke occurrences, 46.7%, and 50% of patients in the acupressure and control groups respectively had experienced one to two strokes previously.

By comparing the dysphagia level for the control group between the pre-test and post-test, our results revealed a non-significant difference (p-value = 0.077). However, when the Hyoid Lift Maneuver performed for seven days, there was a significant difference in the dysphagia level between the pre-test and post-test periods, with a p-value of 0.000. This finding corresponded with a study conducted in Egypt by [27], which found that patients' GUSS scores for dysphagia changed significantly prior to and after they started Shaker exercise (P<0.001). [28] examined the effect of expiratory muscle strength training on swallowing difficulties in patients recovered from subacute stroke in Gimhae, Korea, through a randomized controlled trail. The suprahyoid muscle group exhibited more activity in the experimental group compared to the placebo group. According to the findings of the statistical analysis, there was a significant difference between the groups after the exercise in terms of measured suprahyoid muscle activity (p-value 0.01), results from the liquid penetration-aspiration scale (p-value 0.03), and results from the functional oral intake scale (p-value 0.06), but not in terms of results from the semisolid type penetration-aspiration scale (p-value 0.32). [29] examined the impact of lingual exercise and swallowing maneuvers in addition to normal therapy on enhancing swallowing function and stroke patients' quality of life. This study found that expiratory muscle strength training can effectively improve the suprahyoid muscle activity in stroke patients complaining of

dysphagia. Results were obtained using a t-test, which revealed a significant difference (p-value of 0.001) in the dysphagia impairment index and functional oral intake scale between the intervention and control groups.

The results of the study, that are presented in Table 4, indicate a non-significant difference in dysphagia between groups before the application of the exercise at p-value of 0.49; however, after seven days of intervention, there was a significant difference at p-value of 0.000 between the two groups. Therefore, when combined with conventional therapy, the Hyoid Lift Maneuver can significantly reduce dysphagia following a stroke, as opposed to when conventional therapy is used alone. A double-blind, randomized controlled trial carried out in South Korea by [30] to examine the effect of swallowing training on tongue strength and oropharyngeal swallowing function in stroke patients. The investigational group exposed more increases in posterior and tongue strength at p-values of 0.042 and 0.046, respectively, as well as better improvements in the oral phases of the Videofluoroscopic Dysphagia Scale at p-value of 0.017 when compared to the control group. In an experimental study performed by [31], to investigate if the Chin Tuck Against Resistance exercise may assist patients with difficulty of swallowing who have neurological disorders. The experimental group's post-mean score increased to 15.23±2.28, demonstrating that they were free of dysphagia by the end of the eighth day, from their pre-test mean score of 5.40±0.81. Consequently, in patients with neurological diseases who had dysphagia, chin tucks versus resistance training were beneficial in enhancing swallowing skills. In a quasi-experimental study conducted in Egypt, [5] examine how exercise-based dysphagia therapy affected the swallowing ability of stroke patients. Following seven days of swallowing exercises, on the pretest and posttest, the intervention group's mean scores differ significantly from those of the control group. This suggests that swallowing exercises enhance stroke patients' functional oral eating assessment.

5. Conclusion

Performing Hyoid Lift Maneuver post-stroke alongside the medical treatment for three times per day for 7 days, greatly enhance the ability of stroke patients who have dysphagia to swallow. Therefore, all patients with stroke who have swallowing difficulties should have performed swallowing exercise using the Hyoid Lift Maneuver to improve swallow and eating ability.

6. Nursing Implications

Many physical impairments have been reported by stroke patients. Nurses must act to provide comprehensive care in order to enhance the functional abilities and quality of life. The key to controlling dysphagia is to optimize the swallowing process, encourage a safe swallowing technique, and provide liquid food with the appropriate texture. These actions could improve nursing care and establish a realistic nursing role for patients with dysphagia. There are guidelines on how to eat and drink properly, including how to sit up straight and sip at a 90-degree angle, when not to eat or drink right before bending over or going to bed, and how much to drink in little amounts.

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8. Financial Disclosure

This study was a part of a master's thesis in nursing that was accepted and authorized by the College of Nursing at Kerbala University in Iraq.

9. Conflict of Interest

There isn't any disclosed conflict of interest by the authors.

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