Effect of Dysphagia Exercises on Post Stroke Outcomes

Yasmeen Elsayed Zaki [1], Amal Amin ElSheikh [2], Neima Ali Riad [3], Samira E. Aboalizm[4]

[1]*B.Sc. of Nursing Science,*
[2,3,4]*Prof. of Medical Surgical Nursing,*
[1,2,3,4] *Faculty of Nursing, Menoufia University, Egypt*

Abstract: Background: Stroke is a common neurological disease cause several disabilities as dysphagia which occur with post stroke patients which lead to complications as aspiration pneumonia, prolonged hospitalization, reduce quality of life so post stroke dysphagia exercises is the most effective method to manage dysphagia. **Purpose**: to determine the effect of dysphagia exercises on post stroke outcomes. Design: a quasi-experimental research was utilized. Setting: The study was carried out at neurological department at Menoufia University Hospital, in Shebin El-Kom, Menoufia Governorate, Egypt. Sampling: A consecutive sample of 50 adult patients post stroke divided into two equal groups (study and control) 25 patients for each group. **Instruments**: Three instruments were used for data collection: 1) structured interviewing questionnaire. 2) Gugging Swallowing Screen Scale. 3) Functional Independence tool. **Results**: 100% of both group had poor knowledge level and then 96% of study group attained good knowledge level, 100% of both groups had sever level of dysphagia in pre intervention and changed to 68% of the study group with moderate dysphagia, 100% of both group concerning their dependent level changed to 60% of study group with partially dependent level post intervention. **Conclusion**: the study revealed that dysphagia exercises implementing had a positive impact on the level of knowledge, dysphagia level and function independence level among study group than control group. **Recommendation:** Patients with stroke implement a dysphagia screening protocol, Comprehensive exercise programs, in combination with the stimulation treatment for the actual treatment for patients with swallowing disorders.

Keywords: Dysphagia exercises, post stroke outcomes.

Introduction

Stroke known as cerebrovascular accident is the second leading cause of death and the third leading cause of disability worldwide, the burden of stroke worldwide seems to have declined in the past three decades, the effect of stroke decreases in high-income countries. By contrast, the burden of stroke has grown rapidly in low-income countries which ischemic

stroke accounting for 60–70% of all strokes, its prevalence is higher than hemorrhagic-stroke. According to ministry of health and population Egypt receives 300,000 patients of stroke annually (Carmit et al., 2024).

Dysphagia is a condition where a person has difficulty swallowing both foods that are liquid or solid, it is a frequent complication in stroke patients, which occurs in more than 50% of patients, because stroke patients have difficulty controlling the tongue and cannot chew and swallow food particles because the swallowing phase in the oral and pharynx is disrupted, so cause sever complications as increased hospitalization, morbidity, and risk of aspiration pneumonia and it is associated with poor psychosocial health outcomes, such as reduced nutrition, hydration and quality of life. Patients with dysphagia have longer lengths of hospital stay and higher healthcare costs (Verity et al., 2023).

Current management of dysphagia involves compensation and rehabilitation, compensatory techniques such as modifying diet and fluid consistencies that enable safe swallowing but take a long time, so rehabilitative exercises can improve swallowing function and resumption of oral intake or normal food and drink, rehabilitative exercises can be indirect (motor without swallow) or direct (motor with swallow), indirect exercises aim to strengthen muscles involved in swallowing such as the Shaker head-lift and tongue strengthening exercises where direct exercises involve the action of swallowing such the Mendelsohn maneuver and effortful swallow.

Studies have shown that the positive effects of rehabilitative exercises on reducing the severity and symptoms of post-stroke dysphagia (Choy et al., 2020).

Dysphagia exercises that stimulating and strengthening the swallow-related muscles are strongly recommended for dysphagia rehabilitation. The supra-hyoid muscle complex (SHM) is critical during the pharyngeal phase of swallowing as it controls the movement of the larynx, hyoid bone, and epiglottis to protect the airway, and the opening of upper esophageal sphincter to allow bolus transfer into the esophageal. For post stroke patients, based on the neuroplasticity principle, regular and repetitive resistance training can lead to the strength of swallowing muscles and may be effective on the recovery of sensorimotor control system of swallowing, SHM strengthening exercise has been a focus of research and practice in post-stroke dysphagia rehabilitation (Liu et al., 2023).

If post stroke dysphagia (PSD) exercises are not intervened in time, it further leads to difficulties in eating and drinking, resulting in malnutrition, aspiration pneumonia, dehydration, and asphyxia, which seriously affects the prognosis of PSD patients. PSD not only increases the economic burden of patients and prolongs their hospitalization time, but also brings a greater care burden to their family members (Jian Rong et al., 2023).

Nursing plays an important role in the process of management of dysphagia during post stroke period because the nurse helps patients to cope with the disease in their everyday lives, teaches

how to deal with their disabilities resulting from stroke as dysphagia, and provide systematic health education concerning lifestyle changes. The nurse supports patients and their families by giving the necessary help and emotional support, while undertaking educational actions connected with lifestyle and rehabilitation to improve their quality of life and prevent complications (Fang et al., 2022).

Significance of the Study

Dysphagia is one of the most common disabilities caused by cerebrovascular accident. Menoufia university hospital receives 30-40 patients with stroke monthly. The frequency of dysphagia after stroke is ranged between 14% and 94% among the different studies with a high incidence in acute post-stroke patients (37%–78%) (Mourã et al., 2016).

Dysphagia is a serious life-threatening medical condition that affects many patients in the first few hours and days after stroke. Persistent dysphagia can result in an excess production of saliva, drooling, coughing or choking during eating, and even difficulty speaking or a hoarse voice. These signs associated with poor outcome and increased mortality and morbidity due to dysphagia complications as aspiration pneumonia, dehydration, malnutrition, and death (Keage et al., 2015).

Dysphagia exercises program for post stroke patients may be the most ideal approach to improve the swallowing ability which may be an effective, painless, inexpensive, simple measure for improving swallowing ability and post stroke outcomes and prevent

complications among patients with cerebrovascular accident as aspiration pneumonia, dehydration, malnutrition and prolonged hospitalization (Vadim, 2021)

Operational definitions of Variables

Dysphagia Exercises:

It is operationally defined as programs that are designed to improve swallowing function, strengthen and coordinate swallowing muscles. The interventions that have been introduced include supra-glottic swallowing maneuver, hard-effortful swallow, tongue hold exercise, Menelsohn maneuver, head lifting maneuver, jaw-opening exercises, tongue movement exercises, tongue resistance exercises, closure of the larynx and base of tongue exercise.

Post stroke outcomes:

It is operationally defined improvement in the patients' knowledge, swallowing ability and their functional independence includes: feeding, bathing, grooming, bowel control, transfer and mobility.

Research Hypotheses

The following research hypotheses were formulated in an attempt to achieve the purpose of the study:

1) Patients who follow dysphagia exercises (study group) are expected to have higher level of knowledge about dysphagia exercises than patients who do not (control group).
2) Patients who follow dysphagia exercises (study group) are expected to have more swallowing ability than patients who do not (control group).

3) Patients who follow dysphagia exercises (study group) are expected to be more independent than patients who do not (control group).

Methods

Research Design:

To achieve the purpose of the current study a qausi experimental research design was utilized. A quasi-experiment is an interventional study used to estimate the causal impact of an intervention on target population without random assignment. Quasi-experimental research shares similarities with the traditional experimental design or randomized controlled trial, but it specifically lacks the element of random assignment to treatment or control (Miller et al., 2020).

Setting:

The study was conducted at the neurological department at Menoufia University Hospital, Menoufia governorate, Shebin Elkom, Egypt. Psychological and neurological department located in eighth floor in Menoufia university hospital. It consists of one room for male and another room for female each room contains nine beds in addition to another room contains five beds for male and female and intermediate care contains six beds.

Sampling:

Consecutive sampling is one of the most commonly used kinds of nonprobability sampling in which every subject meeting the criteria of inclusion is selected until the required sample size is achieved (Andrade,

2021) . 50 adult male and female patients post stroke were assigned randomly and equally divided into two groups (study& control).25 patients for each group:-

- **Study group (1):** Patients received and trained about dysphagia exercises along with routine hospital care.
- **Control group (2):** Patients exposed only routine hospital care as received medications according to type of stroke and undergo to several investigations and tests.

Inclusion criteria included the following:

1) Adult patients of both gender (18-60 years) at Neurological department in Menoufia University Hospital with the following criteria:
2) 1–2 days of acute stroke with symptoms of dysphagia.
3) Conscious and oriented for voluntary agreement to participate in study and obey commands.

Exclusion criteria:

1) Patients with neck problems as arthritis because some exercises may cause pain.
2) Patients with Endotracheal intubation or tracheostomy who are unable to perform exercises.
3) Patients who are diagnosed with pneumonia to avoid aspiration which cause latency in swallowing response.
4) Patients with other central neurological disorders to prevent further injury because the exercises may increase intracranial pressure as brain infection and tumor.

5) Patients with orthostatic hypotension to avoid change in blood pressure during performing exercises.

Sample size calculation and power analysis:

Sample size was calculated at power 80%, confidence level 95% and margin of error 5%. It was 50 patients had dysphagia after stroke. The following equation was used:

a) Sample size $n = N = 2SD^2 [Z\alpha_{/2} + Z\beta]^2 / d^2$

$= 2 (1.731)2*\{1.96+0.84\}2 / (1.4)2$

$= 25$ participants per group

b) Hypothesized % Frequency of dysphagia in post stroke patients (p): 10.4%+/-5

c) Confidence limits as % of 100 (absolute +/- %) (d): 5%

d) Design effect (for cluster surveys-DEFF)

e) Sample Size (n) for 95% Confidence Levels was 50 participants divided into two group experimental group and control group each group 25 participants.

Instruments of data collection:

To achieve the purpose of the current study and to collect the necessary data. Three instruments were used by the researcher. These instruments are:

Instrument I: Structured interview questionnaire:

This instrument was developed by the researcher after reviewing the related literature (Carnaby et al., 2020) to assess social characteristics, medical data and patient's knowledge It included three parts:

▪ **Part one: Patient's socio-demographic data:** It included six questions about the patient's age, Gender, level of education, occupation, marital status and Residence

▪ **Part two: Medical history data and life style**: It contained seven main questions about past and present medical history such as presence of comorbid disease, hypertension, diabetes, previous stroke, present stroke type, disabilities result of present stroke, smoking .

▪ **Part three: Patients' Knowledge assessment**: aimed to assess patient's knowledge about and included ten questions about stroke and dysphagia: definition of stroke, causes and definition of dysphagia, relation between stroke and dysphagia as well as causes of dysphagia, types of dysphagia, complications of dysphagia with post stroke patients as well as management, prevention of dysphagia post stroke and outcomes after management dysphagia.

Scoring system:

Answer	Score
Correct and complete	2
Correct and Incomplete	1
Incorrect	0
SUM	20

The instrument II: Gugging Swallowing Screen Scale (GUSS):

It was adopted from Trapl et al., (2007) to assess the swallowing ability of patients. It has 2 divisions: The

preliminary assessment (Part 1) indirect swallowing test included 5 questions and the direct swallowing test (part 2) which consists of 3 subtests namely semisolid diet swallowing test, liquid diet swallowing test and solid diet swallowing test included 6 questions. Thus, all these subsets must be performed sequentially from indirect swallowing test to semi-solid, liquid and solid diet swallowing test (direct swallowing).

Total scoring:

- 20 No dysphagia (100 %)
- 15-19 - Mild Dysphagia (< 75 %)
- 10-14 - Moderate Dysphagia (50% - 75%)
- 0-9 - Severe Dysphagia. (>50)

The instrument III: Functional Independence:

It was adopted from Berges, & Kuo, (2016) to assess functional independence, generally in stroke patients. The tool included ten questions to assess a patient's level of disability as well as a change in patient status in response to rehabilitation or medical intervention. Grading categories range from total independence to total dependent. It is used to measure performance in the following areas: feeding, bathing, grooming, bowel control, bladder control, toilet use, transfers (bed to chair and back), mobility and stairs.

Scoring system:

Total questions were scored on a scale from 20 to 100 and categorized as follows:

- <20 means totally dependent.
- ≥20 < 39 means very dependent.
- 40 to 59 means partially dependent.

- 60 ≤ 80 means minimally dependent.
- 80 to 100 mean Independent

Procedure

Validity

By jury of 5 experts in the field of medical and surgical nursing (four professors and one assist professors) from faculty of nursing, Menoufia university measured validity of all tools, each expert was asked to examine the tool for completeness, coverage, clarity and whether the included items are suitable to achieve the aim of the current study and necessary modifications were done accordingly.

Reliability

- Test re-tests method will be used to ascertain reliability of instruments, the period between each test will be 2 weeks.
- Reliability of the first instrument (Patients' Knowledge) was tested by Cronbach's Alpha and it was found that r = 0.94
- The reliability of the second instrument (Gugging Swallowing Screen Scale) has been reported in the patient with stroke, with a Cronbach alpha at 0.8 was found to be highly reliable for the study
- The reliability of the third instrument (Function independence) has been established at an acceptable psychometric performance (Intra-class co-relation coefficients ranging from 0.86 to 0.88)

Pilot study:

Prior the data collection, a pilot study was conducted on 10% of the total

number of the study sample (5 patients) to test the feasibility, objectivity and efficacy of instruments. Additionally the pilot study gave the researcher experience on how to deal with the included patients, familiarity with the setting and to estimate the time needed to fulfill instruments used in data collection. Some modifications were done so that studied patients who participated in pilot study were excluded from the actual sample.

Ethical consideration:

A written approval was obtained from Ethical and Research committee of Faculty of Nursing Menoufia University prior collecting the data code N.856 An official letter was sent from the Dean of the Faculty of Nursing, Menoufia University to the director of Menoufia University and governorate Hospital explaining the purpose of the study and methods of data collection.A written consent was obtained from all subjects who met inclusion criteria and agreed to participate in the study after An explanation of the purpose, procedure and benefit of the study

The researcher emphasized that the participation in the study was entirely voluntary and anonymity of the subjects was assured through coding data.

Subjects were also informed that they have the right to withdraw from the study at any time without giving any reason and their withdrawal would not affect their care.The purpose of the study was explained to all patients and all their questions were answered. All patients were assured that all information would be confidential.

Confidentiality was assured through coding the data and it would be used only for the research purpose.

Moreover, they were assured that the nature of the questionnaire did not cause any physical or emotional harm to them

Procedure:

Official letter from Dean of the Faculty of Nursing delivered to the responsible authorities of the hospital and approval to obtain their permission to conduct this study after explanation of the purpose of the study

Data collection was extended for a period of 3 months extended from the beginning of November 2023 to the end of January 2024. Data was collected by the researcher during morning and afternoon shift through 3 consecutive days every week during the period of data collection with average three to five patients in shift. Data was collected in the following phases namely: preparatory phase, assessment phase, implementation phase which was divided into 3 sessions and evaluation phase at seventh day and after three months.

Planning phase

Preparation of the study instruments by reviewing of related literature of various aspects of effect of dysphagia exercises on post stroke outcomes in order to select the appropriate instruments for data collection.Booklet was developed and translated into simple Arabic language by the researcher based on review of recent related literature and supplied by clear and illustrative pictures which contain introduction, anatomy of brain in

addition to definition, types, causes, risk factors, signs, symptoms and complication of stroke and also contain definition, types, signs and symptoms of dysphagia, relation between dysphagia and stroke, prevention, management of dysphagia and dysphagia exercises.

Assessment phase:

- The researcher assessed firstly the control group using instruments (I, II, III) and then study group using the same scoring as a baseline assessment to avoid bias The researcher collected Socio-demographic data and medical data from both groups (study and control groups) by using instrument I (part one and part two) (structured interview questionnaire) filled by researcher. Performed pretest assessment of patient's knowledge by using (instrument I part three) for study and control groups by structured interview questionnaire filled by researcher.

- Swallowing ability assessment is performed by using gugging swallowing scale (instrument II) for study and control groups observed by researcher. Before starting the GUSS test, the patient was sit in a bed in at least a 60° upright position. In indirect swallowing test (part one), the bedside screen was started with a simple saliva swallowing. Patients who were unable to produce enough saliva because of dry mouth were given saliva spray as a substitute. In direct swallowing test (part two) consisted of three sequentially performed subtests, started with

semisolid, then liquid, and finally solid textures:

- **Semisolid swallowing trial:**

Distilled water was thickened with an instant food thickener (yoghurt and concentrated guava) into the consistency of pudding. One-third to one-half teaspoon is offered as a first bolus ,followed by five more half-teaspoons. And the criteria of aspiration (non-deglutition, coughing, drooling and voice change) were observed closely after each spoonful.

- **Liquid swallowing trial:**

Started with 3 ml of water, the patient was observed closely while swallowing the first amount. When swallowing was successful, the test was continued with increasing amounts to 5, 10, and 20 ml of water. A 50-ml test was the maximum. The criteria of aspiration (non-deglutition, coughing, drooling and voice change) were observed closely after each amount.

- **Solid swallowing trial:**

A small piece of dry bread was the first bolus at the beginning of this subtest. The test was repeated five times .The criteria of aspiration (non-deglutition, coughing, drooling and voice change) were observed closely after each amount.

Performed pretest assessment for functional independence level by using functional independence instrument (instrument III) observed and filled by researcher for both groups (study and control).

This assessment was taken 30-45 minutes for every patient.

Implementation phase:

All study groups were thought about dysphagia exercises technique (ten exercises) in three sessions each session took (45-50) minutes divided as following:

First session (theoretical session

Second and third session (training session)

▪ **Evaluation phase:**

At seventh day the researcher evaluated both groups for knowledge by instrument one part three, the swallowing ability after the exercises using instrument II and functional independence level by instrument III to compare between study group and control group.

After the third month: the researcher reassessed both groups in outpatient neurological clinics in Menoufia University Hospital.

Statistical analysis

Data were collected, tabulated, statistically analyzed using an IBM personal computer with Statistical Package of Social Science (SPSS) version 20 (SPSS, Inc, Chicago, Illinois, USA). Where the following statistics was applied:

▪ **Descriptive statistics:** in which quantitative data were presented in the form of mean, standard deviation (SD), range, and qualitative data were presented in the form of numbers and percentages.

▪ **Analytical statistics:** used to find out the possible association between the study factors and the targeted

disease. The used tests of significance included:

Chi squared test: is a test of significance used for comparison between two groups having qualitative variables.Pearson's correlation (r): is a test of significance used for correlating two quantitative variables P value of >0.05 was considered statistically non-significant.

Results

Table (1) shows that the Socio-demographic characteristics of patients in study and control groups. It clarifies that more than half of both groups their age (52%) ranged from 40 to 50 years with mean age (48.7200+8.31925, 47.1600+6.92628) among study and control groups respectively. The majority of study group were male (88%) compared to 60% in control group. (48%) in study group had high education, while (56%) of control group had secondary school education. About (76%) of both groups were married. Also, (76%) of the study group had a work compared to (72%) in control group. Majority of the studied sample (80 %in study group) were residence in rural area compared to 72% in control group.

There no statistically significant differences between two groups toward all demographic characteristics of the studied sample except gender.

Figure (1): This figure shows that knowledge level of patient about stroke and dysphagia in study and control groups. It illustrated that (100%) of both groups had poor knowledge level in pre-intervention. (100%) of study group attained good knowledge level compared to 0% in control group in

post intervention. while in follow up intervention the majority of the study group (96%) attained good knowledge level compared to 0% in control group. There were no statistically significant differences between both groups during pre-intervention regarding to knowledge level. During post and follow up intervention there were highly statistically significant differences between both groups regarding to knowledge level.

Table (2) Frequency distribution of studied groups according to Indirect/Direct swallowing ability assessment to solid, semisolid and liquids throughout study period

As evidence from that table, there was no statistics are computed between study and control groups pre intervention but there were highly statistically significance differences post intervention and follow up. Pre intervention the two group (Study and Control Groups) had sever dysphagia but after intervention nearly quarter (24%) of study group had moderate dysphagia to solid food, more than half (52%) to semisolid food and (100%) to liquids while the control group had severed dysphagia to all. In follow up the more than quarter (28%) of study group had mild dysphagia to solid food and nearly two third 32% had moderate dysphagia to solid food while nearly half (44%) had mild dysphagia to semisolid food but the majority (92%) of them had no dysphagia to liquid also nearly two third of the control group had moderate dysphagia to solid food, more than four fifth (84%) had moderate dysphagia to semisolid food and nearly half (44%) had moderate dysphagia to liquids.

Figure (2) shows that 100% of both groups had totally dependent level in pre intervention. Less than half of the study group (40%) had partially dependent level compared to 0% of control group in post intervention. More than half of the study group (60%) had very dependent compared to 0% of the control group in post intervention. 100% of the control group had totally dependent level compared to 0% of the study group. 20% of the control group had partially dependent compared to 60% of the study group in follow up. 28% of the control group had very dependent level compared to 0% of the study group in follow up intervention. Half of control group (52%) had totally dependent compared to 0% in follow up intervention.

There were no statistically significant differences between both groups regarding to level of dependence in pre intervention. There were highly statistically significant differences between both groups regarding to level of dependence in post and follow up interventions

Table (3): Correlation between total dysphagia, total knowledge and total function:

Total knowledge versus total dysphagia, Total dysphagia versus total function, Total knowledge versus total function

Table (3): explain Correlation between total dysphagia, Total knowledge and total function of study group post intervention. There was no statistically significant positive correlation between the patients' total knowledge score and the total function level. There was no statistically significant negative

correlation between the patients' total knowledge score and the total dysphagia level. There was no statistically significant negative correlation between the patients' total dysphagia and total functional assessment post intervention.

Table (1): Frequency distribution of study and control group according their socio-demographic data (N =50)

Demographic Characteristics	Study Group(N=25)		Control Group(N=25)		x^2	P
	No.	%	No.	%		
Age					.889[a]	.641
Less than 40	2	8.0	4	16.0		
40-50	13	52.0	13	52.0		
51-65	10	40.0	8	32.0		
Mean ± SD	48.7200±8.31925			47.1600±6.92628		
Gender					**5.094[a]**	**.024***
Male	22	88.0	15	60.0		
Female	3	12.0	10	40.0		
Educational level					4.849[a]	.303
Illiterate	1	4.0	0	0		
Read and write	2	8.0	2	8.0		
Primary school	3	12.0	2	8.0		
Secondary school	7	28.0	14	56.0		
High education	12	48.0	7	28.0		
Marital status					.400[a]	.940
Single	1	4.0	1	4.0		
Married	19	76.0	19	76.0		
Divorced	2	8.0	3	12.0		
Widow	3	12.0	2	8.0		
Occupation						
Work	19	76.0	18	72.0	.104[a]	.747
Employee	12	48.0	5	20.0		
Administrative work	3	12.0	7	28.0		
Manual worker	4	16.0	6	24.0		
Not work	6	24.0	7	28.0		
Male without job	2	8.0	2	8.0	5.082[a]	.406
House wife	2	8.0	2	8.0		
Retired	2	8.0	3	12.0		
Residence					.439[a]	.508
Rural area	20	80.0	18	72.0		
urban area	5	20.0	7	28.0		

NB.*Significant   **High significant

Figure (1): Total knowledge Level about stroke and dysphagia (Study and Control Groups) (N=50)
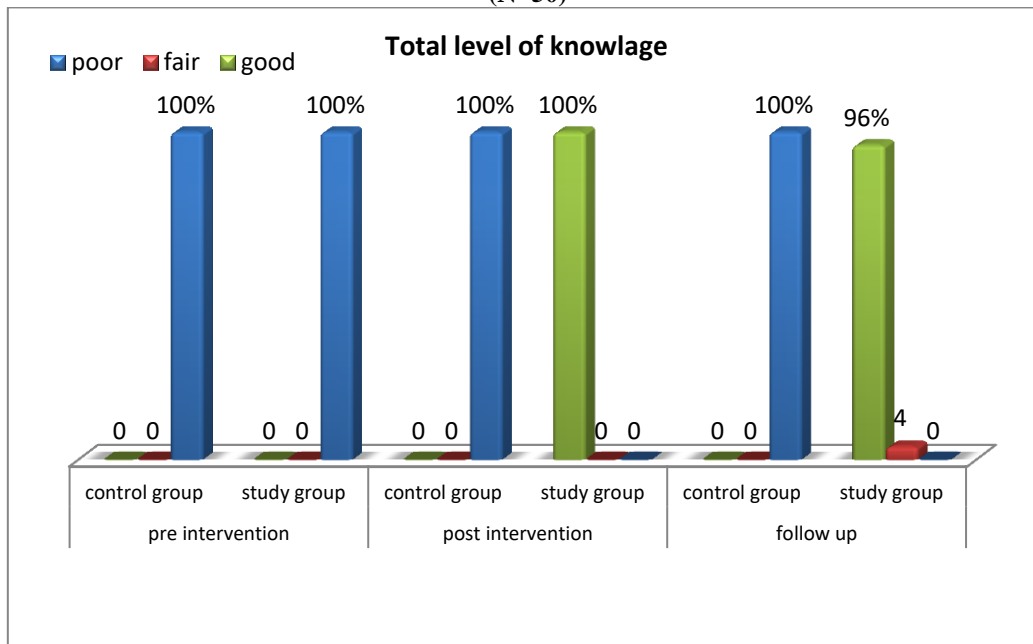

Table (2): Frequency distribution of studied groups according to Indirect/Direct swallowing ability assessment to solid, semisolid and liquids throughout study period (N=50)

Dysphagia level	Pre-intervention						Post-intervention At the first week						At the third month					
	Control group N=25		Study group N=25		X2	p-value	Control group N=25		Study group N=25		X2	p-value	Control group N=25		Study group N=25		X2	p-value
	N	%	N	%			N	%	N	%			N	%	N	%		
Solid																		
Mild dysphagia	0	0	0	0	A	-	0	0	0	0	6.818	.009**	0	0	7	28.0	9.719	.008**
Moderate dysphagia	0	0	0	0			0	0	6	24.0			16	64.0	8	32.0		
Sever dysphagia	25	100	25	100			25	100	19	76.0			9	36.0	10	40.0		
Semisolid																		
Mild dysphagia	0	0	0	0	A	-	0	0	0	0	17.568	.000**	0	0	11	44.0	21.429	**.000**
Moderate dysphagia	0	0	0	0			0	0	13	52.0			21	84	9	36.0		
Sever dysphagia	25	100	25	100			25	100	12	48.0			4	16	5	20.0		
Liquid																		
No dysphagia	0	0	0	0	A	-	0	0	0	0	50.000	**.000**	6	24.0	23	92.0	24.566	**.000**
Mild dysphagia	0	0	0	0			0	0	0	0			8	32	2	8.0		
Moderate dysphagia	0	0	0	0			0	0	25	100.0			11	44.0	0	0		
Sever dysphagia	25	100	25	100			25	100	0	0			0	0	0	0		

Figure (2): Frequency distribution of studied groups according to their functional independent assessment (N=50)
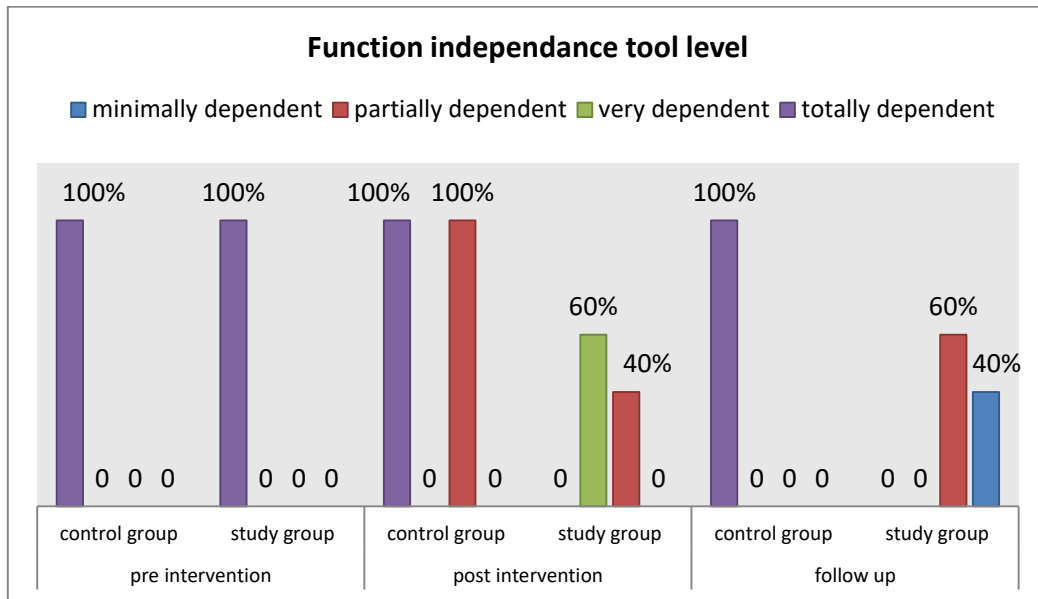

Table (3): Correlation between total dysphagia, total knowledge and total function:
Total knowledge versus total dysphagia, Total dysphagia versus total function, Total knowledge versus total function

	Total knowledge	
Total dysphagia	r	P-value
	-.196	.349
	Total function	
Total dysphagia	r	P-value
	-.336	.101
	Total knowledge	
Total function	R	P-value
	.003	.987

Discussion

Swallowing impairments (dysphagia) are known to occur in a large number of patients after stroke, affecting more than 50% of acute stroke patients. Dysphagia is one of the most common morbidities after stroke, with a reported incidence of 76%-81% (Carnaby et al., 2020). Post stroke dysphagia increases the risk for dehydration, malnutrition, pulmonary complications, and mortality, all of which lead to a poor prognosis. There are several practical methods for decreasing complications associated with dysphagia, including postural adjustments, viscosity changes to food and liquids, oro-pharyngeal exercises, swallowing maneuvers, thermal

stimulation, and enteral feeding, to manage swallowing dysfunction. Oro-pharyngeal exercise is used clinically to rehabilitate swallowing impairments, including those occurring after stroke. Lingual (tongue) exercise is one such approach that has been frequently studied in dysphagia rehabilitation (Liu et al., 2023) so the primary focus of the current study is to determine the effect of dysphagia exercises on post stroke outcomes.

The results of the present study revealed that, there were no statistically significant differences between both groups during pre-intervention regarding to knowledge. During post and follow up intervention there were highly statistically significant differences between both groups regarding to knowledge.

Concerning knowledge level of patients about stroke and dysphagia in study and control groups, the current study revealed that all patients in both groups had poor knowledge level in pre-intervention. All of study group attained good knowledge level compared to zero in control group in post intervention. While in follow up intervention the majority of the study group attained good knowledge level compared to zero in control group.

This result come in agreement with Dziewas, et al., (2021) who studied "European Stroke Organization and European Society for Swallowing Disorders guideline for the diagnosis and treatment of post-stroke dysphagia" in New York and stated that the study group level of knowledge improved after intervention than the control group. Additionally, Liu, et al., (2023) who studied "Effects

of chin tuck against resistance exercise on post-stroke dysphagia rehabilitation: A systematic review and meta-analysis" in China and stated that the intervention affected on the study group while the control group no difference of level of knowledge. Moreover Gok Ugur & Erci (2019) stated after intervention the level of knowledge was good of the study than the control was poor.

For the frequency of distribution of studied groups according to their swallowing ability assessment to solid, semisolid and liquids (Study and Control Groups). The current study revealed that, there was no statistically significance difference between study and control groups pre intervention but there were highly statistically significance differences post intervention and follow up. Pre intervention the two group (Study and Control Groups) had sever dysphagia but after intervention nearly quarter of study group had moderate dysphagia to solid food, more than half to semisolid food and all to liquids while the control group had severed dysphagia to all. In follow up the more than quarter of study group had mild dysphagia to solid food and one third had moderate dysphagia to solid food while nearly half had mild dysphagia to semisolid food but the majority of them had no dysphagia to liquid also nearly two third of the control group had moderate dysphagia to solid food, the majority had moderate dysphagia to semisolid food and nearly half had moderate dysphagia to liquids.

This result come in agreement with Troll et al., (2023) who stated most of studied participants had sever

dysphagia pre intervention to solid, semisolid and liquid food but after intervention there was improvement. Additionally, Selg et al., (2023) who stated that there was no statistics are computed between study and control groups pre intervention but there were highly statistically significance differences post intervention. Moreover Sekimoto et al., (2024) who studied "Improvement of oral function and its impact on oral food intake in subacute stroke patients: A prospective study with dental intervention." in Japan who stated that all oral function parameters improved significantly over time during the hospital stay of study group than the control group.

From the researcher's point of view, that means the effectiveness of the dysphagia exercises to improve swallowing functions of dysphagia patients.

Regarding the frequency distribution of studied groups according to their function independence level assessment in study and control groups. The current study revealed that, all of both groups had totally dependent level in pre intervention. The two fifth of the study group had partially dependent level compared to none of control group in post intervention. More than half of the study group had very dependent compared to none of the control group in post intervention. The entire control group had totally dependent level compared to none of the study group. Fifth of the control group had partially dependent compared to three fifth of the study group in follow up. Nearly one third of the control group had very dependent level compared to none of

the study group in follow up intervention. More than half of control group had totally dependent compared to none in follow up intervention. There were no statistically significant differences between both groups regarding to level of dependence in pre intervention. There were highly statistically significant differences between both groups regarding to level of dependence in post and follow up interventions

This result come in agreement with Padmavathi, Minolin, & KalaBarathi (2023) who studied "Effectiveness of Swallowing Exercises on Dysphagia Among Patients with Cerebrovascular Accident" in Chenna who stated there were no statistically significant differences between experimental and control groups regarding to level of dependence in pre intervention. There were highly statistically significant differences between experimental and control groups regarding to level of dependence in post interventions. Also, Shiraisi et al., (2021) who studied "Improvement in oral health enhances the recovery of activities of daily living and dysphagia after stroke" in Japan who stated multivariate analyses showed that improved oral problems was independently associated with the Functional Independence Measure (FIM-motor) ($\beta = 0.144$, $p = 0.001$) and the Food Intake Level Scale (FILS score) ($\beta = 0.227$, $p < 0.001$) at discharge, after adjusting for potential confounders.

From the researcher's point of view, that mean when dysphagia decreases by consequence the function independence level improved.

Concerning to correlation between total dysphagia and total functional assessment of study group post intervention. The current study revealed that, there was no statistically significant negative correlation between the patients' total dysphagia and total functional assessment post intervention regarding to bathing and grooming, total function. But there was highly statistically significant negative correlation between the patients' total functional assessment post intervention and the total dysphagia level regarding to feeding, dressing, toilet use, transfer, stair, bowel control bladder control, mobility. This result come in agreement with Zhuang et al., (2021) stated there was highly statistically significant negative correlation between the patients' total functional assessment post intervention and the total dysphagia level. From the researcher's point of view, that mean when dysphagia decreased all functions were improved.

Conclusions

Patients who followed dysphagia exercises (study group) acquired higher level of knowledge about dysphagia exercises than patients who did not (control group). Patients who followed dysphagia exercises (study group) had more swallowing ability than patients who did not (control group). Patients who followed dysphagia exercises (study group became more independent than patients who did not (control group).

Recommendation

Post stroke patients should receive dysphagia exercises.

All patients admitted with a diagnosis of stroke (confirmed or not), in the acute phase, to implement a dysphagia screening protocol. It is recommended that screening be performed as early as possible, before any liquid, food or medication ingestion.

The framing, implementation and utilization of clinical guidelines, grounded on the best available evidence and adjusted to clinical contexts, guarantee the quality and excellence of care provided to stroke patients.

Dysphagia screening protocols use validated screening instruments. The Gugging Swallowing Screen (GUSS), due to its psychometric properties, seems to be an adequate instrument.

Consider behavioral intervention, including compensatory strategies (modification of food consistencies and liquid viscosity, postural and swallowing techniques) and rehabilitation (muscle-strengthening exercises, resistance or skills training), as a treatment component of dysphagia in stroke patients.

Using direct and indirect methods to achieve treatment; direct method is associated with the use of foods and achieves treatment through diet adjustments, and diverse posture changes, while indirect method is associated with the stimulation or behavioral swallowing techniques without the direct use of food.

Comprehensive exercise programs, rather than maintaining one exercise, in combination with the stimulation treatment for the actual treatment for patients with swallowing disorders, as well as with the needs of an intensive program, which can be conducted in a

ward, considering insufficient time spent in occupational therapy and reduced compliance of patients and caregivers.

A simplified, comprehensive and illustrated Arabic guided images booklet about dysphagia management should be distributed for each newly admitted patient and their family diagnosed with stroke.

A similar study can be replicated at different settings and on a larger probability sample to allow for greater generalization of the findings.

Apply educational programs about dysphagia management for nurses about the continuous health promotion for patients with stroke in hospitals.

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