# Exploring The effectiveness of Swallowing Exercises on Dysphagia and Quality of Life Among Patients with Head and Neck Cancer

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## Abstract

**Background:** Head and neck malignancies are the sixth most frequent type of cancer. Dysphagia is one of the most frequent complications that affect patients' quality of life. Swallowing exercises could improve dysphagia and quality of life. **Aim:** Is to explore the effectiveness of swallowing exercises on dysphagia and quality of life among patients with head and neck cancer**. Research design:** A quasi-experimental (study/control group) design was used in two settings (radiotherapy unit and clinical oncology department) Zagazig University Hospital, Sharkiya, Governorate, Egypt. A purposeful sample of 80 patients from both genders diagnosed head and neck cancer, patients were assigned into two equal groups (study and control group), 40 patients for each group from the mentioned settings within eight months period were included in the study. **Tools**: Tool (I): Patients' assessment questionnaire; (II) Swallowing Disturbance Questionnaire (SDQ);(III) Dysphagia Handicap Index (DHI) Scale; and (IV) Quality-of-Life Questionnaire (QLQ-C30). **Results**: patients' level of knowledge about head and neck cancer improved from 27.5% among the study group before intervention to 75.0% after four months of swallowing exercises implementation compared to the control group. The mean score of swallowing disturbances questionnaire were 32.40±4.77 among the study group before swallowing exercise implementation and declined after 4 months to 17.05±1.64 compared to the control group. The mean of total dysphagia handicap scores before swallowing exercise implementation was 137.5 ± 15.33 for the study group, while, after 4 months declined to 60.77 ± 20.148 compared to the control group. Mean of total health related quality of life scores before swallowing exercise implementation was 87.42 ± 19.53 for swallowing exercise group and 48.25 ± 22.14 after 4 months compared to the control group. **Conclusion:** swallowing exercise had decreased swallowing disturbances, dysphagia and improved quality of life among patients with head and neck cancer. **Recommendations:** Encourage patients with head and neck cancer to perform swallowing exercise continually.

**Keywords:** Dysphagia, Head and Neck Cancer, Quality of Life, Swallowing Exercises

## Introduction

Head and neck cancer is one of the most common cancers worldwide. It is a broad category of malignancies that arise on the mucosal surfaces of the mouth, nose, larynx, oropharynx, and hypopharynx **(American Speech and Hearing Association, 2022)**. The incidence comprises about 380,000 patients with lip and oral cavity cancer, 185,000 patients with larynx cancer, 133,000 patients with nasopharynx cancer, 98,000 oropharynx cancer, 84,000 hypopharynx cancer, and 54,000 patients with salivary gland cancer. Each year, there are more than 660,000 new patients and 325,000 deaths related to these cancers **(Sung et al., 2021)**. Radiotherapy is the most effective way for treating head and neck cancer**,** most of these patients who get radiotherapy suffer significant side effects both in the short and long term. **(Patterson & Lawton, 2023).**

Head and neck cancer (HNC) may have a significant influence on physical function, swallowing function, nutritional balance and health-related quality of life (HRQOL). Swallowing dysfunction, a prevalent and incapacitating symptom that develops throughout the course of the illness, affects between 60% and 75% of patients. The main reasons for this outcome are scarring from surgical resection, tumor destruction, and side effects from radiation and chemotherapy. (**El-Mahdy et al. 2023).**

Dysphagia pathogenesis caused by radiation therapy included acute inflammation with edema, which may be followed by soft tissues fibrosis resulting in muscle damage and neurological alteration. Moreover, radiotherapy may result in lack of swallowing abilities and coordination with the respiratory functions, loss of tongue strength, prolonged oral and pharyngeal time in swallowing, decreased elevation of larynx and delayed laryngeal closure, **(Guillen-Sola et al., 2019**).

Dysphagia is a common symptom with head and neck cancer patients, and the main complications are typically linked to acute or delayed swallowing, even if the radiation

therapy protocol has been tailored to maintain swallowing function and vital speech organs. **(Baudelet et al., 2020).** On the same line, **(Sung et al., 2021)** added that dysphagia is a widely reported side effect after radiation therapy for patients with head and neck cancer which can persist for a long period of time.

Also, dysphagia has no particular pharmaceutical remedy. Rehabilitation is the primary management strategy. Over the past ten years, increased the interest in using swallowing exercises for head and neck cancer patients who receiving radiotherapy. The goal of these tactics is to stop the swallowing muscles from becoming weak and atrophying due to lack of use. According to earlier studies, swallowing therapy can reduce muscle atrophy and enhance the quality of life associated with dysphagia by reducing aspiration, feeding tube dependence, and hospitalization after treatment. **(Baudelet et al., 2024).**

Patients with dysphagia can participate in a multiphase rehabilitation program. These include dietary modifications that modify solids and liquids food consistency for safe and easly ingestion; adjustments to the head and neck position to allow the bolt to flow under gravity; the introduction of swallowing techniques that guard the airway and prevent bolus pocketing; and oral motor exercises intended to coordinate and strength the oral structure muscles. **(Loewen et al., 2021).**

Applying swallowing exercises to head and neck cancer patients who had dysphagia of varied degrees has been revealed in several studies to enhance functional outcomes. In particular, some of these studies indicated that patients who received radiation therapy and followed a swallowing exercise regimen during and/or after treatment showed better weight, shorter use of gastrostomy tube, improve quality of life scores, and/or a quicker return to an oral diet. Additionally, it has been demonstrated that using preventative swallow exercise routines reduces the degradation of the floor of the mouth muscles. **(Cates et al., 2022).**

Recent recommendations for an important intervention for dysphagia in patients after radiotherapy include the early use of preventive activities. Preventative swallowing therapy appears to lessen the severity and scope of the swallowing issues that develop after radiotherapy **(Furuie et al., 2019**). Prophylactic exercises for the patient to perform throughout cancer treatment may be intended to strengthen the muscles in the tongue, jaw, or pharynx. Exercises are advised to proactively support the swallowing musculature and decrease the effects of functional deterioration**.** Exercises to prevent swallowing problems include Mendelssohn maneuver, the super supraglottic swallowing technique, the two tongue base retraction exercises and the effortful swallowing **(Banda et al., 2021).**

Nurses should be knowledgeable about managing head and neck cancer patients, in addition to the swallowing phases and swallowing difficulties, as they are the best source of patients' information regarding to their problems. Specialist nurses can be crucial in supporting the implementation of or pharyngeal swallowing exercises, such as swallowing maneuvers, tongue exercises, and jaw exercises, to help patients with HNC to manage and improve the side effects of multidimensional treatment, decrease HNC complications, and improve their quality of life **(Braat et al., 2022).**

Effective nursing interventions for dysphagia are essential to reduce complications related to dysphagia. Often, the nurse is the first medical team member responsible for detecting and assessing the signs and symptoms of dysphagia. In addition, the nurse has a significant role in assessing the intensity of dysphagia using standardized tools and can effectively apply different types of exercises and measure its effectiveness in relieving dysphagia and enhancing swallowing ability with head and neck cancer patients. Therefore, the researchers in the current study are interested to explore the effectiveness of swallowing exercises on dysphagia and quality of life for patients have head and neck cancer who receiving radiation therapy at the selected university hospital.

**Significance of the study:**

Head and neck cancer (HNC) is the sixth and most prevalent cancer in humans, globally, it accounts for 3% of all cancers. **(Azzam et al., 2020).** It accounts for approximately 900,000 patients and over 400,000 deaths annually **(Global Cancer Observatory, 2021).** In Egypt the incidence of HNC with its types has increased in recent years **(El din Moawad et al., 2023),** predominantly squamous cell cancer which accounts for 2.68% of all cancer concerns and accountable for 2.22% of all cancer deaths **(Ibrahim & Shash, 2022**).

Swallowing difficulty is one of the most common and crippling effects of HNC and its treatment. Most patients stop eating and drinking by mouth due to toxicity of treatment, this can lead to muscle atrophy, further severity of dysphagia. Swallowing exercises are group of exercises for the patients to practice throughout cancer treatment, the aim of these exercises is to encourage patients to

continue use of their swallowing mechanism. Moreover, combining swallowing exercises as supraglottic maneuver, Mendelsohn and indirect swallowing exercises including lingual and jaw range of motion exercises had positive results and evidence to reduce dysphagia risks and severity.

**Aim of the study: -**

The current study aimed to explore the effectiveness of swallowing exercises on dysphagia and quality of life among patients with head and neck cancer**.**

**Research hypotheses**: for achieving the study aim, the researchers drafted the following hypotheses:

1- Knowledge mean score could be significantly improved among the studied group of patients with head and neck cancer post implementation of the swallowing exercises compared to the control group.

2- Swallowing disturbances could be significantly declined among the studied group of patients with head and neck cancer post implementation of the swallowing exercises compared to the control group.

3- Dysphagia handicapping scores could be significantly declined among the studied group of patients with head and neck cancer post implementation of the swallowing exercises compared to the control group.

4- Quality of life mean score could be significantly improved among the studied group of patients with head and neck cancer post implementation of the swallowing exercises compared to the control group.

**Operational definitions:**

**Swallowing exercises**: are exercises that included getting the tongue forward and forth, tongue to cheeks, tongue to mouth' corners, effortful swallow maneuver, jaw range of motion, supra-glottic swallow, lingual range of motion and mendelsohn maneuver for 5-10 minutes of 10- 15 repetitions for 3 times a day for 7 days per week (**Langmore S. & Pisegna J. 2015).**

**Dysphagia**: For the current study refers to any patient with head and neck cancer who reported difficulties in swallowing of liquid, soft, hard food or saliva which could measure by using swallowing disturbance questionnaire.

**Subjects and method**

**Research Design**: A quasi–experimental (study/control groups) design was utilized to guide and achieve the aim of the current research, the design used for searching if there is causal correlation between the dependent and independent variables. The independent variable manipulated before measuring the dependent variable **(Maciejewski, 2020)**

**Setting**: This study was conducted at radiotherapy unit and clinical oncology department. Zagazig University Hospital, Sharkiya, Governorate, Egypt, which provides chemotherapy or radiotherapy for patients with head and neck cancer. Since these departments were focused on admitting specific patients, great number of patients visited them, so it was chosen from study setting

**Sample**

All patients who were admitted to the previously stated setting, adult male and female whose ages ranged from 21 to 60 years, cognizant and able to interact with the researchers, newly diagnosed with head and neck cancer and were treated with radiation for the first time during the first week of their Hospital stay. However, the exclusion criteria of the patients were those with: (1) Prior history of cancer (2) Previous surgery in the head and neck (3) Receiving treatment for another cancer type (4) Dysphagia from non-cancer causes

The study sample was a purposive sample of eighty adult patients, they were assigned into two groups 40 patients in each, which were: The intervention group [G2, n = 40] followed standard Hospital care in addition to swallowing exercises, while the control group [G1, n = 40] followed standard Hospital care.

**Sample size:**

Eighty patients were determined by using G Power software to test the differences between two independent means. Used "error 0.05", "effect size 0.8", and "power 95%."

**Tools:**

Based on reviewing the related references by the researchers for collecting data, the following four tools were used to gather data for achieving the study's goal:

**Tool I: Patients assessment questionnaire:**

The researchers created the tool after reviewing of recent relevant literature (**Kaur, Pathak & Patel, 2014) (El-Mahdy et al.,2023) (Patterson & Lawton,2023).** To gather baseline data about patients' knowledge, personal and medical information. It divided into three parts:

**Part (1): personal data** including age, gender, marital status, occupation, educational attainment and residence.

**Part (2): medical data** including diagnosis, co-occurring conditions, dysphagia, family history, and duration of the HNC.

**Part (3): patients' knowledge**. It contained two sections: A. Patients' knowledge related to head and neck cancer, consisted of 5 (closed ended) questions regarding to patients' knowledge about definition, clinical manifestations, risk factors, methods of

diagnosis and treatment. B. Patients' knowledge related to swallowing exercise: It composed of 4 questions regarding to knowledge about types, definition and its benefits.

**Scoring system**: two scores were given if the patient completely and correctly answered the question, one score if the patient incompletely and correctly answered the question and zero if he answered incorrectly or listed 'I don't know'. The total possible score was 18. The scores were then summed, transformed into a percentage, and classified as following: A score of 75% or higher (13.5 score or more) was considered satisfactory, while a score below 75% (less than 13.5 score) was considered unsatisfactory.

**Tool II: Swallowing Disturbance Questionnaire (SDQ);**

It is an adopted tool to evaluate swallowing difficulty and was created by **Manor & Cohen (2011**). It includes fifteen questions. Response to question 15 is either 0-no or 1=yes, while questions from 1 to14 are on a scale of 0=Never, 1=Seldom (once a month or less), 2=frequently (from 1 to 7 times a week), and 3=Very frequently (more than 7 times a week). No swallowing disturbance is denoted by a score of 0, swallowing disturbance is denoted by a score of 1–14, frequently by a score of 15–28, and very frequently by a score of 29–42. The results presented in mean and standard deviation; the lower mean scores the better result.

**Tool III: Dysphagia Handicap Index (DHI) Scale:**

This tool was created by **Silbergliet, et al., (2012)**. It is 25 items in self-administered questionnaire. It is a tool for assessing how dysphagia impairs patients' physical, functional, and emotional aspects of their life. The 25 statements were generated based on a set of dysphagia complaints by patients and categorized into three groups: the functional, emotional, and physical aspects of dysphagia. Nine items measure the patients' perception of the physical discomfort brought on by dysphagia. Nine items represent functional troubles of dysphagia, i.e., how dysphagia affects the patients' everyday activities. The psychological issues of dysphagia, or the affective response brought on by dysphagia are represented by seven items related to emotional issues.

After the test completed, the patients were asked to rate the severity of dysphagia on a seven points equal-appearing interval scale depends on number one and the word normal in one side, the number seven and the word "severe problem" at the other side and number four in the middle which indicates moderate swallowing problem. The severity ratings were categorized into four sections using the following descriptions: 1= normal, 2 and 3 = mild, 4 and 5= moderate and 6 and 7= severe. Mean and standard deviation were used by the researchers to express the results.

**Tool IV: EORTC Quality-of-Life Questionnaire (QLQ-C30) (version 3)**: Is a health-related quality of life (HRQOL) questionnaire by the European Organization on Research and Treatment of Cancer (EORTC) (1980). The questionnaire used to measure several aspects of HRQOL specific to cancer patients. It included; physical function (Q 1to Q 5), role function (Q 6&7), symptoms (nausea, vomiting, loss of appetite, constipation, diarrhea fatigue, pain, dyspnea and insomnia) (Q 8 to Q 19), cognitive function (Q 20 & Q 25), emotional function (Q 21 to Q 24), social function (Q 26 & Q 27), financial problem (Q 28), quality of life / global health status (Q 29 & Q 30). Each item was given scores as the following; 1= Not at all, 2 = A little, 3 = Quite a bit and 4 = Very much, with the exception of 'Global QoL, that are two questions with responses rates from 1 = very poor to 7 = excellent. The researchers used mean and standard deviation to express the results.

A linear transformation to a '0–100' scale of the EORTC QLQ-C30 questionnaire was carried out according to the EORTC Scoring Manual. A higher mean score of global QoL indicated a better level of quality of life, but a higher mean score for symptoms indicated more problems.

**Procedures**

**Ethical and administrative consideration:**

Approval for data collection was obtained from the Dean of the Faculty of Nursing at Benha University, alongside director of the hospital and the head of the radiotherapy and clinical oncology units which located at Zagazig University Hospital. Clear explanations regarding the study objectives and nature facilitated the approval process and minimized any potential resistance.

All ethical considerations were made at every level of the research. Prior to the execution of the swallowing exercise for head and neck cancer patients, the Faculty of Nursing at Benha University's Scientific Ethical Research Committee approved the study (REC/MSNP101). A description of the objectives and aim of the study was given to each participant. The ability to leave the study at any time was made clear to the participants. Furthermore, the studied patients assigned

verbal and written consent. The patients' privacy and confidentiality were protected by the researcher.

**Preparation of tools:** involved reviewing literatures and studies relevant to the research problem and utilizing textbooks, evidence-based references, online journals and periodicals.

**Tools validity and reliability:**

Validity of the study tools done by five expertise in medical surgical nursing speciality; three professors and two assistant professors. According of the expertise opinions the necessary modifications done for the study tools.

Reliability of the study tools was determined by the use of Cronbach's α test. The swallowing disturbance questionnaire (SDQ's) (Tool 2) reliability was 0.98. Reliability was determined to be 0.97, dysphagia handicap index (DHI) scale (Too 3) was 0.97 and reliability of EORTC Quality-of-Life Questionnaire (QLQ-C30) (Tool 4) was 0.87.

**Pilot study:**

Eight patients (10%) of the total investigated patients, participated in a pilot trial. The purpose of the pilot testing was to verify the possibility of the study procedure as well as the clarity, applicability, and time required for filling out each tool. There was no modification done for the study tools, so those patients were incorporated in the main study sample.

**Field work:** Was done from October 2024 to May 2025, a period of eight months was used for the data collection process. Using the above research instruments, the researchers collected data three days a week (morning and afternoon) at radiotherapy unite and clinical oncology department at Zagazig University Hospital. Field work was done through four phases as the following:

**Assessment phase:**

Informed consent was obtained from the patients who met the study criteria and accept to participate after explaining the study aim, the researchers assessed patients' knowledge, personal and medical data by using Tool 1, swallowing disturbance by using Tool II as well as dysphagia handicap index (DHI) (Tool III) and assessed quality-of-life by using QLQ-C30 (Tool IV). The study tools were filled by the researchers; it took about 20 to 30 minutes to obtain baseline data from each participant in the study. The researchers started with assessing the control group at first then the study group to evade biased of the results.

**Planning phase:**

**Swallowing exercises booklet:** After examining the patients' educational needs and after reviewing the relevant literatures **(Kumar et al., 2015; Guillen-Sola et al., 2019; Wall et al., 2020; Royal Burkshire NHA Foundation Trust 2021& Hajdú et al., 2022),** the researchers designed a booklet with simplified Arabic swallowing exercises accompanied by picture illustrations based on the patients' pre-test results. The swallowing exercises aimed to attain better coordinating and strengthening of the swallowing muscles for enhancement of the swallowing.

Getting the tongue forward and forth, tongue to cheek, tongue to mouth corners, Effortful Swallow Maneuver, jaw range of motion, Supra-glottic swallow, Lingual range of motion and Mendelsohn were among the swallowing exercises. Beginning in the first week, patients were instructed to execute these exercises at least three times a day, 10 times each.

**Implementation phase**: Patients who underwent head and neck cancer (study group) were enrolled in the swallowing exercise program. The researchers gave the patients an introduction and described the aims of the study. During the program sessions, the researchers trained the chosen patients a thorough explanation of the swallowing exercises.

The patients (study group) were divided into eight subgroups, according to the best time and degree of preparedness for sessions. Each subgroup included four to five patients have head and neck cancer. Subject explanations differed relying on the educational backgrounds of the participants and their degree of dysphagia, the exercises were implemented in four sessions as the following:

**The first session:** The orientation and justification for the purpose and significance of the intervention program, which included knowledge on head and neck, were covered in the first session (the introductory session). It included overview about the definition of head and neck cancer, signs and symptoms, causes, complications, diagnosis, method of treatments. The researchers revised the swallowing exercises' objectives and their relation to swallowing functioning and quality of life. The first session took twenty to thirty minutes. During this session, patients were shown and given instructions on exercises as:

**Getting the tongue forward and forth**: Patie nts were told to extend their tongue asfar as the y could, hold the stretch for five seconds while maintaining their tongue in the middle, relax, p

ull their tongue back as far as they could, and t hen repeat the Process as many times as they c ould, up to ten times.
- **Tongue to cheek**: Patients were told to stick their tongue tip as far back in their mouth as possible in their right cheek, hold the position, and then let go. After doing the exercise again, this time to the left, unwind. The patients were told to perform the exercise as frequently as they could, up to ten times.
- **Tongue to mouth corners**: Patients were told to grin and press their tongue tip against their right mouth corner. Next, move it to the left corner of your mouth, move it back and forth, and try moving tongue more quickly from side to side while maintaining accuracy with the tip of tongue in the corners of mouth, and repeat as many times as necessary—up to ten times.

**The second session:** Involved the Effortful Swallow Maneuver**.** Bolus clearance from the valleculae is enhanced by this motion. It was applied as a corrective and compensatory measure. Patients were told to visualize having to swallow a big object. Swallow more forcefully. When swallowing, the extra effort should be noticeable on the neck, and it should be repeated up to ten times. **In order to perform the Masako maneuver**, the patient must be asked to sit or stand comfortably, stick their tongue out as far as they feel comfortable, hold it softly between their front teeth, swallow, and then release it. We'll perform this exercise ten times. This session took 20 to 30 minutes to complete.

**The third session:** Included exercises for jaw range of motion involve asking the patient to open his mouth as wide as possible, hold it open for two to three seconds, close it, and repeat. Next, move his jaw as far from side to side as he can in each direction. Ten repetitions of this workout. **Supra-glottic swallow:** Patients were told to inhale deeply, hold their breath, bite or sip, swallow while holding their breath, cough immediately after swallowing (on the exhale), swallow again, breathe, and repeat these actions. This was a 30-minute session.

**The fourth session:** Involved Lingual range of motion exercises requesting that the patient extend their tongue, move it up toward their nose, then down toward their chin, stretch as far as they can in both directions, and hold for five seconds in each direction before moving their tongue to the left, holding for five seconds, and then again to the right, holding for five seconds. Ten repetitions of each step at three times a day. **Mendelsohn:** It was advised that patients swallow normally. Feel the up-and-down motion of the larynx with fingers on the neck. Patients were told to use their throat muscles to feel the larynx migrate up and hold it during the subsequent swallow. Avoid lifting the larynx too soon, hold it for three seconds after letting it rise naturally. Advice the patient to hold it rose, use throat muscles rather than fingers, take his time, finish the swallowing, and repeat as many times as he can—up to ten times. This was a 30-minute session.

In the light of this, the intervention was stopped right away if the patient complained of any pain or discomfort, and the patient was observed until they felt significantly better. A progressive increase in repetitions was used for patients who could not initially perform 10 repetitions of a particular exercise. Patients in the study group had a single 30-minute training session that included both demonstration and re-demonstration to guarantee that the exercises were performed correctly. The patients were told to complete these exercises every day. The patients received daily follow-up phone calls, instructional leaflets in Arabic, visual aids, and thorough explanations of the exercises and their advantages in order to improve adherence and retention.

-The patients were urged by the researchers to continue performing the exercises they had learned on a regular basis without skipping sessions.
- The researchers planned a follow-up meeting to assess effect of the swallowing exercises on dysphagia and quality of life, two and four months after the exercises began

Each patient in the study group was provided with a booklet included the exercises which should be followed at home with the needed instructions and pictures to illustrate and attract their attention as a reference for reviewing and recalling the instructions during performing exercises at home. A brief summary in conclusion of each session, concentrated on the main points which provided to the patients and encouraged to ask questions, and determine the next meeting date. Related to the control group followed the routine Hospital nursing care.

**Evaluation phase**: Patients were followed up post implementing swallowing exercises for knowledge (Tool I part 3) at immediate post program and post four months. Swallowing disturbance questionnaire (Tool II) as well as dysphagia handicap index (DHI) (Tool III) scale and quality of life scale (Tool IV) were

filled by the researchers for control group and after each intervention of swallowing exercises for study groups. Reading was done firstly for the control group who followed routine hospital care alongside radiotherapy treatment and then for the study group to determine how swallowing exercises affected their quality of life and ability to swallow, the 1st post program reading by the end of the 2month, then at the end of the 4th month as the 2nd post program reading.

Data analysis was performed using SPSS software version 25. Kolmogorov-Smirnov test was used for deciding the normal distribution of the quantitative variables. Chi-square test was used for comparing the nominal variables in the two groups. Fisher's exact test was used on a smaller sample size, alternative to the chi-square test, when the frequency count is < 5 for more than 20% of cells. Comparing the mean scores in the two groups were used to the independent t-tests. Pearson product-moment correlation coefficient used for correlation between different numerical variables. When p-value < 0.05, it is a significant, and p-value <0.001 mean a highly significant.

## Results

**Section I: Description of the study samples' personal data of the control and the swallowing exercise group. Table (1)** shows that 45.0% and 42.5 % of the control and swallowing exercise group respectively their age was in more than or equal 50 years with mean of age 45.70 ± 6.68 for the control group and 45.93±9.23 for swallowing exercise group. Male gender constitutes 70.0% and 62.5% respectively of the control and swallowing exercise group. Regarding marital status, 70.0% and 60.0% respectively of the control and swallowing exercises group were married. Related to occupation, 52.5% and 47.5% of the control and swallowing exercises groups were employees. According to educational attainment, 35.0% of the control group and 37.5% of swallowing exercises group had intermediate qualifications. With reference to residence, 52.5% of the control group and 60.0% of swallowing exercises groups had lived in urban region. There was no statistically significant difference between the two study groups regarding demographic variables.

**Table (2)** clarifies that 52.5% and 55.0% respectively of the control and swallowing exercises groups had Laryngeal and hypolaryngeal cancer. According to duration of illness 52.5% and 47.5% respectively of the control and swallowing exercises group had cancer from less than one year. With reference to comorbid diseases, 57.5% and 52.5% of the control and swallowing exercises groups had chronic disease, 30.4%, and 38.1% respectively of the control and swallowing exercises groups had diabetes mellitus. According to duration of dysphagia 52.5%, `and 47.5% respectively of the control group and swallowing exercises groups had dysphagia from more than 1 to less than or equal 3 months. Moreover 80.0%, `and 85.5% respectively of the control group and swallowing exercises groups had no family history of head and neck cancer. In addition, duration head and neck cancer 62.5%, `and 70.0%respectively of the control group and swallowing exercises groups had cancer from 1 to less than 6 months. There was no statistically significant difference between the two groups regarding medical data.

**Section II: Delineates hypothesis testing for being supported or not**

**Figure (1)** clarifies that the minority 20% and 27.5% respectively of the control, and the study group had satisfactory knowledge related head and neck cancer and swallowing exercise before intervention, while, immediate post their level of knowledge improved significantly 22.5% and 85.0% respectively for the control and study group had satisfactory knowledge and after four months of swallowing exercises program 27.5% and 75.0% respectively had satisfactory knowledge.

**Table (3)** concerning swallowing disturbances this table represents a mean score of 32.87±2.62 and 32.40±4.77 respectively among the control, and swallowing exercises groups before swallowing exercise implementation with a non- statistically significant difference between both groups (p>0.05). While after 2 months of swallowing exercises implementation 31.50±3.70 and 25.77±4.14 respectively of the control and swallowing exercises groups. And after 4 months 36.82±3.51and 17.05±1.64 respectively of the control and swallowing exercises groups with highly significant differences (<0.001 **) after 2 and 4 months of swallowing exercises implementation

**Table (4):** Presents that there was no significant difference between the control and swallowing exercise groups regarding the dysphagia handicapping-related domains (Physical, Functional and Emotional) mean score before swallowing exercises implementation p values of 0.675, 0.684, and

0.519, respectively. While there was a significant difference between the two groups related the dysphagia handicapping-related domains (Physical, Functional and Emotional) and the mean after 2 months of implementation of the swallowing exercises p = <0.001**, <0.001**, and <0.001** respectively, and also at follow-up after 4 months (p = <0.001**).

**Figure (2)** indicates that mean of total dysphagia handicap scores before swallowing exercise implementation was (138.45± 19.79) for control group and 137.5 ± 15.33 for swallowing exercise group. While, post 2 months of applying swallowing exercises was 127.8 ± 20.94 for control group and 77.12± 18.45 for swallowing exercise group. And after 4 months was 130.77 ± 27.31) for control group and 60.77 ± 20.148 for swallowing exercise group.

**Table (5)** Presents that there was no significantly difference between the control and the swallowing exercises groups related the health related quality of life mean score before applying swallowing exercises p values of 0.135, 0.137, 0.132, 0.88, 0.459 ,0.862, 0.117 and 0.738, respectively. While there was improved QOL aspects for study group with statistical significantly between the two groups related the quality of life after 2 months of post implementation of the swallowing exercises p = <0.001** for all QoL aspects except financial problem it was 0.008**, respectively, and also in follow-up after 4 months regarding all aspects of QoL (p = <0.001**.

**Figure (3)** indicates that mean of total health related quality of life scores before swallowing exercise implementation was 87.08± 15.29 for control group and 87.42 ± 19.53 for swallowing exercise group. While, post 2 months of applying swallowing exercises was 96.4 ± 26.44 for control group and 66. 82 ±22.15 for swallowing exercise group. And after 4 months was 96.12 ± 17.11 for control group and 48.25 ± 22.14 for swallowing exercise group.

**Section III: Table (6)** There were highly significant positive correlation between total swallowing disturbance and total quality of life post two and four months of swallowing exercises program p<0.001** in the study and control group. A highly significant negative correlation between total dysphagia handicap and total quality of life post two and four months of swallowing exercises in both groups. There was highly significant positive correlation between total dysphagia handicap and total swallowing disturbance post four months of swallowing exercises program between both groups.

**Table 1. Frequency and percentage distribution of the control group and swallowing exercise group according to personal data (n= 80).**

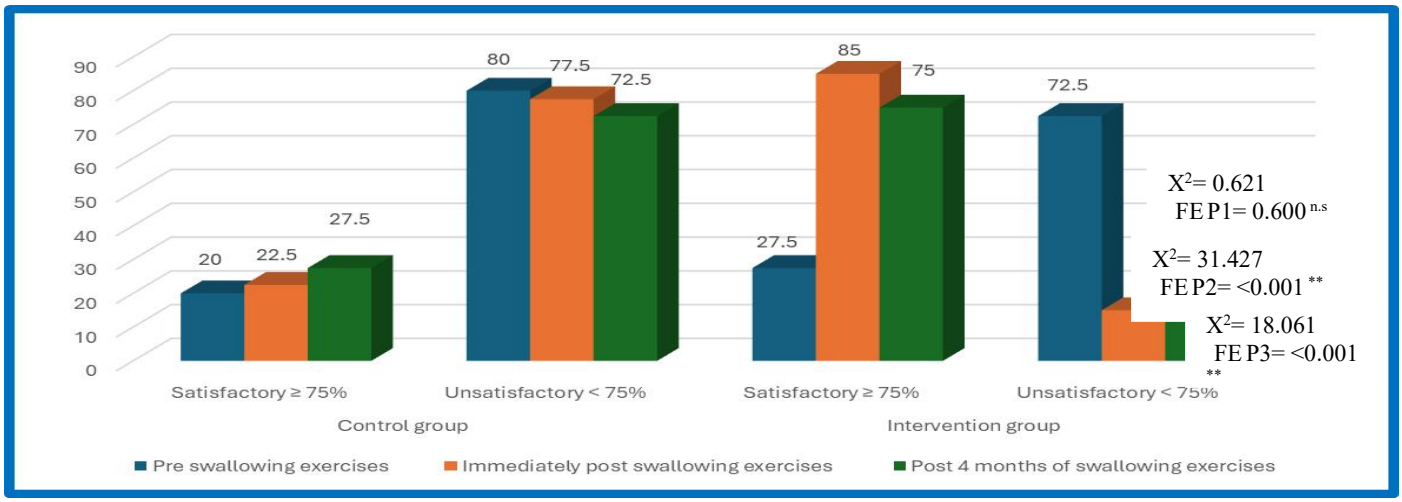
| Patients' personal data | Variables | Control group n=40 | | swallowing exercise group n=40 | | $X^2$ | P value |
|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | | |
| **Age (year)** | 30-<40 | 12 | 30.0 | 10 | 25.0 | 0.602 | 0.740 n.s |
| | 40-<50 | 10 | 25.0 | 13 | 32.5 | | |
| | ≥ 50 | 18 | 45.0 | 17 | 42.5 | | |
| | **Mean ± SD** | **45.70±8.68** | | **45.93±9.23** | | t= 0.112 | 0.911 n.s |
| **Gender** | Male | 28 | 70.0 | 25 | 62.5 | 0.503 | FEp 0.637 n.s |
| | Female | 12 | 30.0 | 15 | 37.5 | | |
| **Marital status** | Not married | 12 | 30.0 | 16 | 40.0 | 0.879 | FE 0.482 n.s |
| | Married | 28 | 70.0 | 24 | 60.0 | | |
| **Occupation** | Not Working | 9 | 22.5 | 10 | 25 | 0.252 | 0.969 n.s |
| | Employee | 21 | 52.5 | 19 | 47.5 | | |
| | Retired | 4 | 10.0 | 4 | 10.0 | | |
| | Free work | 6 | 15.0 | 7 | 17.5 | | |
| **Educational attainment** | Illiterate | 8 | 20.0 | 9 | 22.5 | 0.211 | 0.976 n.s |
| | Read and write | 9 | 22.5 | 8 | 20.0 | | |
| | Intermediate qualification | 14 | 35.0 | 15 | 37.5 | | |
| | University qualification | 9 | 22.5 | 8 | 20.0 | | |
| **Residence** | Urban | 21 | 52.5 | 24 | 60.0 | 1.257 | FE 0.370 n.s |
| | Rural | 19 | 47.5 | 16 | 40.0 | | |

**Table 2. Frequency and percentage distribution of the control group and swallowing exercise group according to medical data (n= 80).**

| Medical data | Variables | Control group n=40 | | swallowing exercise group n=40 | | $X^2$ test | P value |
|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | | |
| **Medical Diagnosis** | Nasopharyngeal cancer | 7 | 17.5 | 14 | 35.0 | 7.690 | 0.053 n.s |
| | Oral and oropharyngeal cancer | 8 | 20.0 | 4 | 10.0 | | |
| | Laryngeal and Hypolaryngeal cancer | 21 | 52.5 | 22 | 55.0 | | |
| | Salivary gland cancer | 4 | 10.0 | 0 | 0.0 | | |
| **Duration of head and neck cancer** | <1 years | 21 | 52.5 | 19 | 47.5 | 1.076 | 0.084 n.s |
| | 1-<5 years | 10 | 25 | 11 | 27.5 | | |
| | >5 years | 9 | 22.5 | 10 | 25 | | |
| **Presence of chronic disease** | Yes | 23 | 57.5 | 21 | 52.5 | 1.421 | 0.053 n.s |
| | No | 17 | 42.5 | 19 | 47.5 | | |
| **chronic disease #** | | n= 23 | | n= 21 | | | |
| | Diabetes mellites | 7 | 30.4 | 8 | 38.1 | 1.322 | 0.062 n.s |
| | Chronic Obstructive Pulmonary Disease | 6 | 26.1 | 7 | 33.3 | | |
| | Peripheral Vascular Disease | 6 | 26.1 | 4 | 19.1 | | |
| | Cerebrovascular Disease | 4 | 17.4 | 2 | 9.5 | | |
| **Duration of dysphagia** | <1 month | 10 | 25 | 11 | 27.5 | 1.076 | 0.084 n.s |
| | 1 month- < 3 months | 21 | 52.5 | 19 | 47.5 | | |
| | 3-6 months | 9 | 22.5 | 10 | 25 | | |
| **Presence of family history of head and neck cancer** | Yes | 8 | 20.0 | 6 | 15.0 | 0.346 | FEP 0.770 n.s |
| | No | 32 | 80.0 | 34 | 85.0 | | |

**#** **not mutually conclusive** **FEp:** p value for Fisher exact for chi square

**Figure (1): Comparison between both studied groups regarding total knowledge level about head and neck cancer and swallowing exercises throughout implementation phases (n= 80).**




*(FE) p value for Fisher exact for chi square* *Not significant (p > 0.05)* *** Highly significant (p ≤ 0.001)*

*(!) Difference between intervention and control groups pre swallowing exercises*
*(2) Difference between intervention and control groups immediately post swallowing exercises*
*(3) Difference between intervention and control groups post 4 months of swallowing exercises*

**Table 3. Comparison of the swallowing disturbances between Studied groups at the three intervention phases (n= 80).**

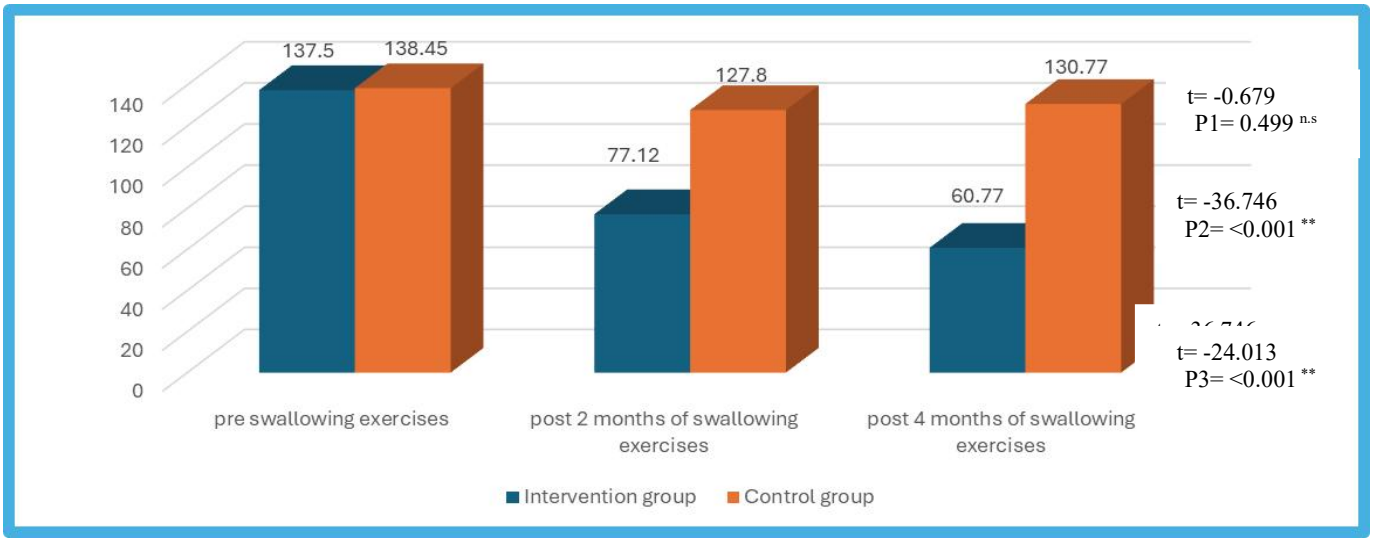
| Swallowing disturbance | Studied groups | | Independent t-test | p value |
|---|---|---|---|---|
| | Control group | Swallowing exercise group | | |
| | $\bar{X}$ ± SD | $\bar{X}$ ± SD | | |
| Pre swallowing exercises | 32.87±2.62 | 32.40±4.77 | -0.552 | 0.583 n.s |
| Two months post swallowing exercises | 31.50±3.70 | 25.77±4.14 | -6.514 | <0.001 ** |
| Four months post swallowing exercises | 36.82±3.51 | 17.05±1.64 | -32.219 | <0.001 ** |

**Table 4. Comparison of the dysphagia handicap mean score between control group and swallowing exercise group at the three intervention phases (n= 80)**

| Dysphagia handicap | | Studied groups | | Independent t-test p value |
|---|---|---|---|---|
| | | Control group N=40 | Swallowing exercise group N=40 | |
| | | $\bar{X}$ ± SD | $\bar{X}$ ± SD | |
| Pre swallowing exercises | Physical handicap | 39.10±3.69 | 38.75±3.74 | -0.421<br>0.675 n.s |
| | Functional handicap | 55.25±3.02 | 55.02±1.71 | -0.409<br>0.684 n.s |
| | Emotional handicap | 44.10±2.41 | 43.72±2.74 | -0.649<br>0.519 n.s |
| Two months post swallowing exercises | Physical handicap | 43.82±4.82 | 30.10±3.84 | -14.075<br><0.001** |
| | Functional handicap | 47.35±3.84 | 27.27±2.75 | -26.834<br><0.001** |
| | Emotional handicap | 36.62±4.61 | 19.75±2.22 | -20.820<br><0.001** |
| Four months post swallowing exercises | Physical handicap | 49.42±5.91 | 20.97±2.06 | -28.721<br><0.001** |
| | Functional handicap | 47.97±8.84 | 22.82±2.18 | -16.374<br><0.001** |
| | Emotional handicap | 33.37±3.93 | 16.72±2.28 | -23.116<br><0.001** |

*(t) independent t test Not significant (p > 0.05) ** Highly significant (p ≤ 0.001)*

**Figure 2 Comparison between total mean score of the studied groups regarding dysphagia handicap throughout phases of swallowing exercises implementation phases (n= 80).**




*(t) independent t test* *Not significant (p > 0.05)* *** Highly significant (p ≤ 0.001)*

*(!) Difference between intervention and control groups pre swallowing exercises*

*(2) Difference between intervention and control groups post 2 months of swallowing exercises*

*(3) Difference between intervention and control groups post 4 months of swallowing exercises*

**Table 5. Comparison between mean score of the studied groups regarding quality of life throughout phases of swallowing exercises implementation phases (n= 80)**

| Quality of life | Pre swallowing exercises | | Two months post swallowing exercises | | Four months post swallowing exercises | | t-test p value (1) | t-test p value (2) | t-test p value (3) |
|---|---|---|---|---|---|---|---|---|---|
| | Control group N=40 | Intervention group N=40 | Control group N=40 | Intervention group N=40 | Control group N=40 | Intervention group N=40 | | | |
| | $\bar{X}$ ± SD | $\bar{X}$ ± SD | $\bar{X}$ ± SD | $\bar{X}$ ± SD | $\bar{X}$ ± SD | $\bar{X}$ ± SD | | | |
| Physical function | 15.20±1.50 | 14.62±1.87 | 15.42±2.79 | 11.67±1.49 | 16.32±2.11 | 6.42±0.84 | -1.511<br>0.135 n.s | -7.495<br><0.001** | -27.475<br><0.001** |
| Role function | 6.32±0.76 | 6.60±0.87 | 6.55±1.03 | 3.67±0.97 | 6.42±1.31 | 2.75±0.77 | 1.501<br>0.137 n.s | -12.802<br><0.001** | -15.193<br><0.001** |
| Symptoms | 31.25±2.32 | 32.30±3.49 | 37.57±3.81 | 23.00±2.66 | 39.57±5.11 | 15.80±1.22 | 1.524<br>0.132 n.s | -19.794<br><0.001** | -28.598<br><0.001** |
| Cognitive function | 6.60±1.49 | 7.05±0.67 | 3.15±1.23 | 6.85±1.00 | 6.60±0.95 | 2.72±0.67 | 1.730<br>0.088 n.s | -14.747<br><0.001** | -20.910<br><0.001** |
| Emotional function | 13.20±1.47 | 13.45±1.53 | 12.77±2.67 | 9.05±1.60 | 13.47±1.67 | 5.20±0.82 | 0.744<br>0.459 n.s | -7.559<br><0.001** | -27.987<br><0.001** |
| Social function | 6.47±1.33 | 6.52±1.21 | 6.17±1.43 | 5.32±1.36 | 6.30±1.52 | 2.82±0.63 | 0.175<br>0.862 n.s | -2.718<br>0.008* | -13.320<br><0.001** |
| Financial problem | 3.35±0.66 | 3.10±0.74 | 3.45±0.67 | 1.32±0.47 | 3.57±0.54 | 1.22±0.42 | -1.587<br>0.117 n.s | -16.251<br>0.008* | -21.435<br><0.001** |
| Global health status | 3.60±0.92 | 3.52±1.06 | 7.60±1.08 | 9.62±1.87 | 3.85±1.98 | 11.30±2.13 | -0.336<br>0.738 n.s | 5.913<br><0.001** | 16.161<br><0.001** |

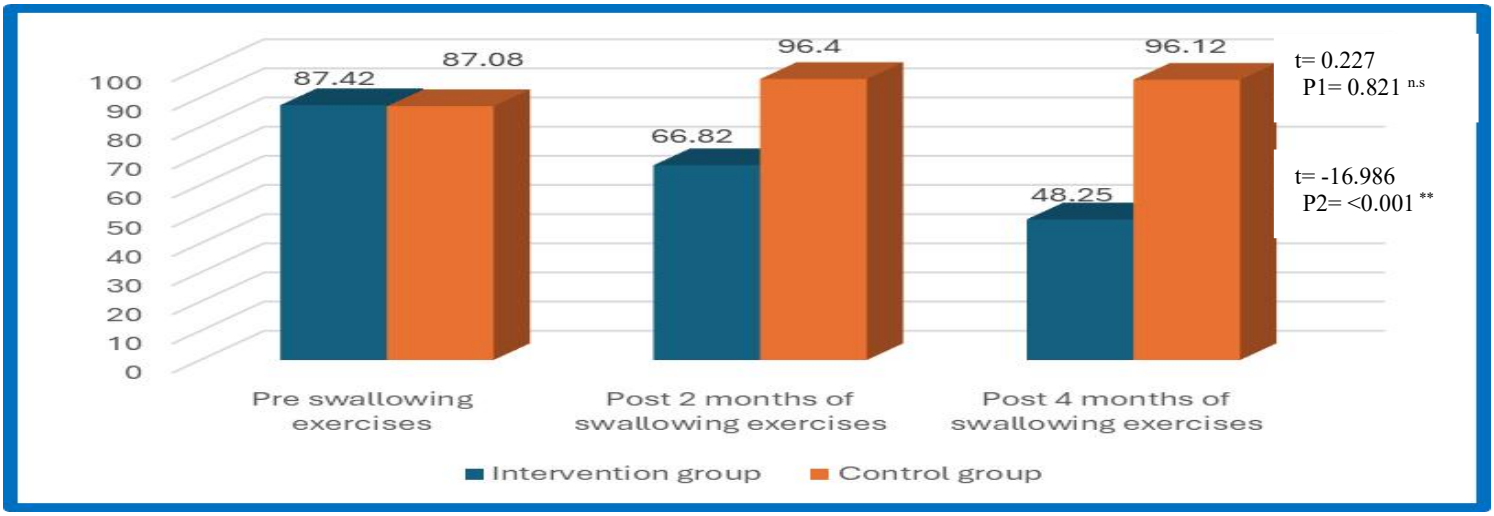
*(t) independent t test* *Not significant (p > 0.05)* *** Highly significant (p ≤ 0.001)*

*(!) Difference between intervention and control groups pre swallowing exercises*

*(2) Difference between intervention and control groups post 2 months of swallowing exercises*

*(3) Difference between intervention and control groups post 4 months of swallowing exercise*

**Figure 3 Comparison between total mean score of the studied groups regarding quality of life aspects and symptoms throughout phases of swallowing exercises implementation phases(n=80)**




*(t) independent t test* *Not significant (p > 0.05)* *** Highly significant (p ≤ 0.001)*
*(!) Difference between intervention and control groups pre swallowing exercises*
*(2) Difference between intervention and control groups post 2 months of swallowing exercises*
*(3) Difference between intervention and control groups post 4 months of swallowing exercises*

**Table 6 Correlation between swallowing disturbance, dysphagia handicap and quality of life among studied groups throughout swallowing exercises implementation phases, (n= 80).**

t= -35.211
P3= <0.001 **

| r-p / Variables | | | Pre swallowing exercises | | Two months post swallowing exercises | | Four mont swallowing exercises | |
|---|---|---|---|---|---|---|---|---|
| | | | Total swallowing disturbance | Total quality of life | Total swallowing disturbance | Total quality of life | Total swallowing disturbance | Total quality of life |
| **Total swallowing disturbance** | Study group | **R** | - | 0.663 | - | 0.615 | - | 0.519 |
| | | **p** | | <0.001** | | <0.001** | | 0.001** |
| | Control group | **R** | - | 0.682 | - | 0.492 | - | 0.866 |
| | | **P** | | 0.001** | | 0.001** | | <0.001** |
| **Total dysphagia handicap** | Study group | **R** | 0.546 | -0.017 | 0.635 | -0.556 | 0.676 | -0.649 |
| | | **P** | <0.001** | 0.921 n.s | <0.001** | <0.001** | <0.001** | <0.001** |
| | Control group | **R** | -0.338 | -0.354 | 0.304 | -0.821 | 0.674 | -0.720 |
| | | **P** | 0.033* | 0.025* | 0.056 n.s | <0.001** | <0.001** | <0.001** |
| **Total quality of life** | Study group | **R** | 0.663 | - | 0.615 | - | 0.519 | - |
| | | **P** | <0.001** | | <0.001** | | 0.001** | |
| | Control group | **R** | 0.682 | - | 0.492 | - | 0.866 | - |
| | | **P** | 0.001** | | 0.001** | | <0.001** | |

*Not significant (p > 0.05)* *(*) Statistically Significant at ≤0.05* ** *Highly significant (p ≤ 0.001*

## Discussion

Dysphagia is one of the most prevalent complications among patients with head and neck cancer **(Petersson, Finizia, & Tuomi, 2021).** Patients who experience dysphasia may experience severe morbidity, higher mortality, and a lower quality of life. It is crucial to make sure that patients have head and neck cancer undergo thorough and efficient swallowing interventions (**Strüder et al., 2023).** Exercises that strengthen or increase the pharyngeal and oral musculature's range of motion as part of a swallow intervention can help with swallow maintenance or rehabilitation. **(Greco et al., 2018)**. It entails the mendelssohn maneuver, the super supraglottic swallowing technique, the two tongue base retraction exercise, and the effortful swallowing exercise. (**François et al., 2019)**.

According to recent research, doing swallowing exercises before, during, or after radiation therapy may help with these problems and improve patient outcomes (**Nutting et al., 2023**). Therefore, the aim of the current study was to explore the effectiveness of swallowing exercises in enhancing dysphagia and quality of life among head and neck cancer Patients.

The findings of the current study reveal a non-statistically significant difference between the study and control group regarding their demographic and medical history indicating sample homogeneity. Considering a more detailed view of the demographic. Nearly to half of the control and study groups with an age range of more than or equal fifty years with mean of age 45.70±8.68 and 45.93+9.23 respectively, the highest percent were male and married. These results could be explained by the biological pathways linking aging and cancer, the strong correlation between age and cancer incidence, and the prediction that cancer will become a significant problem as the population ages. These findings are matched with a previous investigation as **Hajd et al. (2019),** who studied swallowing exercises during treatment of head and neck cancer and found that the majority of their sample was over fifty. And also, agree with **Mohammed, et al., (2022)** whose study was about swallowing exercises program effect on head and neck cancer patients.

The present study's findings were consistent with an Egyptian study by **Elkader et al., (2022),** about nursing instructions impact on head and neck cancer patients' outcomes, who noted that among the study and control groups' mean patient ages were 51.5 ± 10.9 and 51.8 ± 10.6 years, respectively, and that more than two thirds of the control group's members were males. According to **Samuel et al., (2019)** study of the effectiveness of rehabilitation exercises on functional capacity and quality of life for patients with head and neck cancer, the majority of patients in both groups were males, with the mean age of the patients among the exercise group was 52.76 ± 9.65 and among the control group was 52.81 ± 10.48. A study done by **(Siegel et al., 2021)** agreed that males are more than twice as likely to develop HNC as females, also are more commonly diagnosed in adults over the age of fifty than in younger people **(Shrestha et al., 2023)** emphasized that the high prevalence of HNC is between males than females, attributed to the greater incidence of established risk factors such as alcohol consumption and tobacco use among males. This result was in line with **Abdel Gawad et al., (2020)** finding who clarified that highest percentage of patients in both groups were married.

Regarding occupation, nearly half of study group patients and half of control group patients were employees. The current study's results appear to be matched with those of **Mohammed et al., (2022),** who reported nearly more than one third of the study and control groups were employees. **Abdel Gawad et al., (2020),** who found that workers patients made up the majority of both groups. As for residency, the current study finds that the highest percent of the study control and the study group lived in urban areas. Pertaining to the educational attainment, the current study reveals that the one third of both groups were Intermediate qualification. Which is matched to some extent with **Mohammed et al., (2022)** study findings who reported that two thirds of the studied sample' were educated and disagreed with **Conway et al., (2015)** study who found that increased risk of head and neck cancer linked with low educational level. This result interpreted as the fact that more than half of the current study subjects resides in urban areas where there is emphasis on education and a greater availability of resources and universities. This runs counter to the findings of **Omar et al., (2022),** which revealed; the highest percent of patients were not work and were from rural areas.

Based on the findings of the current study, laryngeal and hypolaryngeal cancer affected more than half of patients among the control and the study group. This finding is corroborated by the finding of **Omar et al., (2022)** who found that majority of the patients under study had internal neck tumors (larynx tumors). While **El Din et al., (2014)** finding was concurred with the same results, indicating that the larynx was the most frequently

affected cancer site between the patient group concerning medical diagnosis.

According to the findings of the study, more than half of the patients among the study and control group had confirmed diagnosis of head and neck cancer within less than one year of the illness's onset. This was matched with the findings of **Nayak et al., (2019)**, which showed that the majority of the subjects experienced illness for two to six months. According to duration of dysphagia approximately half and nearly to half of the study and control group had dysphagia from more than 1 to less than or equal 3 months, this could be attributed to methodological concern related to the included criteria of the current study. This was in line with findings of a research conducted by **Ahmed, F., et al., (2023)** and revealed, majority of participants in their study did nt' have a history of the disease in their families. This was corroborated in a study by **Abdel Gawad et al., (2020**), revealed that over two thirds of patients in both groups had no family history of cancer.

Reference to chronic diseases about one third of the patients had diabetes mellitus. It is worth noting that there was no statistically significant difference among the study group related to medical data demonstrating homogeneity of the study and control group. Also, **Zedan et al., (2023)** showed more than one third of studied group had past medical problem with diabetes. This finding not matched with **Sayed et al., (2020)** who showed that less than half of study and control group had past medical problem with hypertension.

When comparing the study and control groups based on total knowledge mean scores, it is clear that the two groups experienced the majority had unsatisfactory knowledge related head and neck cancer before swallowing exercise implementation. While the majority of intervention group had satisfactory level of knowledge after 2 and four months of swallowing exercise implementation. Therefore, educational program must be provided for patients receiving treatment to increase their information **(Dunberger & Bergmark 2016). Support to the first research hypotheses**. These findings were in line with **(Shepard & Kelvin, 2014)** study which revealed that understanding of disease process, side effect, plans of the treatment by the patients and their families is a crucial element. These findings were agreed with **Kisuya et al., (2015**) who revealed improvement in the level of knowledge among patients with cancer post providing educational program.

When comparing the study and control groups based on swallowing disturbance mean scores, it is clear that the two groups experienced frequent swallowing disturbances pre swallowing exercise, confirming that there are no differences at all between the study and control groups. Nevertheless, after two and four months of applying the swallowing exercises by the study groups, decrease in mean score (improved) with statistically significant differences were recorded between the control and swallowing exercise groups. These findings demonstrated that the study groups exhibited improvements in swallowing disturbances. **Lending support to the second research hypotheses.** The researchers claimed this improvement in swallowing function in the study groups to the fact that swallowing exercises strengthen and enhance synchronization between nerves and muscles involved in the swallowing process.

A study by **Yasaroglu & Demir, (2023)** was in line with the current finding which stated that swallowing exercises can strengthen pharyngeal wall contractions. **Zedan et al., (2023)** were in line with these findings and reported an improvement in swallowing function between study and control groups after performing swallowing exercises benefiting study group and this may be related to that Masako and supraglottic exercises strengthen the initiation of pharyngeal phase and enhance swallowing functions. Furthermore, swallowing exercise training, which included training of the esophagus, tongue and oral muscle group to improve oral intake and swallowing without difficulty, in contrast to control group.

Additionally, **Omar et al., (2022)** provided support for this outcome by reporting a decrease in swallowing difficulties following the implementation of swallowing exercises. Moreover, these results confirmed by **Malone, (2021) and McCarty & Chao, (2021)** who reported that swallowing exercises strengthened pharyngeal wall contraction, compared to control group. Conversely, **Peng et al., (2015)** showed no significant differences among pre and post treatment of the swallowing function between patients who perform swallowing exercises, while patients who did not perform the exercises revealed low in their swallowing functions. This discrepancy can be ascribed to the degree of patient adherence to the exercise regimen and other methodological variations. This is confirmed by **Hajdú et al., (2021)** perspective, who emphasized on the way to teach the exercise which has a positive effect on patients

to perform the exercise and consequently the outcome.

To shed the light on the dysphagia handicapping related physical, functional and emotional here was no statistically significant difference among the control and swallowing exercises groups prior of applying swallowing exercises. While showed statistically significant differences in mean score of physical, functional and emotional aspects of dysphagia, between control and swallowing exercise groups at the second and fourth months of applying swallowing exercises. The researchers hypothesized that the swallowing exercises' aptitude to improve the coordinated movement of the larynx, hyoid bone, and pharynx—thereby making swallowing easier—may be the reason for the noted improvement in physical issues associated with dysphagia. Additionally, these exercises may lessen airway blockage during pharyngeal swallowing. This improvement in physical and functional aspects are inflecting in the improvement of emotional aspects **Lending supported to the third research hypotheses.** This coincides with **Gomah Yousef et al., (2020)** who declared that swallowing exercises had a positive effect on dysphagia severity and improving the swallowing functions between cerebrovascular stroke patients.

**Petersson et al., (2023)** findings were partially in a harmony with the current study as their studied group showed improvements during 8 weeks of follow-up, with statistical significant improvements of the functional and emotional domains. The findings of a study done by **Constantinescu et al., (2021)** related to **the a**dherence of head and neck cancer patients to swallowing therapy at home using mobile system, which showed significantly improved of the composite, physical and emotional.

Regarding quality-of-life, there was a statistically significant difference between study and control group at post two and four months, as study group experienced improvement of all items of quality of life after performing of swallowing exercises compared to control group. These findings might be due to patients' adherence to the swallowing exercises program, the educational booklet, illustrated pictures, researchers' supervision and phone calls for follow-up, all were crucial elements in improving patients' quality-of-life. This is supported by multiple studies that found a significant differences between the study and the comparison group at the middle and long-term outcomes. **Thus, the fourth hypothesis is supported.** The finding of a study done by **Carmignani et al., (2018),** who also consistent with **Abdel Gawad et al., (2020)** findings, reported a significant improvement among the study group's overall quality of life at the third week following the education compared to the control group.

The present study is supported by the finding of **Kumar et al., (2015),** who revealed that the study group's quality of life (QOL) was statistically higher than that of the control group. They also found that the study group's patients had less fibrosis in their swallowing muscles and could chew a wider variety of foods, which improved their sense of satisfaction and self-worth. **Patterson & Lawton, (2023)** added that treatment response and quality of life may be enhanced by early intervention as the study's participants were hospitalized for the first week after receiving a new diagnosis of head and neck cancer.

**Banda et al., (2021)** on other hand Swallowing exercises showed non significant impacts on aspiration risk and all QoL variables, according to their systematic study, which contradicts the current findings. On the same wavelength. **Barot et al., (2023)** showed that the Masako and supraglottic movements enhance pharyngeal swallowing by improving pharyngeal constriction and airway blockage as well as pharyngeal muscle activity.

Concerning correlation between total swallowing disturbance and total quality of life, there were highly significant correlation pre swallowing exercises program and post two and four months of swallowing exercises in the study and control group, these finding could be explained as implementing swallowing exercises program can improve dysphagia and consequently quality of life as they positively correlated. This finding in the same line with **Kim, (2018)** who discovered that the overall score of the SWAL-QOL outcome and the total functional dysphagia scale had a strong inverse connection.

Additionally, this conclusion is consistent with **Hong & Yoo's (2017)** findings showing the swallowing function and QOL are significantly correlated. These findings suggested that QOL rose when swallowing function was improved. Moreover, the current study revealed. The results of current study were consistent with those of **Perry et al. (2016),** who revealed that pretreatment swallowing exercises could improve the quality of life for patients with HNC by increasing physiologic reserve, decreasing atrophy and delaying fibrosis.

**Conclusion:** Statistically significant differences regarding knowledge were recorded between the control and swallowing exercise groups at immediate post program and post four months. In addition, the study

findings demonstrated that the study groups exhibited significant decline in swallowing disturbances and dysphagia handicap as well as statistical significant improvement in their quality of life during the second and fourth month of intervention.

**Recommendations:**

**From the previously mentioned conclusion, the following recommendations could be inferred:**

- Arranging seminars to educate patients who have head and neck cancer and receive chemotherapy or radiotherapy about the value of preventative swallowing exercises and how to perform for treating dysphagia.
- Conducting a study to assess educational needs of oncology patients regarding swallowing exercises.
- Carrying out a further longitudinal investigation to assess how various swallowing exercises affect dysphagia.
- Repeating this study on a larger sample from different geographic distribution for generalization of results.
- Educational program must be provided for patients receiving treatment to increase their information

## Limitation of the study

There was no limitation of the study

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