

## Effectiveness of Prophylactic Swallowing Exercise on Dysphagia and Quality of Life among Head and Neck Cancer Patients Receiving Chemo-Radiotherapy

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### 1.ABSTRACT

**Background:** Dysphagia is one of the most frequent side effects of chemo-radiotherapy for head and neck cancer, which has an adverse influence on the quality of life and health of survivors. **Aim:** This study aimed to evaluate the effectiveness of prophylactic swallowing exercise on dysphagia and quality of life among patients with head and neck cancer receiving chemo-radiotherapy. **Method:** A quasi-experimental research approach was conducted in radiotherapy department at Mansoura Nuclear Medicine Unit. **Sample:** A purposive sample of 60 head and neck cancer patients undergoing chemo- radiotherapy, was divided into two matched groups; study group and control group. Prophylactic swallowing exercise initiated before the start of chemo-radiotherapy and continued throughout the duration of their chemo-radiotherapy. **Tools:** A structured Interview Questionnaire, (EORTC) Quality-of-Life Questionnaire (QLQ-C30) and its Head and Neck Cancer Module (QLQH& N35) and Functional Oral Intake Scale (FOIS). **Results:** Head and neck cancer patients undergoing chemo-radiotherapy who received swallowing exercise experienced less dysphagia and improved quality of life compared to whom received routine care as there was a highly statistically significant differences between studied groups ( $p < 0.001$ ). **Conclusion:** Prophylactic swallowing exercise had a positive effect on dysphagia and quality of life in head and neck cancer patients undergoing chemo- radiotherapy. **Recommendation:** Head and neck cancer patients undergoing chemo- radiotherapy should be encouraged to perform the prophylactic swallowing exercise before and along the period of chemo-radiotherapy.

**Keywords:** Chemo-radiotherapy, Dysphagia, Head and Neck Cancer, Swallowing Exercise.

### 2.Introduction

One of the most prevalent types of cancer in the world is head and neck cancer (HNC) (Li et al., 2021). It is a diverse group of cancers that develop on the mucosal surfaces of the nose, mouth, oropharynx, larynx, and hypopharynx (Chen et al., 2020). Concurrent chemo-radiotherapy is the best method of treating head and neck cancer (Tan, Satar & Majid, 2022). The majority of head and neck cancer patients receiving chemo-radiotherapy experience considerable short- and long-term adverse effects (Brook, 2020). Acutely and even after treatment is over, dysphagia is one of the most frequent adverse effects in individuals receiving chemoradiotherapy.

Head and neck cancer patients who are undergoing chemo-radiotherapy treatment experience abnormalities in swallowing, which negatively impacts quality of life (Janaki, Lavanya & Prathyush, 2017). Despite advancements in treatment, 38% to 46% of people have dysphagia (Hutcheson et al., 2017). There is an urgent need for solutions to prevent, decrease, and alleviate swallowing difficulties due to the significant

negative effects of dysphagia on morbidity, mortality, and quality of life (Wells & King, 2017).

Recent recommendations for an important intervention for dysphagia in patients after chemo-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 CRT (Furuie et al., 2019). Prophylactic exercise is given to the patient to perform both during and after cancer treatment. These exercises may be intended to increase range of motion or 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 (Pickens, 2019). Exercises to prevent swallowing problems include the Mendelssohn Maneuver, the Super Supraglottic Swallow Technique, the Effortful Swallow, and the Two Tongue Base Retraction Exercises (Carrion et al., 2018).

#### 2.1 Significance of the study:

In the world, head and neck malignancies are the sixth most frequent type of cancer

(Vigneswaran, & Williams, 2014). It is a widespread and complex illness that places a heavy financial strain on society, healthcare organizations, and sufferers (De Souza et al., 2014). They caused an estimated 453,307 cancer-related deaths and 887,649 new instances of cancer worldwide in 2018 (Bray et al., 2018). Depending on the disease's stage, head and neck cancer treatment can be quite difficult. Chemo-radiation therapy patients are vulnerable to a variety of short- and long-term problems, which have a negative impact on their health and quality of life (Hameed, Zafar & Ghafoor, 2018). One of the top five side effects of chemo-radiotherapy for patients with head and neck cancer is dysphagia, and it can linger for a very long time (De Felice et al., 2018). Despite advancements in treatment, 38% to 46% of people have dysphagia (Hutcheson et al., 2017). The medical effects, which can potentially be fatal (e.g., dependence on a feeding tube, starvation, aspiration pneumonia), have a significant negative influence on everyday life and health-related quality of life (QOL) (Govender, Smith, Gardner, Barratt & Taylor, 2017). These negative effects and the high prevalence of swallowing issues among HNC patients highlight how crucial it is to avoid, monitor, and treat this issue (Baudeflet et al., 2020).

## 2.2 Aim of the study

The aim of this study was to evaluate the effect of prophylactic swallowing exercise on dysphagia and quality of life among patients with head and neck cancer receiving chemo-radiotherapy.

## 2.3 Study Hypotheses

H1: Swallowing exercises will have a significant positive effect on reducing dysphagia among patients with head and neck cancer receiving chemo-radiotherapy.

H2: Swallowing exercises will have a significant positive effect on improve quality of life among patients with head and neck cancer receiving chemo-radiotherapy

## 3. Method

### 3.1 Study Design:

A quasi-experimental research design was conducted to carry out this study.

### 3.2 Setting:

This study was conducted in radiotherapy department at Mansoura Nuclear Medicine Unit.

### 3.3 Study Sample.

A purposive sample of 60 head and neck cancer patient (intervention group (n=30) and control group (n=30) were enrolled in the present

trial. Study included patients aged between 20-60 years, both genders, patients receiving chemo-radiotherapy and patients having a history of head and neck cancer, those who had received previous radiation therapy for head and neck cancer, and those who had dysphagia from a reason other than cancer were not included.

### 3.4 Tools of data collection:

In the study, three instruments were utilized to gather relevant data in the following ways:

#### Tool I: A structured interview Questionnaire:

The researcher developed this tool after studying pertinent literature (Charters & Clark, 2021; Hajdú, Wessel, Dalton, Eskildsen & Johansen, 2021; Hajdú et al., 2019; Kotz et al., 2012), it aimed to assess the patient's demographic data and clinical health status at the time of admission to radiological department. This tool consists of two main parts:

#### Part 1: Patient's Demographic Data:

The patients' private information was covered in this section, such as their age, gender, marital status, place of residence, degree of education, line of work, and smoking habits.

#### Part 2: Health Relevant Data:

This part was focused on patient's present medical history (medical diagnosis, primary site of tumor, tumor stage, data related to chemo-radiotherapy such as: dose, duration of treatment and number of sessions per week, and patient's past history (past medical problems, past surgical history) and family history of head and neck cancer.

#### Tool II: (EORTC) Quality-of-Life Questionnaire (QLQ-C30) and its Head and Neck Cancer Module (QLQH& N35) (Bjordal et al., 1999).

For the evaluation of health-related quality of life in clinical trials of patients with head and neck cancer before, during, and after treatment with radiotherapy, surgery, or chemotherapy, the QLQ-H&N35 in conjunction with the QLQ-C30 is a reliable tool. It includes 35 questions totaling 7 multiple-item symptom scales for pain, swallowing capacity, taste/smell, speech, social eating, and sexuality. It also includes 11 single-item scales for symptoms related to the teeth, mouth opening, dry mouth, sticky saliva, coughing, feeling unwell, using painkillers or nutritional supplements, using a feeding tube, and weight loss or gain.

### **Scoring:**

The scale comprises 35 items. Items 1 to 30 are scored on four-point Likert-type categorical scales (“not at all,” “a little,” “quite a bit,” “very much”). The answers to items 31 through 35 are in a “no/yes” format. The scores are converted into 0-to-100 scales, with a high score indicating a high level of symptoms or issues, in a manner similar to that used to score the QLQ-single C30's items and symptom scales.

### **Tool (III): Functional Oral Intake Scale (FOIS).**

The functional oral intake scale was developed by Crary et al. (2005) as a tool to objectively assess and track patients with neurogenic dysphagia's range of oral intake. It has very high reliability, validity, and sensitivity to change. It uses a seven-tier ordinal scale to rate oral intake of meals and liquids.

### **3.5 Content Validity:**

Tools were revised by a panel of seven experts; one expert at Rehabilitation and Rheumatology Department at Faculty of Medicine Mansoura University, one expert from Critical Care Nursing at Faculty of Nursing Mansoura University, one expert from Geriatric Field Nursing at Faculty of Nursing Mansoura University, as well as one expert from Community Health Nursing at Mansoura University and there are three experts at Medical- Surgical Nursing at Faculty of Nursing Mansoura University who reviewed the tools to test the study tools for content validity, completeness, feasibility and clarify of the items.

### **3.6 Reliability:**

Reliability was tested by using Cronbach's Coefficient Alpha test. The coefficient value for tool (II) was reliable as 0.893, and coefficient value of tool (III) was reliable as 0.923.

**3.7A pilot study:** a pilot study was conducted on six patients, or 10% of the study sample to ascertain the viability, objectivity, clarity, and applicability of the study tools, to identify potential difficulties that might emerge during the application of the study, and to gauge the time needed for data collection. As a result, any required adjustments were made, and the participants from the pilot study were not included in the main investigation.

### **3.8 Data collection process:**

**This study was conducted in three phases:**

#### **Phase I: Preparatory phase:**

Ethical approval were obtained from Research Scientific Ethical Committee of Faculty of

Nursing Mansoura University. An official permission to conduct the study was obtained from Directors of Nuclear Medicine Hospital affiliated to Mansoura University Hospital, Egypt. Oral informed consent were obtained from patients to participate in the study after explaining the purpose of the study and confidentiality was preserved. The researcher reviewed the recent related literature and theoretical knowledge of various aspects of this study in order to develop the appropriate tools for data collection and prophylactic swallowing exercises program. Session plan and colored booklet with simple Arabic language were developed by the researcher after reviewing recent literature.

Once the necessary approval granted to proceed with the proposed study, head and neck cancer patients who met sampling criteria and accepted to participate in the study were individually interviewed. The researcher was available at the previously mentioned setting 4-5 days per week from 10:00 am to 3:00 pm. until all participants were interviewed. The researcher collected data over a period of about 9 months from June 26, 2021 to March 23, 2022.

#### **Phase II: Implementation phase:**

During this phase, an initial assessment of both groups were carried out before implementing prophylactic swallowing exercises to obtain baseline data using the prepared study tools (**Tool I, II, III**). After baseline assessment, based on the participants assessment needs, the program were planned and started for intervention group, each participant received individualized training sessions. Before chemo-radiation therapy (CRT) began, the preventive swallowing exercises were started, and patients were told to keep doing these particular swallowing exercises throughout their CRT. The total duration of training for each session lasted for an average of 30 mins, during this session the researcher used simple, clear and easy language to be understood by the patients.

#### **Swallowing exercises techniques:**

- Intervention were prophylactic swallowing exercises that included a set of five exercises given to the patient including:
  1. **The Effortful Swallow Maneuver.** This maneuver improves bolus clearance from the valleculae. It was used as a compensatory and remedial approach.
  2. **2&3. Tongue Base Retraction Exercises (Tongue Hold Maneuver, Tongue Retraction Maneuver).** Both enhance tongue

base to posterior pharyngeal wall contact, which enhances bolus propulsion into the pharynx.

3. **The Super Supraglottic Swallow Maneuver.** It enhances the speed and extent of laryngeal elevation and makes it easier to close the airway entry before and during the swallow.
  4. **The Mendelssohn Maneuver.** This maneuver increased swallowing performance and triggered and strengthened the pharyngeal phase initiation. Swallowing training typically involves exercising the oral muscle group, tongue, and esophagus to increase oral and esophageal muscle strength.
- Intervention patients were instructed to carry out the aforementioned exercises. Each exercise should be performed three times daily for a total of ten reps.
  - All training sessions and assessments (pre, post and follow up) took place in the radiological department.
  - To further promote adherence to the swallowing exercise routine and to give a record of patients who were unable to complete it, patients were advised to keep a daily performance diary.
  - In order to increase participant retention, patients underwent a weekly supervised session. Patients who did not show up were contacted by phone.
  - Each patient was provided with a booklet consisting of exercises to be followed at home with instructions and pictorial illustrations to attract their attention and to be as a reference to review and remember instructions while performing exercises at home. At the end of each session, a brief summary emphasized on the important points was given to the patients and they were encouraged to ask questions, each patient was given his or her next appointment date.
  - Regarding Control Group: The patients received the routine hospital nursing care.

#### **Phase III: Evaluation phase:**

After completion of prophylactic swallowing exercises, the researcher evaluated the effect of prophylactic swallowing exercises on intervention group compared to control group using (Tool II, III) after one month after implementation of swallowing therapy and three months later. During this period (between post and follow up

assessment), the patient adherence to home exercise was ensured either by direct routine follow up at hospital or by telephone.

#### **3.9 Ethical considerations and human rights:**

Any and all pertinent factors will be taken into account. Each participant in the study will be fully informed about the nature, purpose, advantages, risks, compensation, and alternative treatments before giving their verbal agreement. The researcher will explain that involvement is wholly voluntary. Participants will be made aware that they can withdraw from the study at any time and that doing so won't have an impact on their care. They also have the freedom to refuse to participate in the study. Throughout the entire study, anonymity, privacy, safety, and confidentiality will be guaranteed.

#### **3.10 Statistical analysis:**

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean  $\pm$  standard deviation (SD). Categorical data were expressed in number and percentage. One-way analysis of variance (ANOVA) test was used for comparison among more than two for variables with continuous data. Chi-square test was used for comparison of variables with categorical data. Correlation co-efficient test was used to test for correlations between two variables with continuous data. The reliability (internal consistency) test for the questionnaires used in the study was calculated. Statistical significance was set at  $p < 0.05$ .

#### **4. Results:**

Table (1) showed that, a total of (60) patients were enrolled in the current study. More than two thirds (66.7% vs. 63.3%) of study and control group respectively were ranged between 50 to 60 years. with their mean age was (51.8  $\pm$  5.7 and 51.2  $\pm$  5.3) for the study and control groups respectively. Regarding gender, more than two third (63.3%) of study group were male and more than half (53.3%) of control group were male. According to residence, (60.0%) of study group and (50.0%) of control group were live in urban. Concerning marital status, slightly less than three quarters (70.0%) of study group were married compared to two third (60.0%) of control group.

Concerning level of education, the table illustrated that, (36.7%) of study group and (43.3%) of control group graduated from secondary schools. As regards to occupation, (60.0%) of study group and (80.0%) of control group were working. In reference to smoking habits, more than half (56.7%

and 53.3%) of the study and control group respectively were smokers. No significant difference was detected between study and control group, where (p-value >0.05).

Table (2) showed that, more than one third (43.3%) of study group were suffering from nasopharyngeal cancer while in the control group also more than half (53.3%) were suffering from nasopharyngeal cancer. Regarding primary site of tumor, more than one third (43.3%) of

study group start cancer in pharynx while more than half (53.3%) of control group also start cancer in pharynx. According to tumor stage, about half (50.0% and 43.3%) of study and control group respectively had cancer at stage IV. Regarding radiotherapy as a treatment of cancer, one third (33.3%) of study group take radiation at dose 66 gy\33fx while slightly less than half (46.7%) of control group take radiation at dose 60gy\30fx. About three quarters of study and control group (70.0% and 80.0%) respectively take 5 sessions of radiotherapy per week. No significant difference was detected between two groups, where (p-value > 0.05).

The table also noticed that, the majority of study group had diabetes mellitus (33.3%) and hypertension (30.0%), in the control group also the majority of them had diabetes mellitus and hypertension (23.3% and 26.7%) respectively. Regarding family history of cancer, more than two third (66.7%) of study group have positive family history of cancer and two third (60.0%) of them were first degree of relatives while slightly less than half (46.7%) of control group have positive family history of cancer and more than half (57.1%) of them were second degree of relatives. No significant difference was detected between study and control group, where (p-value > 0.05).

Figure (1) revealed that, the mean score of quality-of-life questionnaire pre intervention was (30.9 ±2.7 & 31.2 ±3.2) for the study and control group respectively with no significant difference. In spite, at post intervention evaluation, a highly statistically significant difference was detected between both groups, where (p-value <0.001). While at follow up, both groups exhibited improvement but there was no significant difference between two groups, where (p-value >0.05).

Table (3) showed that, the majority (93.3%, 96.7%) of study and control group respectively were totally oral intake without restriction with no

statistically significant difference between study and control group pre intervention, where (p-value >0.05). Post intervention, more than two third (63.3%) of study group were totally oral intake with no restriction while more than two third (63.3%) of control group were totally oral intake with multiple consistencies, but needs special preparations, such as soft with thickened fluid or puree with thin liquids, there was highly statistically significant difference between study and control group where (p-value <0.001). In follow up test, about two thirds (70.0%) of study group were totally oral intake with no restriction while more than two third (63.3%) of control group were totally oral intake with diet with special preparations and limitation on specific food items due to swallowing difficulties with statistically significant difference between study and control group where (p-value 0.009).

Table (4) showed correlation between quality-of-life questioner and functional oral intake scale. According to study group, there was statistically significant difference at pre, post intervention and follow up where (p-value 0.003, 0.007, 0.013) respectively. According to control group there was statistically significant difference at pre, post intervention and follow

### **5. Discussion:**

Dysphagia is one of the most prevalent side effects among patients with head and neck cancer (Pettersson, Finizia, & Tuomi, 2021). Patients who experience dysphagia may experience severe morbidity, higher mortality, and a lower quality of life. Therefore, it is crucial to make sure that patients with head and neck cancer undergo thorough and efficient swallowing interventions (Hussain, Ahmad, Yahaya, Wan Puteh & Mohd Ibrahim, 2021). 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. 2018 (Greco et al.). It entails the Mendelsohn Maneuver, the Super Supraglottic Swallow Technique, the Two Tongue Base Retraction Exercises, and the Effortful Swallow Exercise. (François, Fiack, Deslanges, & Petrov, 2019).

According to demographic information, the majority of head and neck cancer patients were in their fifth decade of life, the study's findings show. These findings are consistent with a previous investigation by Hajd et al. (2019), which looked at patients with head and neck cancer having chemoradiotherapy treatment and found that the

majority of their research sample was over fifty. And also, agree with Mohammed, Safwat, Fathi & Mahmoud, (2022) whose study was about “Effect of Swallowing Exercises Program on Patients with Head and Neck Cancer”. These findings may be due to the molecular pathways of aging and cancer being intertwined, cancer incidence is closely related to age, and cancer can be expected to become a major challenge as the aging population grows.

However, this finding not coinciding with the study done by **Hajdú et al., (2021)** on head and neck cancer patients that received swallowing exercise during treatment which found that the mean age was higher. Such difference between the current finding and other findings may be due to strict inclusion criteria and exclusion of age group more than 60 years from the current study which included in other studies.

Our results also revealed that regarding gender, head and neck cancer was more common in males than females in both studied groups. This consistent with the study conducted by Tuomi et al., (2022) which found that males were more prevalent than females in their study. Besides the study of Mohammed et al., (2022) which found that more than two thirds of head and neck cancer patients were male. In the researchers view, this is due to the fact that one of the main factors causing head and neck cancer is smoking, and in Egypt smoking is more prevalent in male than female so males are more risk to head and neck cancer than females. This finding inconsistent with the study conducted by Hamilton et al., (2022) who reported that the prevalence of head and neck cancer was more in females than males.

As regard to smoking habits, the current study demonstrated that more than half of patients with head and neck cancer were smokers. This finding is comparable with that of Hajd et al. (2019), who observed that the majority of patients with head and neck cancer smoked. Additionally, research by Pachuaue et al., (2022) and Hajd et al., (2021) showed a link between smoking and the chance of developing head and neck cancer.

Concerning medical diagnosis, the present study revealed that the majority of study and control group were suffering from nasopharyngeal cancer. This finding not in the same line with study conducted by Nocon et al., (2021) who found that high percent of head and neck cancer patients suffered from oropharyngeal cancer. From the researcher’s perspective, the incidence of cancer in another part of head and neck may be due to the

primary site of developing a tumor and interrelated factors such as genetic factors, hormonal factors and environmental factors.

According to primary site of tumor, high percent of study and control groups started tumor in pharynx. This finding in the same line with Cates, Evangelista & Belafsky, (2022) which assessed the effect of pretreatment dysphagia on post chemoradiation swallowing function in head and neck cancer and confirmed this result. This finding not consistent with finding of study done by Tuomi et al., (2022) which reported that nearly half of studied groups start tumor in tonsil.

Regarding treatment of cancer, the majority of studied groups take radiation at dose 66gy/33fx and 60gy/30fx. Similarly, to study by Ohba et al., (2016) who studied preservation

by doing preventative swallowing exercises on patients with advanced head and neck cancer, with findings that supported these findings. Conversely to the study conducted by Jeans et al., (2021) who found that high percent of head and neck cancer patientstake radiotherapy at dose 70 gy\35fx.

Regarding chemotherapy, the majority of studied groups take platinol as a chemotherapy. This finding consistent with Charters & Clark, (2021) who reported that high percent of studied groups take platinol as a chemotherapy. This may be related to as platinole the most commonly chemotherapy used because of its effective action.

Regarding past medical problems, more than one third of study group had past medical problem with diabetes, and more than one third of control group had no past medical problems. This finding not consistent with Sayed et al., 2020) who found that less than half of study and control group had past medical problem with hypertension.

According to the current study, both the study and control groups included a significant percentage of members with a positive family history of cancer. This finding is consistent with a study by Getz et al. (2017) that discovered that most people with head and neck cancer have a family history of the disease. Family history is one of the most well acknowledged risk factors for the development of cancer, thus this may be related to as People with a family history of cancer often have a two to three times higher chance of having cancer than people without a history of the disease.

Regarding quality-of-life, there was a statistically significant difference between study and control group at posttest and follow up, as study

group experienced improvement of all items of quality of life except sexuality after performing of swallowing exercises compared to control group. This finding in the same line with Brady, McSharry, Lawson & Regan, (2021) who discovered a statistically significant difference between the intervention and control groups as rehabilitation exercises helped to improve quality of life as reported by patients' post-treatment. Also, this in the same line with Hamdan, Abd Hamid & Leong Bin Abdullah, (2022) who found that there was a statistically significant improvement in all aspects of quality of life except sexuality.

This improvement between study and control group after performing swallowing exercises in favor of study group may be related to that swallowing exercises induce and strengthen the pharyngeal phase initiation and improve swallowing function, as well as swallowing training, which primarily includes training of the oral muscle group, tongue, and esophagus to enhance oral intake, so patients are able to eat in front of others without difficulty and can enjoy meal, in contrast to control group, according to study conducted by Zhang et al., (2021), strengthen throat and jaw muscles which lead to improve swallowing so that the discomfort and pain during swallowing that the patient feel relieved compared to control group and it also increase the strength and mobility of the muscles of larynx which it help in improve speech of patient and facilitate talking to others without problem than in control group. This supported by study conducted by Yang et al., (2021); François, Fiack, Deslanges & Petrov, (2019).

Moreover, these results confirmed by Malone, (2021) and McCarty & Chao, (2021) who reported that swallowing exercises strengthened pharyngeal wall contraction which assisted in eating and helped food to enter in upper esophageal sphincter and into the esophagus during swallow and also strengthened airway muscles and prior to and during swallowing, bringing the vocal folds together created a mechanical barrier to aspirated material that can be entered the airway down to below the true vocal folds and caused choking compared to control group. This also supported by study conducted by Mizuhashi & Koide, (2020) who reported that swallowing exercise stimulate the muscles around the salivary gland and the vagus nerve, thus promote salivary secretion and this help to decrease thickness of saliva and dryness of the mouth contrary to control group.

In this regard, Banda et al., (2021) who study swallowing exercises for head and neck cancer patients found no significant benefits immediately after the intervention for all domains of EORTC QLQ-CH&N-35. In the researcher's view, this discrepancy may be due to loss of adherence of subjects to swallowing exercise program and the adherence to exercise program is very important to achieve improved swallowing outcomes.

In relation to swallowing function of the studied groups, there was a statistically significant improvement in swallowing in study group compared to control group at posttest and follow up after performing swallowing exercises program. This finding agrees with Banda et al., (2021) who reported that swallowing exercises had significantly better effects on swallowing function in the experimental group compared with the control group, and also, in the same line with Greco et al., (2018). This may be related to as rehabilitation swallowing exercises had a significant positive effect on dysphagia or swallowing difficulties, this view supported by Gomah Yousef El-Deeb & Elsayed Rady, (2020). As swallowing exercises focused on strengthen muscles and enhancing synchronization between the nerves and muscles involved in swallowing, exercising swallowing muscles is the greatest strategy to improve your ability to swallow. This in the same line with Hajdú et al., (2021).

And also, it strengthened and lengthened the muscles responsible for protecting the airways and swallowing. It targets particular muscles or sets of muscles involved in swallowing, such as the respiratory muscle complex, hyolaryngeal complex, and oral musculature. This supported by study conducted by Krekeler, Rowe & Connor, (2021). This results not in the same line with Brady et al., (2021) who found that there was no statistically significant difference between the comparison and intervention groups in relation to swallowing function.

Concerning correlation between quality-of-life questioner total score and functional oral intake score, there was statistically significant correlation between them. 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. Additionally, because oral intake met fundamental human needs, it may be linked to QOL.

## 6. Conclusion

This study indicated that prophylactic swallowing exercises are a simple non-pharmacological and cost-effective method. From the findings of the present study, there was a significant improvement in dysphagia among the study group patients after performing prophylactic swallowing exercises as compared to control group patients who

received only routine care. So, it is concluded that prophylactic swallowing exercises has a positive effect on dysphagia in head and neck cancer patients undergoing chemo radiotherapy. From this point of view, head and neck cancer patients undergoing chemo radiotherapy can adopt swallowing exercises to manage dysphagia alongside other treatments to alleviate symptoms in head and neck cancer patients.

## 7. Recommendations:

In the light of the results and conclusion drawn from the present study, the following recommendations are proposed:

### For patients:

- Organizing workshops for head and neck cancer patients undergoing chemo-radiotherapy to teach them the importance of prophylactic swallowing exercises and how to practice it to manage dysphagia.
- Head and neck cancer patients should be encouraged to perform prophylactic swallowing exercises daily; this can be helped by providing them with an illustrated, colorful and simplified pamphlets.
- Designing a training program for nurses to raise their awareness regarding swallowing exercises program, which is very important part in the treatment process for patients with head and neck cancer

### Further research:

- The same study could be replicated on a large sample size of patients with a longer duration.

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**Table 1:** A frequency distribution of the studied groups regarding their demographic data (N=60)

	Study group (N=30)		Control group (N=30)		Chi-Square	
	N	%	N	%	X <sup>2</sup>	P
<b>Age (years)</b>						
40 < 50	10	33.3	11	36.7		
50 – 60	20	66.7	19	63.3	0.073	0.787
<b>Mean ±SD</b>	51.8 ±5.7		51.2 ±5.3		0.420	0.676
<b>Gender</b>						
Male	19	63.3	16	53.3		
Female	11	36.7	14	46.7	0.617	0.432
<b>Residence</b>						
Rural	12	40.0	15	50.0		
Urban	18	60.0	15	50.0	0.606	0.436
<b>Marital status</b>						
Married	21	70.0	18	60.0		
Widowed	3	10.0	4	13.3		
Divorced	6	20.0	8	26.7	0.659	0.719
<b>Education</b>						
Illiterate	6	20.0	6	20.0		
Read and write	5	16.7	6	20.0		
Secondary	11	36.7	13	43.3		
University	8	26.7	5	16.7	0.950	0.813
<b>Occupation</b>						
Working	18	60.0	24	80.0		
Not working	12	40.0	6	20.0	2.857	0.091
<b>Smoking habit</b>						
Smoking	17	56.7	16	53.3		
None	13	43.3	14	46.7	0.067	0.795

P: Probability.

\* Statistically significant if (p<0.05)

\*\* Highly significant if

(p<0.001) Statistical test used: Chi squared test (X<sup>2</sup>)

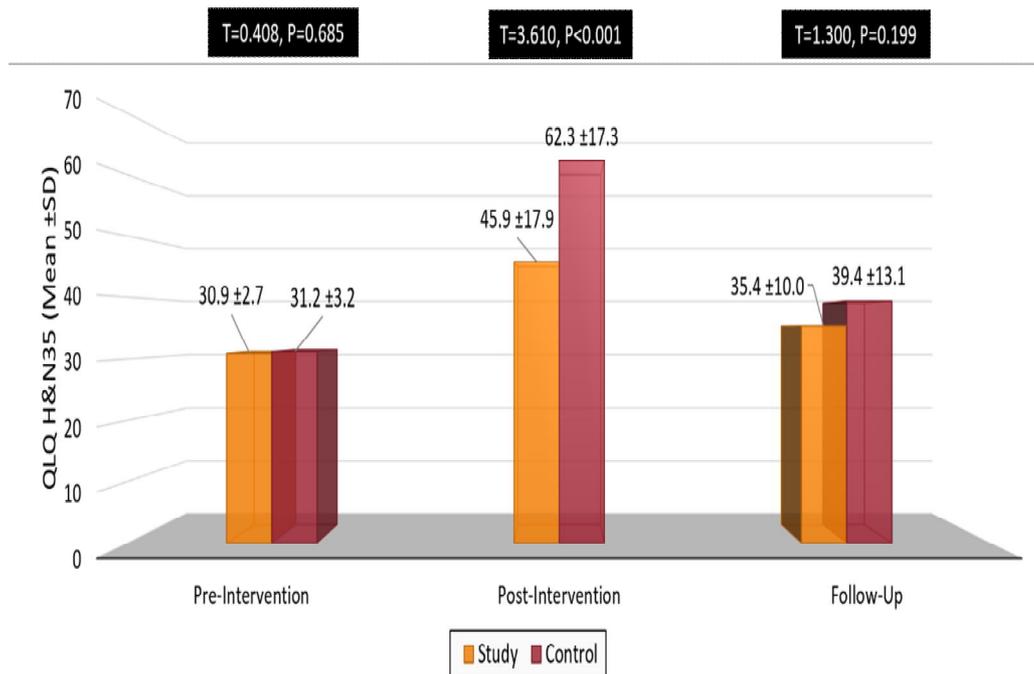
Table (2): A frequency distribution of the studied groups regarding their health relevant data (N=60)

	Study group (N=30)		Control group (N=30)		Chi-Square	
	N	%	N	%	$\chi^2$	P
<b>Medical diagnosis</b>						
Laryngeal and hyolaryngeal cancer	6	20.0	4	13.3		
Nasopharyngeal cancer	13	43.3	16	53.3		
Oral and oropharyngeal cancer	9	30.0	7	23.3		
Salivary gland cancer	2	6.7	3	10.0	3.389	0.335
<b>Primary site of tumor</b>						
Larynx	6	20.0	4	13.3		
Pharynx	13	43.3	16	53.3		
Oral cavity	9	30.0	7	23.3		
Salivary gland	2	6.7	3	10.0	2.535	0.468
<b>Tumor staging</b>						
Stage II	4	13.3	5	16.7		
Stage III	11	36.7	12	40.0		
Stage IV	15	50.0	13	43.3	2.355	0.502
<b>Treatment</b>						
<b>Radiotherapy</b>						
70gy \ 35fx	4	13.3	6	20.0		
60gy \ 30fx	9	30.0	14	46.7		
66gy \ 33fx	10	33.3	6	20.0		
44gy \ 22fx	7	23.3	4	13.3	3.305	0.347
<b>Number of sessions per week</b>						
4 session per week	7	23.3	2	6.7		
5 session per week	21	70.0	24	80.0		
6 session per week	2	6.7	4	13.3	3.644	0.162
<b>Chemotherapy</b>						
<b>Dosage</b>						
Platinol 40 mg\m2	7	23.3	10	33.3		
Platinol 50 mg\m2	8	26.7	11	36.7		
Platinol 60 mg\m2	15	50.0	9	30.0	2.503	0.286
<b>Duration</b>						
4 weeks	17	56.7	16	53.3		
5 weeks	11	36.7	8	26.7		
6 weeks	2	6.7	6	20.0	2.504	0.286
<b>Past medical problems</b>						
Hypertension	9	30.0	8	26.7		
Diabetes mellitus	10	33.3	7	23.3		
Heart diseases	4	13.3	1	3.3		
Renal diseases	0	0.0	3	10.0		
None	7	23.3	11	36.7	6.277	0.179
<b>Family history of cancer</b>						
Positive	20	66.7	14	46.7		
Negative	10	33.3	16	53.3	2.443	0.118
<b>Degree of consanguine of cancer</b>						
First degree	12	60.0	6	42.9		
Second degree	8	40.0	8	57.1	0.971	0.324

N.B/ - Gy. Gray, unit for absorbed radiation dose.- Fx. Fractions, dose of radiation.

P. Probability. \* Statistically significant if (p<0.05)  
used: Chi squared test ( $X^2$ )

\*\* Highly significant if (p<0.001)Statistical test



**Figure (1)** A comparison between study and control group regarding quality-of-life pre / post and at follow up.

N.B/ - QLQ H & N 35. Quality of life questionnaire-Head and Neck 35.

P. Probability. \* Statistically significant if (p<0.05) \*\* Highly significant if (p<0.001) Statistical test used: T- test.

**Table 3.** Comparing Functional Oral Intake levels (FOIS) between study and control groups pre / post and at follow up (N=60)

		Studygroup (N=30)		Controlgroup (N=30)			
FOIS Levels	Description	N	%	N	%		
<b>Pre-intervention</b>							
Level 6	Total oral intake (It's a diet with special preparation with Limitation on specific food items due to swallowing difficulty)	2	6.7	1	3.3		
Level 7	Total oral intake. No restriction	28	93.3	29	96.7	0.351	0.553
<b>Post-intervention</b>							
Level 4	Total oral intake, but of a single consistency, such as a pureed diet	0	0.0	7	23.3		
Level 5	Total oral intake with multiple consistencies, but needs special preparation, such as soft with thickened fluid or puree with thin liquids	0	0.0	19	63.3		
Level 6	Total oral intake (It's a diet with special preparation with Limitation on specific food items due to swallowing difficulty)	11	36.7	4	13.3		
Level 7	Total oral intake. No restriction	19	63.3	0	0.0	48.267	<0.001**
<b>Follow-Up (3 months later)</b>							
Level 6	Total oral intake (It's a diet with special preparation with Limitation on specific food items due to swallowing difficulty)	9	30.0	19	63.3		
Level 7	Total oral intake. No restriction	21	70.0	11	36.7	6.696	0.009*

N.B/ - FOIS. Functional oral intake scale

P. Probability. \* Statistically significant if (p<0.05) test used: Chi squared test ( X<sup>2</sup> )

\*\* Highly significant if (p<0.001) Statistically

**Table (4):** Correlation between Quality-of-Life total scores and Functional Oral Intake (FOISscores) (N=60)

	Study group (N=30)		Control group (N=30)	
	R	P	R	P
Pre-intervention	-0.526	0.003*	-0.378	0.040*
Post intervention	-0.484	0.007*	-0.384	0.036*
Follow-Up (3 months later)	-0.450	0.013*	-0.413	0.023*

P. Probability.                      \* Statistically significant if (p<0.05)                      \*\* Highly significant if (p<0.001)  
Statistical test used: correlation coefficient test