

Effect of Swallowing Exercises Program on Patients with Head and Neck Cancer

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Abstract

Background: Swallowing exercises can improve the swallowing function and minimize swallowing problems that may develop from head and neck cancer and its treatment **Aim:** The aim of this study was to assess the effect of swallowing exercises program on patients with head and neck cancer. **Design:** A quasi- experimental design used to achieve the aim of the current study. **Subjects:** Convenience sample of 30 adult patients with head and neck cancer. **Setting:** The study conducted at the oncology outpatient clinics affiliated to Fayoum University hospital, Cairo, Egypt. **Tools:** Three tools were used in the current study, I. Patients' interviewing questionnaire which composed of demographic characteristics, patients' medical data, and patients' knowledge regarding head and neck cancer and swallowing exercises, II. Sydney Swallowing Scale (SSS) self-report inventory, which measure symptomatic severity of swallowing difficulty III. Swallowing exercises assessment tool to assess the ability of head and neck cancer patients to practices swallowing exercises, **Results:** the mean age of the study sample was 38.76 ± 5.09 and 60.0% were males, 43.3% of patient diagnosed with tumor in the neck (larynx). There was high significant deference between patients knowledge pre and post swallowing exercises program implementation in all items include definition, causes, factors, signs and symptoms and managing of HNC with (p value =0.001). Finally there is weak positive correlation between total patients' level of knowledge and total performance of swallowing exercises at ($r =0.284$). **Conclusion:** based on findings of the current study, it could be concluded that: majority of the study patients had satisfactory level of total knowledge post swallowing exercises program. Meanwhile, there is significant relation among the studied patients in all items of swallowing Sydney scale (alleviate swallowing problem) post swallowing exercises program implementation. In addition to, there was a positive correlation between the total level of knowledge of the patients and the total performance of swallowing exercises at ($r=0.284$). There is a positive correlation between total patients' level of knowledge and the total swallowing scale of Sydney at ($r=0.401$). There is a positive correlation between total performance of swallowing exercise and total Sydney swallowing scale at ($r=0.375$). **Recommendations:** Continues update educational program about swallowing problems and swallowing exercises that should be designed for patients with head and neck cancer to improve their knowledge and prevention of potential complications.

Keywords: *Head and neck cancer& swallowing exercises program.*

Introduction

Cancers of the head and neck are malignant tumors categorized by the area of the head or neck in which they begin. These areas are described in the following regions (paranasal sinuses, oral cavity, salivary glands, pharynx and larynx) squamous cell carcinomas that arise from epithelial membranes of these regions, it is the most frequent malignant tumor of head and neck cancer (**Kotz et al., 2012**).

Alcohol and tobacco use including (smokeless tobacco, sometimes called “chewing tobacco” or “snuff”) are the two most important risk factors for head and neck cancers, especially cancers of the oral cavity, oropharynx, hypopharynx, and larynx. At least 75% of head and neck cancers are caused by tobacco and alcohol use. Other risk factors for cancers of the head and neck include the following: preserved or salted foods, poor oral hygiene, occupational exposure, radiation exposure, infection with the Epstein-Barr virus (**National Cancer Institute, USA, 2017**).

There are many symptoms affect the patients suffering from head and neck cancers may include a lump or a sore that does not heal, a sore throat that does not go away, difficulty in swallowing (dysphagia), and a change or hoarseness in the voice (**American cancer society, 2017**).

The treatment plan for patients who had diagnosed with head and neck cancer depends on a number of factors, including the exact location of the tumor, the stage of the cancer, and the person’s age and general health. Treatment for head and neck cancer can include surgery, radiation therapy, chemotherapy, targeted therapy, or a combination of treatments. Each treatment has negative impact on

overall health of those patients (**Moslemi, et al., 2016**).

Most of patients who receive chemo- radio therapy have significant side effect during treatment and for long time after recovery. Swallowing problem is one of undesirable side effect of chemo-radio therapy and is one of the main expected of diminished patients quality of life after treatment (**Amanat, Ahmed, Kazmi, and Aziz, 2017**). Dysphagia is unwanted symptom in head and neck cancer patients. Damage of swallowing function is causing malnutrition, dehydration, aspiration and pneumonia (**Shinn et al., 2013**).

Swallowing exercises can improve the swallowing function and help to maintain the ability to drink and eat and minimize swallowing problems that may develop from treatment until the patients needed to a feeding tube Nurse must be encourage to perform swallowing exercises every day to get over swallowing problems (**Lewin, 2014**).

Nurses are the best source of information for questions and concerns related to patients' medical problem, so, they should be aware of dealing with patients on head and neck cancer. The nurse involves in more frequent assessment to see if early detection of problem with proper consult for proper intervention. The nurse should be aware of sign of swallowing problems to help patients in doing swallowing exercises and having their food (**Kraaijenga et al., 2015**).

Significance of the study:

In 2015, head and neck cancers globally affected more than 5.5 million people (2.4 million mouth, 1.7 million throat, and 1.4 million larynx cancer), and it has caused over 379, 000 deaths (146,

000 mouth, 127, 400 throat, 105, 900 larynx cancer). Together, they are the seventh most-frequent cancer and the ninth most-frequent cause of death from cancer. In the United States, about 1% of people are affected at some point in their life, and males are affected twice as often as females (**National Cancer Institute, 2017**).

Head and Neck Cancer (HNC) have been studied in different regions of the world but little is known about its incidence patterns in the Middle East and Egypt. In Egypt, head and neck cancer represents about 17% of all malignant tumors (**Kamal, El Fetouh, Ahmed and Hegazy, 2014**). The total number of patients with head and neck cancer admitted to the oncology outpatient clinic of Fayoum University hospital were (40) during the year (2016) in (**Statistical Administration and Medical Records Department at oncology, 2017**). So that, assessing the effect of swallowing exercises on patients with head and neck cancer is very effective to identify their needs and improve their swallowing function.

Aim of the study

The aim of this study was to assess the effect of swallowing exercises program on patients with head and neck cancer through the following;

1. Assessing the patients' knowledge regarding head and neck cancer.
2. Assessing problems among patients with head and neck cancer.
3. Developing, implementing and evaluating the effect of swallowing exercises program.

Research hypothesis:

The current study hypothesized that; the implementation of the swallowing exercises program will lead to significant positive improvement in knowledge and will alleviate swallowing problems among patients with head and neck cancer.

Research Design:

A quasi- experimental design used to achieve the aim of the current study.

Setting:

The study was conducted at the oncology outpatient clinics affiliated to Fayoum University hospital. The hospital consists of five floors. Outpatient area located in the first floor. It consists of five rooms. Statistic and public relation room, follow-up 2 rooms, 2 rooms for treatment. The patients coming for receiving treatment from Saturday to Wednesday.

Subjects and Methods

A convenience sample of all available patients of (30) patient following at the oncology outpatient clinic affiliated to Fayoum university hospital.

Tools for data collection:

Tools for data collection: Three tools were used in current study:

1- Patients' interviewing questionnaire: This tool was developed and filled by the researcher in a simple Arabic. It was composed of three parts based on reviewing of relevant recent related literatures.

Part 1: Patients' demographic characteristics: It was used to assess

patients' demographic characteristics regarding age, gender, educational level, marital status, Place of residence, occupation and living status. It composed of seven end closed question.

Part II: Patients' Medical data:

It was used to collect the clinical data for patients with HNC.

It was included 18 closed ended questions divided into 7 questions regarding; (patient's Medical data) included 3 questions regarding weight, height and body mass index (kg/M²) and 4MCQ regarding smoking), as 3 questions regarding present history as (chief complain, therapeutic management, symptoms) and 4 questions regarding past medical history as (chronic illness, swallowing problems). Past surgical history (two MCQ) and family history (two MCQ)

Part III: Patients' knowledge regarding head and neck cancer This part used to assess patients' knowledge regarding head and neck cancer. Based on reviewing recent literature (Conway, et al., 2015), (Kamal, et al., 2014). It consisted of 18 statements and divided to two parts:

A- Part I: It included 10 statements to assess patient's knowledge regarding head and neck cancer include (definition, The prevalence of the disease, factors, signs& symptoms, diagnosis, method of treatment, side effect of treatment, dealing with side effect, precautions and suitable nutrition).

B- Part II: It included 8 statements to assess patient's knowledge regarding swallowing exercises include (difficulty swallowing, severity of difficulty swallowing, dealing with difficulty of swallowing, regarding

swallowing exercises, importance and goals, types, how to practice and practicing swallowing exercises before).

Scoring system: The total score for the second part which was concerned with patients' knowledge was 36 degrees, if the patient's response was "know" it was given two degree, and was given one degree if the response was "I don't know". The total degrees for every patient was summed up then categorize as follow:

- More than or equal to 75% was considered satisfactory level of knowledge.

- Less than 75% was considered unsatisfactory level of knowledge less.

II-Sydney Swallowing scale **Appendix II:**

It was used to assess symptomatic severity of swallowing difficulty as reported by patients. It was adapted from (Wallace, Middleton & Cook, 2000). This tool consisted of (17) statements translated to help the patients choose a mark on the place which he/she best described. High score was referring to worse condition.

❖ Scoring system:

The total score for swallowing problems was (51 score) grades based on statistical approach, it was considered that:

-From 1 to 17= mild.

-From 18 to 34 = moderate.

-From 35 to 51 = severe.

III-swallowing exercises assessment tool Appendix III: This tool was used to assess the ability of head and neck cancer patients to perform swallowing exercises. Adapted from

Lewins, (2014). This tool consisted of 15 statements including the following items

- Ability to perform swallowing exercises (4 questions).
- Muscle and tongue exercises (7 questions).
- Closing windpipe exercises (4 questions).

❖ **Scoring system:**

The total score of assess the ability of head and neck cancer patient to practices swallowing exercises was 30 marks, each item done correctly was given two grade and each item that was not done was given one

- More than or equal to 85% was considered satisfactory level of practices.
- Less than >85% was considered unsatisfactory level of practices.

Pilot study:

The pilot study to investigate and ensure the feasibility, objectivity and applicability of the study. Before performing the actual study a pilot study carried out on 4 patients (10%) had head and neck cancer was done on patients who met the selection criteria, in addition to clarity, adequacy and internal consistency of the study tools to determine possible problems in the methodological approach or instruments. The tools were completed without difficulty, adding support to the validity of the instruments. Little modification was done e.g. rephrasing and rearrangements of some sentences. Patient who were involved in the pilot study were excluded from the main study sample.

Field of work:

Field work included three phases: assessment and planning phase, implementation phase and evaluation phase.

A. Assessment and planning phase

- This phase started by interviewing 30 patients with head and neck cancer in the outpatients clinic affiliated to Fayoum University hospital to explain the aim and nature of the study as well as taking their approval to participate in the study prior to data collection it was taken about 10-15 minutes to fill it in for every patient.
- The patients' knowledge assessment tool was used to determine the patients' level of knowledge regarding disease process and its treatment also their knowledge related to swallowing exercises. This tool was filled in by the researcher or by patients according to their level of education.
- Then Sydney Swallowing scale and swallowing exercise assessment tool were filled in by the researcher or patients included in the study.

All Patients were assigned to current study received swallowing exercises program. Based on patients' knowledge and needs, the researcher developed the swallowing exercises program in Arabic language based on **(Rinkel et al., 2015, Lewins 2014).**

The content of the booklet concerned with head and neck cancer patients including the following items (definition, risk factors, signs & symptoms, diagnosis, method of treatment, and precautions, as well as swallowing exercises include (first exercises to improve the ability to

swallow, Second exercise to improve muscles of mouth and tongue, third exercises practice closing windpipe).

B. Implementation phase:

- Educational program was designed on four educational sessions. Sessions of the swallowing exercises program were conducted for the studied group prior during the first interview; it includes one theoretical session and three practical sessions, starting with greeting the patients with head and neck cancer while assuring patients' privacy.
- First session was included session definition and knowledge about head and neck cancer, prevalence of the disease, factors, signs & symptoms, diagnosis, method of treatment, side effect of treatment, and precautions.
- Second session was included definition and knowledge about the swallowing exercises program's purpose, importance, goals, types and how to practice.
- Third session was included dealing with side effect, and suitable nutrition.
- Fourth session was included adjusting to stress of life
- Patients were allowed to ask questions in case of miss- understanding while listening and expressing interest for them. At the end of these sessions the researcher emphasized the importance of follow up visits and informed them that they followed by the researcher after one month from the fourth visit at outpatients' clinics.
- Data collection were carried out at the outpatients' clinic, 2 days / week (Saturday and Thursday) for 3-4 patients in morning and afternoon shifts,

Each session toke from 30 to 45 minute, for a period about six months, starting at May to the October 2018.

- In addition to the educational program was conducted through small group discussion, role play, and demonstration, supported by using posters, video and booklet. Also by using simple words and a tone of voice that shows interest, concern and friendliness.

C. Evaluation phase:

- Evaluation the effect of swallowing exercises program on patients' with head and neck cancer suffering from swallowing problems was tested by comparing the results of the data collected pre and post swallowing exercises program.

Results

Table (1): regarding patients' demographic characteristics, table 1 shows that, half of the studied patients 50 % were age between 41 to 60 yrs. with the mean age 38.76 ± 5.09 . While 60.0% were males, 70.0% were married, 66.7% of them were living in urban areas, 63.3% were educated, 76.7% not working, and 96.7% were living with family.

Table (2): concerning patients' medical data, table 2 indicates that, 46.7% were of the patients were underweight. Regarding smoking, it was found that, 66.7% of them were smokers. According to present diagnosis it was found 43.3% of patients' diagnosed with tumor in (larynx). The most common post-operative therapeutic treatment was chemotherapy 60%. As well as 100% of the study sample were suffering from difficult in swallowing.

Table (3): reveals that (60%) of studied subjects did not affected with swallowing problems before. (66.7%) of the studied subjects suffer from chronic diseases. Regarding to family history 40.0% of the studied subjects had person in his family affected with head and neck cancer.

Figure (1): illustrated that, comparison between satisfactory total level of patients' knowledge pre and post program implementation, (10%) of studied patients had had satisfactory level of knowledge regarding HNC and swallowing exercises preprogram implementation. Meanwhile, (86.7%) of the studied patients had satisfactory level of knowledge regarding HNC and swallowing exercises post swallowing exercises program implementation respectively.

Figure (2): showed that, the highest percentage of the study subjects patient suffer from sever difficulty before swallowing exercises (50%), moderate difficulty (36.7%) and mild difficulty (13.3%). Post swallowing exercises program implementation; Swallowing exercises improve swallowing by decrease degree of swallowing severity as convert to sever (6.7%), moderate (26.7%) and mild (66.7%).

Figure (3): indicates that 40 % of patients who are unable to perform swallowing

exercises pre swallowing exercises program implementation, but 86, 7 % of patients are able to perform swallowing exercises post swallowing exercises program implementation.

Table (4): Demonstrate the relationship between the demographic characteristics of the patients being studied and their overall level of information, that there was non-significant relationship between the patients being studied (age, gender, educational level, marital status, job and place of residence) but there was a significant relationship between the patients being studied living with (p value = 0.010 *).

Table (5): reveals that, there was non-significant relation between studied patients' demographic characteristics and total level of performance swallowing exercises post swallowing exercises program implementation.

Table (6): this table indicates that there is a positive correlation between the total level of knowledge of the patients and the total performance of swallowing exercises at ($r=0.284$). There is a positive correlation between total patients' level of knowledge and the total swallowing scale of Sydney at ($r=0.401$). There is a positive correlation between total performance of swallowing exercise and total Sydney swallowing scale at ($r=0.375$).

Table (1): Number and percentage distribution of patients' demographic characteristics (n=30).

demographical characteristics	N	%
Age		
from 20 to 30 years	8	26.7
-from 31 to 40 years	4	13.3
-from 41 to 60 years	15	50.0
-from than 60 years	3	10
Mean \pm SD		38.76 \pm 5.09
Gender		
-Male	18	60.0
-Female	12	40.0
Level of education		
Educated	19	63.3
Not educated	11	36.7
Marital Status		
-Married	21	70.0
-Unmarried	9	30.0
Working		
Work	7	23.3
Not working	23	76.7
Place of residence		
Urban	20	66.7
Rural	10	33.3
Living Status		
Anole	1	3.3
with family	29	96.7

Table (2): Number and percentage distribution of patients' regarding medical data (n. =30).

General medical data	N	%
BMI		
Underweight	14	46.7
Healthy weight	13	43.3
Obese	3	10
Smoking		
Yes	20	66.7
No	10	33.3
Present medical history	N	%
Present diagnosis; tumor in		
neck from the inside(larynx)	13	43.3
neck from the outside(lymph node- thyroid gland)	9	30.0
the oral cavity	6	20.0
head or brain	2	6.7
Types of therapeutic treatment		
Chemotherapy	18	60.0
Surgical therapy	12	40.0
The most symptoms patient's suffering		
Pain in (oral cavity-larynges-neck)	14	46.7
Difficult in speech	12	40.0
Difficult in swallowing	30	100.0

Table (3): Number and percentage distribution of patients according to past medical history and family history (n.=30).

Past history	N	%
Have you ever been affected with swallowing problems		
Yes	12	40.0
No	18	60.0
Do you suffer from chronic diseases		
Yes	20	66.7
No	10	33.3
Family history		
Did anyone in your family get sick of your current illness (head and neck cancer)		
Yes	12	40.0
No	18	60.0

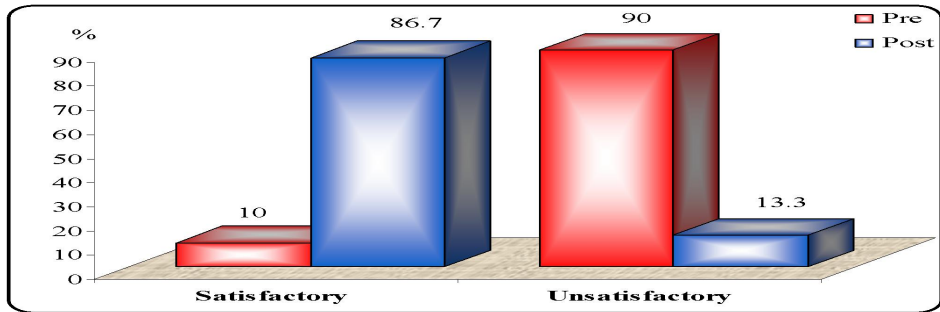


Figure (1): Percentage distribution of the total level of patients' knowledge regarding head and neck and swallowing exercises pre and post program implementation.

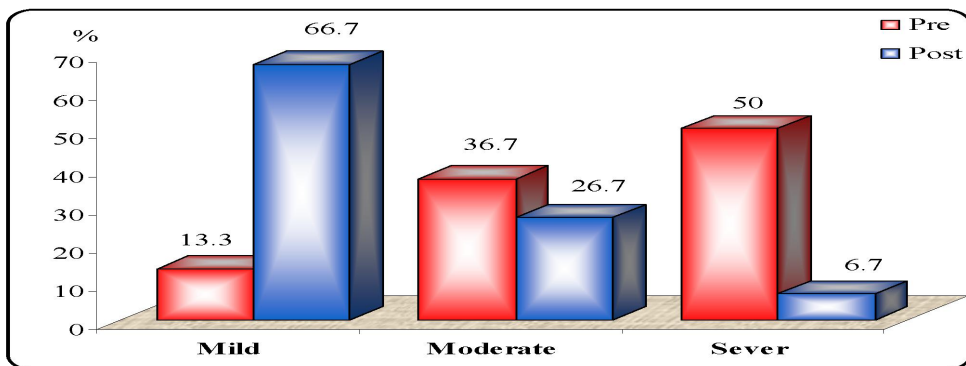


Figure (2): Percentage distribution of patients as regard to total Sydney swallowing scale pre and post swallowing exercises program implementation (n.= 30).

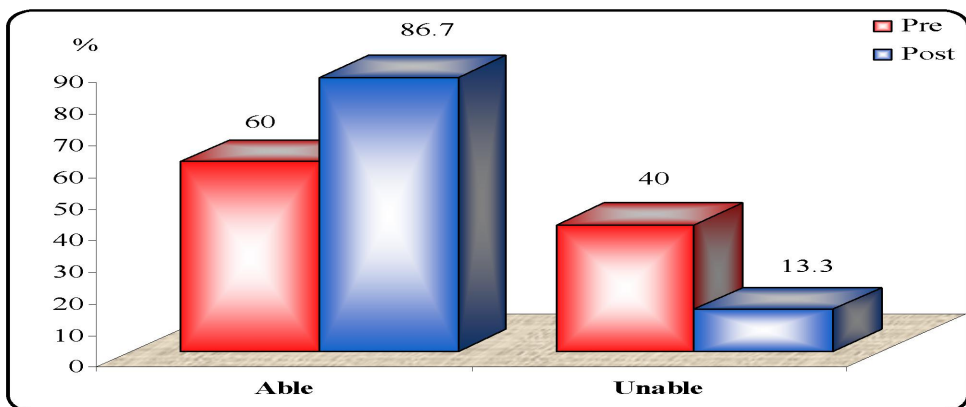


Figure (3): Percentage distribution of the patients regarding total performance swallowing exercises pre and post swallowing exercises program implementation.

Table (4): Relation between patients' demographic characteristics and total level of patients' knowledge post swallowing exercises program implementation (n=30).

		Total level of patients' knowledge				Chi-square	
		Satisfactory		Unsatisfactory		X ²	P-value
		N	%	N	%		
Age							
	20-30	7	87.5	1	12.5	0.938 0.816	
	31-40	3	75.0	1	25.0		
	41-60	13	86.7	2	13.3		
	60 or more	3	100.0	0	0.0		
Gender							
	Male	16	88.9	2	11.1	0.192 0.661	
	Female	10	83.3	2	16.7		
Level of education							
	Not educated	10	90.9	1	9.1	0.271 0.603	
	Educated	16	84.2	3	15.8		
Marital Status							
	Married	18	85.7	3	14.3	0.055 0.815	
	Unmarried	8	88.9	1	11.1		
Working							
	Work	7	100.0	0	0.0	1.405 0.236	
	Not working	19	82.6	4	17.4		
Place of residence							
	Urban	18	90.0	2	10.0	0.577 0.448	
	Rural	8	80.0	2	20.0		
Living Status							
	Anole	0	0.0	1	100.0	6.724 0.010*	
	with family	26	89.7	3	10.3		

* P-value <0.05 was considered significant

Table (5): Relation between patients' demographic characteristics and total level of patients' performance post swallowing exercises program implementation (n=30).

		Total level of patients' perform				Chi-square	
		Done correctly		Not done		X ²	P-value
		N	%	N	%		
Age							
	20-30	7	87.5	1	12.5	0.938 0.816	
	31-40	3	75.0	1	25.0		
	41-60	13	86.7	2	13.3		
	60 or more	3	100.0	0	0.0		
Gender							
	Male	16	88.9	2	11.1	0.192 0.661	
	Female	10	83.3	2	16.7		
Level of education							
	Not educated	9	81.8	2	18.2	0.353 0.552	
	Educated	17	89.5	2	10.5		
Marital Status							
	Married	18	85.7	3	14.3	0.055 0.815	
	Unmarried	8	88.9	1	11.1		
Working							
	Work	7	100.0	0	0.0	1.405 0.236	
	Not working	19	82.6	4	17.4		
Place of residence							
	Urban	18	90.0	2	10.0	0.577 0.448	
	Rural	8	80.0	2	20.0		
Living status							
	Anole	1	100.0	0	0.0	0.159 0.690	
	with family	25	86.2	4	13.8		

* Non significant P >0.05

Table (6): Correlation between total patients' level of knowledge, total performance of swallowing exercises and Sydney swallowing scale post program implementation (n=30).

Post	Total knowledge		Total performance of swallowing exercises	
	r	P-value	r	P-value
Total performance of swallowing exercises	0.28	<0.001		
	4	**		
Sydney Swallowing scale(swallowing problem)	0.40	<0.001	0.375	0.002*
	1	**		

**Highly significant p <0.01 * P-value <0.05 was considered significant

agreement with a study done by **Kamal, et al., (2014)** in their study

Discussion

It has been known that head and neck cancer (HNC) and its treatment lead to alterations in swallowing functioning .Range of motion exercises for the lips, jaw, oral tongue, tongue base, larynx, and hyoid-related musculature are designed to improve the movement by extending the intended structure in a desired direction until a strong stretch is felt. These exercises should be provided prior to treatment through either primary or postoperative chemo or radiotherapy may help prevent trismus, decrease the formation of fibrotic tissue, improve pharyngeal clearance, prevent aspiration and dehydration (**Lewins, 2014**).

So, the aim of the current study was to assess the effect of swallowing exercises program on patients with head and neck cancer.

Concerning the **demographic characteristics** of the studied patients', the result revealed that; about half of studied patients' ages were (41 to 50 years) with mean age 38 years. This finding were in

titled with head and neck cancer patients receiving chemo radiation therapy and mention that the majority of their study sample were in age of fifty and more.

Regarding gender the current study revealed that more than half of the studied patients' were men this finding was in agreement with a study done by **Virani, Kunduk, Fink, and MCWhorter, (2015)** about "Effects of two different behavioral swallowing exercise protocols performed during radiation therapy", who revealed that the majority of their study sample were men.

As regarding level of education the current study revealed that nearly two third of the studied patients' were educated this result contradicted with study done by **Conway et al., (2015)**, **about** on study titled with "estimating and explaining the effect of education and income on head and neck cancer risk", it was found that low education was associated with an increased risk of head and neck cancer.

As regarding marital status and working more than two third of studied patients married and not working, this result agrees with **Amanat, Ahmed, Kazmi, and Aziz, (2017)**, on their study in titled "Components of socioeconomic risk associated with head and neck cancer: "A population-based case-control study in Scotland" 103 patients, high risk of head and neck cancer was consistently associated with poor socioeconomic circumstances who reported that more than two third of studies patients were unemployed and married.

Concerning the **medical data**, the current study revealed that less than half of the study subjects underweight. This result not matched with by **Virani, et al., (2015)** who found in their study that weekly weight loss between the control and study group did not vary significantly at any point through radiotherapy.

Concerning smoking, the finding of the present study revealed that, near to more than two third of study sample were smoker and exposure to passive smoking, this result supported by **Attar et al., (2010)** in study titled with "Head and Neck Cancer in a Developing Country" who mentioned that cigarette smoking is one of the major factors suggested in developing head and neck cancer.

Concerning to medical diagnosis of studied patients near less than half of them had tumor in the neck from the inside (larynx). This result supported by **Kamal, et al.,**

(2014) in their study titled with "Clinical outcome and survival of head and neck cancer patients "in their study included 120 patients with HNC presented to clinical oncology department, Menoufia University from January 2005 to December 2010. The study denoted that the commonest site of malignancy among the group of patients was the larynx.

As regards types of therapeutic management the present study results finding that near two third of study subject had treated with chemotherapy, this result in the same line with, **Vokes, (2010)** in the study titled with "Induction chemotherapy for head and neck cancer "mentioned that inductive chemotherapy improved survival in patients with advanced stage respectable squamous cell carcinoma of the head and neck.

Concerning the symptoms associated with head and neck cancer, the study results revealed that all the study sample were suffering from swallowing difficulties. This result supported by **Raber-Durlacher, et al., (2012)** in the study titled with "Swallowing dysfunction in cancer patients" found that safe successful swallowing depends on complex events affected by head and neck cancers and their treatment, the swallowing process affected by chemo radiotherapy.

As regarding to the past medical history study results revealed that near half of study subject suffering from chronic disease as hypertension, this result supported with **Wallace Middleton, Cook**

(2000) in their study titled with "Development and validation of a self-report symptom inventory to assess the severity of oral-pharyngeal dysphagia" who reported that most of studied patients had chronic disease like hyper tension.

Concerning family history the present study finding revealed that near half of studied patients had family history of head and neck cancer this result supported by

Zaid, Abo-Azma, Megahed, and Deraz, (2017), in the study "Hereditary and environmental risk factors; clinical and laboratory risk matters for head and neck, especially oral, cancer and pre cancer" Found that most of studied patients in his study had family history with head and neck cancer.

Regarding patients' level of knowledge and swallowing exercises, in the present study showed that studied patients had satisfactory level of patients' knowledge regarding head and neck cancer post program implementation.

This result goes in the same line with **Van Der Meulen, Leeuw, Gamel, and Hafsteinsdóttir (2013)** in their study titled with "Educational intervention for patients with head and neck cancer in the discharge phase" in the study explained that patients with head and neck cancer had adequate information regarding their disease and treatment.

In relation to ability of head and neck cancer patients to perform

swallowing exercises, the current study found that patients had difficulty of swallowing pre swallowing exercises program implementation, but post program implementation there an improvement in swallowing exercises. From the investigator point of view the educational program provide patients and their families' specific information about their diagnosis, treatment and swallowing exercises that enhance their knowledge and decrease anxiety

This result supported by **Shinn et, al., (2013)** in their study titled with "Adherence to Preventive Exercises and Self-Reported Swallowing Outcomes in Post-Radiation Head and Neck Cancer Patients" reported that performing Pretreatment swallowing exercises produces measurable improvements in post treatment swallowing function in patients who undergo organ-preservation chemo radiation therapy for head and neck cancer.

Regarding swallowing exercises, the present study found that more than half of the patients studied performed swallowing exercises correctly before swallowing exercises, but more than two thirds of the patients studied performed swallowing exercises after swallowing exercises.

This result matched with **Moslemi, et al., (2016)**, in study titled with "An intensive swallowing exercises protocol for improving swallowing physiology in order adults with radio graphically confirmed

dysphagia" reported that oral exercises significantly improve the swallowing function of patient with oral cavity cancers.

As regard a relation between patients' demographic characteristics and total level of patients' knowledge post swallowing exercises program implementation the current study it was found that, there was no relation between all item of demographic characteristics and total level of patients' knowledge, but there was significant relation between livings status and total level of knowledge with (p value=0, 01*).

In the investigator's point of view, patients stay with their families, assisting them in swallowing activities and encouraging them to learn more and giving them support to perform swallowing exercises. This result supported by **Bose, Brockton, and Dort (2013)**, about "Effect of written information with people with head and neck cancer" who found in their study that patients with head and neck cancer who live with family had improvement in knowledge than who live alone.

Regarding the relation between patients' demographic characteristics and total performance of swallowing exercises post program implementation there was no relation. This result matched with **Attar (2010)** in a study about "Head and Neck Cancer in a Developing Country" this study revealed that there was no relation between swallowing performance and marital status,

working, place of residence or natural of living.

In the present study, there were a positive correlation regarding total levels of patients' knowledge, total level of patient performance of swallowing exercises and Sydney scale, from the investigator point of view the positive significant correlation due to importance of education of swallowing exercises program that enhance the patients' knowledge, and swallowing problems, of the patients. Also, motivate patients to share in exercise.

This result supported by **Kotz et al., (2012)** in study titled with "Prophylactic swallowing exercises in patients with head and neck cancer undergoing chemo radiation " concluded that patients who performed prophylactic swallowing exercises had improved swallowing function at 3 and 6 months after chemo radiation therapy but not immediately after chemo radiation therapy.

This result matched with **Duart et al., (2013)** in study titled with "Swallow Preservation Exercises during Chemo radiation Therapy Maintains Swallow Function" this study revealed that swallowing exercises appears to help maintain or improve swallowing function in head and neck cancer patients undergoing radiotherapy or chemo radiation therapy. This result may occur due to the fact that swallowing exercises designed to preserve range, rate, coordination, and flexibility of the

vocal tract musculature involved in swallowing

This result goes in the same line with a study done by **Kraaijenga et al., (2015)** in a study about " Effects of strengthening exercises on swallowing musculature and function", mentioned that strengthening exercises on swallowing musculature and function shows significant increase in muscle strength and volume after the 6-week training period.

Conclusion

Based on findings of the current study, it could be concluded that: majority of the study patients had satisfactory level of total knowledge post swallowing exercises program. Meanwhile, there is significant relation among the studied patients in all items of swallowing Sydney scale (alleviate swallowing problem) post swallowing exercises program implementation. In addition to, there was a positive correlation between the total level of knowledge of the patients and the total performance of swallowing exercises at ($r=0.284$). There is a positive correlation between total patients' level of knowledge and the total swallowing scale of Sydney at ($r=0.401$). There is a positive correlation between total performance of swallowing exercise and total Sydney swallowing scale at ($r=0.375$).

Recommendations

The result of this study projected the following recommendation:

- Continues update educational program about swallowing problems and swallowing exercises that should be designed for patients with head and neck cancer to improve their knowledge and prevention of potential complications.
- Replication of the current study on a large probability sample is recommended to achieve generalization of the results.
- 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.

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