

EFFECT OF INSTRUCTIONAL SCHEME REGARDING PREVENTION OF POST THYROIDECTOMY NECK PAIN AND DISABILITY ON PATIENTS' KNOWLEDGE AND PRACTICE

Azza Anwar Aly¹, Fatma Mohamed Elmansy², Laila A. Hamed³, Zizi Fikry Mohamed Abdelrasol⁴

¹Assistant professor of Medical-Surgical Nursing, Faculty of Nursing, Damanhur University, Egypt.

¹Associate Professor of Medical Surgical Nursing, Ibn Sina National College for medical studies, KSA.

²Lecturer of Medical-Surgical Nursing, Faculty of Nursing, Suez Canal University, Egypt.

²Assistant professor of Medical-Surgical Nursing, Nursing College, Qassim University, Saudi Arabia.

³ Assistant Professor of Medical-Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt.

⁴Assistant professor of Medical-Surgical Nursing, Faculty of Nursing, Damanhur University, & King Salman International university Egypt.

Background: Thyroidectomy is a very common surgical procedure worldwide and has an important role in the management of thyroid diseases in patients with hyperthyroidism, goiter, or malignant thyroid tumors. The most frequent complications after the surgery are neck pain, tension and pressure on the neck, difficulties moving the neck, hyperparathyroidism, bleeding, and recurrent laryngeal nerve injury. **Aim:** To evaluate the effect of the instructional scheme regarding the prevention of post-thyroidectomy neck pain and disability on patients' knowledge and practice. **Design:** quasi-experimental design was used to accomplish this study. **Setting:** The study was conducted in the general surgery department and surgical clinics at National Medical Institute in Damanhour, El-Behera Governorate, Egypt. **Sample:** A purposive subject of 100 patients of both sexes was selected from the above-mentioned setting and scheduled for thyroidectomy surgeries. They were divided into two equal groups with 50 patients in each group. **Tools:** Three tools were used to collect data during the pre, post, and one month after surgery, tool (I) a structured interview questionnaire, tool (II) a Patients' Practical observational checklist, and tool (III) a Neck Pain Disability Index Questionnaire. **Results:** The study's findings revealed a highly statistically significant difference between the both groups regarding the level of pain & disability in addition to, their level of knowledge post-implementing the instructional guideline with p-value (<0.001 & <0.001) respectively. Furthermore, there was a highly statistically significant correlation between both groups' level of practice and post-thyroidectomy Neck Pain & disability index with a p-value = 0.0004. **Conclusion:** The Instructional Scheme has a positive effect on the prevention of post-thyroidectomy neck pain and disability, moreover it has a positive effect on improving patients' knowledge and practice. **Recommendations:** Arabic booklet with simple language and different simple pictures should be available and presented for undergoing

thyroidectomy patients, involving procedures for therapeutic exercises and proper body mechanics. Repetition of the present study on the greater possibility population is advised to gain generality.

Keywords: Instructional Scheme, neck pain, disability, and thyroidectomy.

INTRODUCTION:

The thyroid gland is the most vital hormonal gland and has an important role in human growth and development. It helps regulate many body functions (**Monisha et. al., 2018**). Thyroidectomy is used to remove the thyroid gland and is one of the most common endocrine and neck surgeries performed today with the advances in technology (**Gropper et. al., 2020**). Total thyroidectomy is a prominent treatment in patients with cancer, and thyroid operations were prevalent if patients were diagnosed with goiters, hyperthyroidism, and thyroid nodules (**Othman et. al., 2019, Faisal et. al., 2018, Monisha et. al., 2018, and Caulley et. al., 2017**). Over the past three decades, there has been a sharp rise in thyroid surgery. In the United States, thyroidectomy is performed on 118,000 to 166,000 individuals each year. Both male and female patients undergo thyroidectomy; However, women are more than men (**Abd-Elhafiez et. al., 2022, Abo Shehata et. al., 2020, Hashem et. al., 2018**).

Although mortality and morbidity rates are low, long-term complications after thyroidectomy still cause many health problems (**Bawa et. al., 2021, Yüksel et. al., 2020, and Srikanth et. al., 2018**). Patients who have undergone thyroid surgery often face recurrent complications after thyroidectomy due to invasive intervention and secondary metabolic disorders. In addition, several factors, including comorbidities of the patient, the surgeon's surgical technique, and inherent disease-related factors, such as the presence of thyroid cancer and toxic goiter, may influence postoperative complications (**El Shafaey et. al., 2022**).

Early postoperative phase, many patients experience suffocating sensations, tightness pressure symptoms, and discomfort in their neck such as pain, tension in the neck, stiffness around the shoulder, restricted shoulder, and neck range of motion difficulties (**El-Gammal et. al., 2020, Alqahtani et. al., 2020, and Sorensen et. al., 2019**). In addition to suffering from wound infection, hematoma, airway obstruction, hypothyroidism, and hypocalcemia (**Gropper et. al., 2020, and Sulaiman & Al-Sayegh, 2020**). A feeling of discomfort is present in all patients with post-thyroidectomy incisions due to the hyperextension position taken by the patient during the surgical procedure thus, shoulder and neck movement problems may persist for a long time and affect patients' daily activities and their quality of life (**Gerard et. al., 2021, Rodríguez-Torres et. al., 2019, Kim et. al., 2018, Lee et. al., 2018, and Abdelgadir et. al., 2017**). Patients who undergo thyroidectomy often experience an improvement in their lives three to six months after surgery (**Sorensen et. al., 2019**).

Recurrent laryngeal nerve paralysis is the most feared complication after thyroidectomy. Alteration of voice function and impairment in swallowing may occur due to surgical edema, injury to the vocal folds from intubation, recurrent laryngeal nerve (RLN) paralysis, injury to the external branch of the superior laryngeal nerve, or damage to the anterior girdle muscles (**Sorensen et. al., 2019**). Such symptoms are often temporary, but they may reduce both disease-specific and generic quality of life (QoL) (**Altaf et. al., 2019**, and **Lee et. al., 2018**).

Therefore, it is essential that all post-thyroidectomy patients receive therapeutic support and routine postoperative care as well as counseling on the prevention of post-thyroidectomy neck pain and disability to improve their knowledge and practice. In addition to starting the stretching exercises from the first day after surgery to avoid negative experiences after thyroidectomy, by reducing muscle pain, and improving range of motion, flexibility, functionality, and neuromuscular coordination after surgery (**Miyauchi et. al., 2021**, and **Alqahtani et. al., 2020**). Prior research has demonstrated that patients should be made aware of potential post-discharge problems, given the proper precautions, and given effective follow-up during the postoperative period (**Clayman 2020**, and **Atasayar & Demir 2019**).

Evaluation of potential or actual postoperative complications is a critical nursing task to ensure safe nursing procedures and beneficial patient outcomes, so early detection and prompt action are essential (**El Shafey et. al., 2022**, and **Nasir & Ahmed 2020**). In addition to assessing pain levels, patients are taught neck exercises and symptoms of potential problems. Written and verbal information regarding wound care, medication, nutrition, and follow-up should be implemented. The position of the patient is important to ensure patient comfort and prevent complications post-thyroidectomy (**Yüksel et. al., 2020**). Nurses should urge patients to move their necks and shoulders and completely extend their necks gently as this is the easiest and most effective exercise to reduce pain and muscle stiffness and increase muscular flexibility and functional capabilities (**Abd-El Mohsen & Ahmed 2018**).

Significant of the study:

The burden of thyroid disorder is high in Africa in general but data on the incidence of thyroidectomy complications and their predictive factors are limited (**Wondwosen et. al., 2019**). The prevalence of thyroid disorders is very high worldwide. Although thyroidectomy operations have a nearly 0% death rate, the mortality rate at 0–30 days, 31–90 days, and at 91–365 days after surgery was 0.4%, 0.2%, and 2.5%, respectively (**Farhad et. al., 2022**). Significant postoperative problems can occur, with the majority of patients complaining of neck pain and disability observed during daily clinical practice. The incidence of thyroidectomy complications was observed in 18.6% of patients. The most common complications were external branch injury of the superior laryngeal nerve (EBSLNI) and hypocalcemia (**Wondwosen et. al., 2019**).

The usual hospital length of stay for thyroidectomy patients in clinics is one to two days and planning for patient discharge and education regarding at-home care is not done well. Lack of post-discharge patient education causes patients to be confused about potential problems which might encounter in everyday life and leaves them without any remedies (Clayman 2020, and Atasayar & Demir 2019). Most of the patients undergoing thyroidectomy did not have sufficient knowledge regarding neck exercises and the benefits of practicing these exercises to reduce neck pain and disability. Therefore, this study was designed to improve patients' knowledge and practice of preventing neck pain and disability after thyroidectomy.

Aim of the study

This study aimed to evaluate the effect of Instructional Scheme regarding prevention of post thyroidectomy neck pain and disability on patients' knowledge and practice.

Objectives:

1. Assessing patients' knowledge regarding prevention of post thyroidectomy neck pain and disability
2. Assessing patients' practices regarding prevention of post thyroidectomy neck pain and disability
3. Assess the neck pain level and disability post thyroidectomy.
4. Determining the effect of Instructional Scheme on prevention of neck pain and disability.

Research hypothesis:

H1: Patients' knowledge and practices are expected to be improved post-implementing Instructional Scheme more than those who did not.

H2: Patients' neck pain level is expected to be decreased post-implementing Instructional Scheme regarding prevention of post thyroidectomy neck pain and disability than those who did not.

Research design:

A quasi-experimental design was used to accomplish this study

Setting:

The study was conducted in the general surgery department and surgical clinics affiliated to National Medical Institute in Damanhour, El-Behera Governorate., Egypt.

Subjects:

A convenient subject of 100 patients of both sexes was selected from the above-mentioned setting and scheduled for thyroidectomy surgeries. They were divided into two equal (study and control) groups with 50 patients each. Calculation of the sample size was done using the EPI info program

Inclusion criteria:

The patients who planned for thyroidectomy and voluntarily agreed to participate in the study, were aged between 18-60 years of age who had no previous neck surgery, were able to communicate and follow directions verbally and could read, write, and speak.

Exclusion criteria:

Patients diagnosed with chronic neck pain or disability for any reason such as a problem with the cervical spine or rheumatic conditions of the neck that required special treatment and education. Patients who had previously participated in an educational program related to the prevention of neck disability after thyroidectomy, or who did not attend all sessions or did not complete the questionnaire after completing the instructional scheme.

Tools for data collection:

Three tools were used to collect data:

Tool (I): A structured interview questionnaire: It was developed by the researchers in simple Arabic language after reviewing the related literature **Abd-El Mohsen & Ahmed (2018)** and translated in simple Arabic language, it was included two parts:

Part (1) Patients' socio-demographic data, it consisted of six items including patients' personal data such as age, gender, marital status, level of education, occupation, and residence

Part (2) Patients' clinical and surgical data, it consisted of questions related to the type of surgery, and indications for surgery.

Part (3): Patients' knowledge assessment sheet: A structured interview questionnaire was used to assess the level of the patient's knowledge. It was adapted from (**Abd-Elhafiez et. al., 2022**, and **El Shafaey et. al., 2022**) and modified by the researchers after reviewing the relevant literature. This consists of twenty multiple-choice questions (MCQs). Correct answers had a score of 1 and an incorrect or unknown answer scored 0 with possible total scores ranging from 0 to 20. Total scores of patients' knowledge was categorized as; Satisfactory at a limit of $\geq 60\%$, Unsatisfactory at $< 60\%$ according to statistical analysis. MCQ about patients' knowledge includes thyroid gland anatomy, thyroidectomy definition, thyroid surgery indications, potential risks, length of hospital stay, preparations for surgery, precautions to reduce the risk of wound infection, care of the neck wound, and proper posture after surgery, proper sleeping position after surgery, time to restore physical activity willpower and exercises, benefits of stretching exercises after surgery, adequate and safe time to lift heavy objects after surgery, when is showering allowed after surgery, indications to take calcium after surgery, how long the patient needs thyroid hormone replacement therapy, permitted food after surgery, and forbidden food after thyroidectomy.

Tool (II): Patients' Practical Observational checklist:

It is designed to assess the patient's performance of breathing exercise, neck stretching exercises, assess the appropriate use of body mechanics after surgery, use the correct drinking water technique, and sucking on an ice cup in the early postoperative period. It was adopted from (**Abd-Elhafiez et. al., 2022** and **Miyauchi et. al., 2021**) and modified by the researchers after reviewing the relevant literature. The exercises were taught to the study group before surgery, with the researchers demonstrating the head and neck exercises, and then each patient re-demonstrated the exercise. Then the exercises were applied on the first day after the operation.

The practice was assessed by using an observation checklist with a full-scale score of 2, a partial completed scored 1, and not done scored zero. Good practice is defined as having a score above 75%, average practice as being between 75% and 60%, and poor practice as being less than 60% of the overall score.

Tool (III) : Neck Pain Disability Index Questionnaire "NDI": It was adopted from (**Abd-Elhafiez et. al., 2022**, and **Abd-El Mohsen & Ahmed 2018**).

It was designed to assess post-thyroidectomy neck pain and its effect on the ability to manage and perform daily living activities. It consisted of ten domains: pain severity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation. It was assessed in the first post-operative week. A total of 50 points were available for the NDI, which was composed of 10 items, each worth up to 5 points. Less self-assessed disability is indicated by a lower score. The Neck Pain and Disability Index Questionnaire was ranked in the following groups: The following categories are No Disability (0–4), Mild Disability (5–14), Moderate Disability (15–24), Severe Disability (25–34), and Complete Disability equal to or more than 35.

Tool Validity and Reliability:

Content validity was performed to determine whether the content of the tools covered the aim of the study. The tools were reviewed by five medical surgical nursing experts and two consultants for neck surgery. According to experts' suggestions the tools were modified. The Neck Pain Disability Index Questionnaire was found to have a reliability coefficient of Cronbach's alpha of 0.74.

Administrative and Ethical considerations:

The research approval was obtained from the ethical committee in the faculty of nursing at Damanshour University before starting the study. Official approval was obtained from the administrator of the study setting. An informed written consent from patients to apply for this study was secured. Patients were also informed that participation was voluntary, and they had the right to withdraw at any time without giving a reason. The researcher was assured of maintaining anonymity and confidentiality of the objective data. The privacy of study subjects was considered during data collection. Furthermore, the patients were informed that this data would not be reused in another research without their permission.

Pilot study:

A pilot study was conducted on (10% of the study subjects) 10 patients who undergoing thyroidectomy to test the clarity and applicability of the tool and the average time to complete the questionnaire was assessed. No changes were made to the research tools, so those patients were included in the main study.

Data collection procedure:

Data collection and teaching sessions were conducted in the morning and afternoon shifts. Data collection was carried out over 5 months, from the beginning of January 2022 to the end of May 2022. Data was collected through the following phases:

Pre-Instructional Scheme phase:

Formal permission is granted by the appropriate authorized personnel. Patients who met the research criteria and agreed to participate in the study were interviewed individually to explain the nature and usefulness of the current study and then written consent was given. Each selected patient was invited to fill out questionnaires regarding the patient's demographic data, clinical data assessment, knowledge assessment, and observation of the patient's exercise practice as a baseline for preoperative data assessment and prior to implementation of instructional scheme. To complement follow-up data collection in the first week after patients were discharged from hospital, patients' telephone numbers were collected first to contact them to schedule additional visits.

Instructional Scheme development and implementation phase:

Based on the initial assessment of patients' knowledge and their information about practicing the neck exercises, the researcher developed instructional scheme and implemented them in the form of 4 sessions. The instructional scheme was applied to the study group in 3 theoretical sessions, plus 1 practical session for each group of patients; each session lasted 25 to 30 minutes. The booklets were distributed to the studied patients at the end of the sessions. Group discussions, demonstrations, and remonstrations were all part of the teaching method. Additional teaching tools included instructional videos on neck stretches exercises, PowerPoint presentations, and a full-color booklet with illustrative images, created by the researcher in Arabic and distributed to patients as a guide and resource to help them understand all aspects of thyroidectomy. Each session ends with the researchers summarizing the main points and reviewing the content of the session over time for patient inquiries. Each patient receives all materials and CD which including theoretical and practical session.

The content of the sessions was divided as follows:

1st session: The first session was an introductory session to clarify the goal and contents of the program, its general objectives, educational methods, learner activities, and evaluation methods. Then the researcher give lecture focused on knowledge about thyroid gland anatomy,

thyroidectomy definition, thyroid surgery indications, potential risks, how much thyroid is removed, type of anesthesia used, length of hospital stay, preparations for surgery, precautions to reduce the risk of wound infection, care of the neck wound, and proper posture after surgery, proper sleeping position after surgery.

2nd session: focused on instructions about time to restore physical activity willpower and exercises, benefits of stretching exercises after surgery, proper and safe time to lift heavy objects after surgery, when is showering allowed after surgery, indications to take calcium after surgery, how long the patient needs thyroid hormone replacement therapy, permitted food after surgery, and forbidden food after thyroidectomy.

3rd Session: focused on patients' practice, where the researcher demonstrated the head and neck exercises to the patients, then each patients re-demonstrated the exercises. It consists of the following patient instructions: neck and shoulders completely relaxed, looking down, face to the right, face to the left, head tilted to the right, head tilted to the left, shoulders circled, shoulders slowly fully raised, then brought back down. In addition, for first-time drinking water techniques, the patient was asked to sit upright at 80–90° (or above 30°C). Next, the patient was asked to drink a full 3 oz. (90 cc) of water from a cup or from a straw, successive, slow, and steady swallowing but without pause. Finally, the patient was assessed for interruption of drinking and coughing immediately upon completion of drinking.

On the first day after surgery, nursing care included assessment of neck pain, the patient's abilities to initiate a range of motion, and assistance with onset. The patient was asked to maintain an ideal posture as much as possible, avoid excessive stretching of the muscles, avoid prolonged periods in the same position, and stop the exercises if he felt severe pain. The patient was asked to practice the neck stretching exercise that had been taught to him/her during the preoperative period with a color booklet and instructional videos included. The study group performed exercises involving five repetitions of each exercise three times a day (morning, afternoon, and evening). At the time of discharge, patients were handed a booklet and advised to perform home exercises for one month

The control group followed the routine hospital care prescribed by the surgical team and consisted of routine preoperative care, routine postoperative care, and routine pharmacological treatment.

4th session: focused on general predischarge instructions. It focused on the following: post-operative medication, and warning signs that require medical attention, follow-up visits, and post-operative activities such as returning to work, driving, reading, and returning to normal exercise. Before discharge, the researcher arranged with the patients the time and place of follow-up, which took place in the 1st week postoperative in the outpatient clinic and then one month later.

Evaluation phase:

This phase was aimed to evaluate the effect of instructional scheme regarding prevention of post thyroidectomy neck pain and disability on patients' knowledge and practice. The studied patients were evaluated using the same tools used in the initial assessment. It was completed by the researchers for both groups. After each group had completed the four sessions, the patient was re-evaluated one week after the implementation of the instructional scheme and then re-evaluated for retention one month later.

Statistical analysis:

All data were collected, tabulated, and statistically analyzed using IBM Corp. Released in 2015. IBM SPSS Statistics for Windows, version 23.0. Armonk, New York: IBM Corp. Quantitative data were expressed as mean \pm SD and median (range), and qualitative data were expressed as frequency & (percentage). The t-test was used to compare the mean of two of the normally distributed variables. The percentages of the categorical variables were compared using chi-square or Fisher's exact test, as appropriate. McNemar's test compared categorical paired variables. All tests were two-sided. A p-value < 0.05 was considered statistically significant, while a p-value < 0.001 was considered statistically highly significant, and a p-value ≥ 0.05 was considered a statistically insignificant.

Results:

Table (1): Shows that (36% and 40%) of the study group and control group were in the age group of 40-50 years, with the mean and standard deviation of the patient's age being 48.6 ± 10.2 and 47.7 ± 9.1 years, respectively. Regarding gender, (60% and 70%) of the studied group and the control group were female, respectively. Concerning occupation 52% of the patients in the study group and 72% in the control group were unemployed. Moreover, 88% of the patient in the study group and 82% in the control group were married. Regarding residence, (70% and 80%) respectively of the studied group and the control group were living in rural areas. Finally, there were no significant differences between the two groups related to all items of sociodemographic characteristics (p-value > 0.05).

Figure (1): Shows that regarding the education level of the patients, 40% of the study group were uneducated followed by 36% of them graduated from secondary school. While 36% of the patients in the control group were uneducated, followed by 30% of them who graduated from secondary school.

Table (2): Reveals with regard to surgical indications that 36% of the patients in the study group and 44% of the control group had a diagnosis of Graves' disease. Regarding the type of surgery, 48% of the patients in the study group and 46% of the patients in the control group had a partial thyroidectomy. Finally, there was no statistically significant difference between the two groups regarding surgical induction or type of surgery.

Table (3): Clarified that 88.0% of the patients in the study and 84% of the patients in the control groups had unsatisfactory levels of knowledge at the pre-intervention stage. While 80.0% of patients in the study group post-implementing the instructional Scheme had a satisfactory level of knowledge compared to only 20.0% of patients in the control group who had a satisfactory level of knowledge. There was a highly significant difference between the patients in the study group and the control group regarding total knowledge before and after implementing the instructional scheme with a p-value 0.0001.

Table (4): Reveals that after one week post-applying the instructional Scheme 56% of the patients in the study group had mild disability and 74% of the control group had moderate disability. While after one month of post-applying the instructional scheme, 60% of the patients in the study group had no disability and 44% of the control group had a moderate disability. There was a highly statistically significant difference between the patients in the study group and the control group related to neck pain & disability after the first week and first month after surgery at a p-value 0.0001.

Table (5): Shows that 55% of patients in the study group with a satisfactory level of knowledge suffered from mild disability post-applying the instructional scheme. While 60% of those with unsatisfactory levels of knowledge had mild disabilities. Moreover, there was a highly statistically significant correlation between study group patients' level of knowledge and post-thyroidectomy neck pain & disability index with a p-value 0.0001.

Figure (2): Shows that after one week post-applying the instructional scheme regarding the prevention of post-thyroidectomy neck pain and disability 66% of the patients in the study group had a good level of practice and 22% of them had average practice. While after one month of post-applying the instructional scheme, 50% of the patients in the study group had a good level of practice and 32% of them had average practice. Moreover, there was a significant difference between the level of patient practice in the study group concerning post-thyroidectomy prevention of neck pain and disability after one week of implementing the instructional scheme compared to the level of practice one month after the implementation of instructional scheme at a p-value 0.0001.

Table (6): Illustrate that 66.67% of patients in the study group with a good level of practice had a mild disability post-applying the instructional scheme compared to 54.55% of patients who had an average level of practice and 66.67% of those with poor practice level have moderate disabilities. There was a highly statistically significant correlation between study group patients' level of practice and post-thyroidectomy neck pain & disability index with a p-value = 0.0004.

Table (1): Demographic Characteristics Distribution among the Patients undergoing thyroidectomy (n=100).

Items	Study group		Control group		x ²	p-value
	No.50	%	No.50	%		
Age						
<30 years	4	8.0	3	6.0	2.18	0.13
30 <40 years	8	16.0	6	12.0		
40 < 50 years	18	36.0	20	40.0		
50 < 60 years	14	28.0	17	34.0		
60 < 70 years	6	12.0	4	8.0		
Mean ± SD	48.6±10.2		47.7±9.1			
Gender						
Males	20	40.0	1 5	30.0	0.7 2	0.36
Females	30	60.0	35	70.0		
Occupation:						
Employed	24	48.0	14	28.0	2.7	0.12
Unemployed	26	52.0	36	72.0		
Marital status:						
Married	39	88.0	41	82.0	2.3	0.16
Unmarried	11	22.0	9	18.0		
Residence						
Rural	35	70.0	40	80	1.7	0.19
Urban	15	30.0	10	20		

χ^2 Chi-square test

$p > 0.05$: in-significant

Figure (1): A comparison between the studied and control group regarding their level

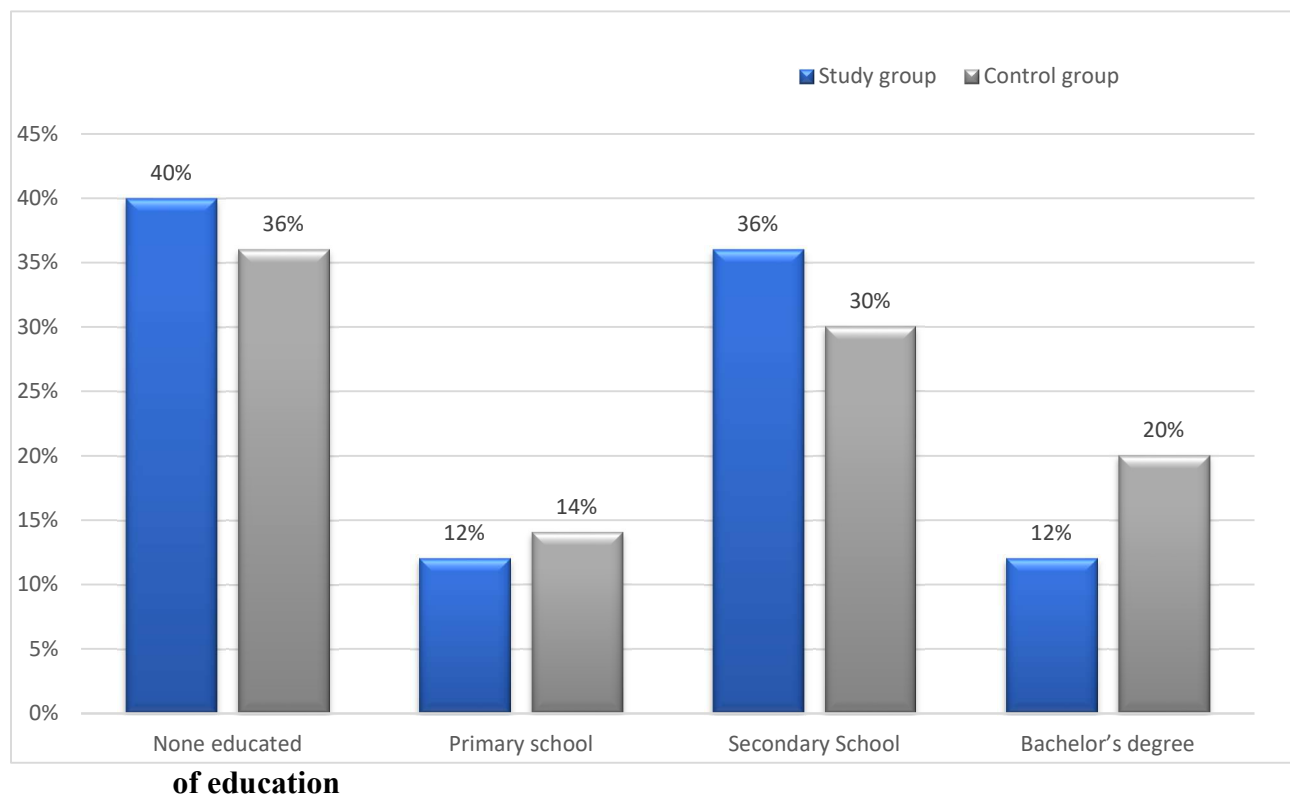


Table (2): Comparison of the study group and control group related to surgical indication and type of surgery (n=100).

Items		Study group n.50		Control group n.50		χ^2	p-value
		No.	%	No.	%		
Surgical Indication	Benign regular Goiter	17	34.0	18	36.0	2.3	0.302
	Graves' disease	18	36.0	22	44.0		
	Malignant neoplasm	15	30.0	10	20.0		
Type of Surgery	Total thyroidectomy	15	30.0	12	24.0	5.4	0.12
	Subtotal	24	48.0	23	46.0		

	Thyroidectomy				0		
	Hemi thyroidectomy	11	22.0	10	20.0		
	Near total thyroidectomy	0	0.0	5	10.0		

χ^2 Chi-square test,

$p > 0.05$: in-significant

Table (3): Comparison of the study group and control group regarding total knowledge pre- and post-implementation of the Instructional Scheme (n=100).

Total Patients' knowledge		Satisfactor y		Unsatisfactory		p-value	
		No.	%	No.	%	pre	Post
Study group	Pre	6	12.0	44	88.0	P=0.07 3	P=0.0001* *
	Post	40	80.0	10	20.0		
Control group	Pre	8	16.0	42	84.0		
	Post	10	20	40	80		

* $p < 0.05$: in-significant

Table (4): Comparison of the study group and control group related to Neck Pain & disability index after the first week and first month after surgery (n=100).

Items	After one week				After one month				
	Study group n=50		Control group n=50		Study group n=50		Control group n=50		p-value
No Disability	12	24.0%	0	0.0%	30	60.0%	5	10.0%	0.0001* *
Mild Disability	28	56.0%	0	0.0%	12	24.0%	13	26.0%	
Moderate Disability	10	20.0%	37	74.0%	8	16.0%	22	44.0%	
Severe Disability	0	0.0%	13	26.0%	0	0.0%	10	20.0%	
Complete Disability	0	0.0%	0	0.0%	0	0.0%	0	0.0%	

** $p < 0.001$: highly significant

**p*<0.05: significant

Table (5): Correlation between study group patients' level of knowledge and post thyroidectomy Neck Pain & disability index (n= 50).

Post thyroidectomy neck pain & disability	Level of Knowledge				χ^2	p-value
	Satisfactory n=40		Unsatisfactory n=10			
No Disability	10	25%	2	20%	19.7	0.0001* *
Mild Disability	22	55%	6	60%		
Moderate Disability	8	20.0%	2	20%		
Severe Disability	0	0.0%	0	0.0%		
Complete Disability	0	0.0%	0	0.0%		

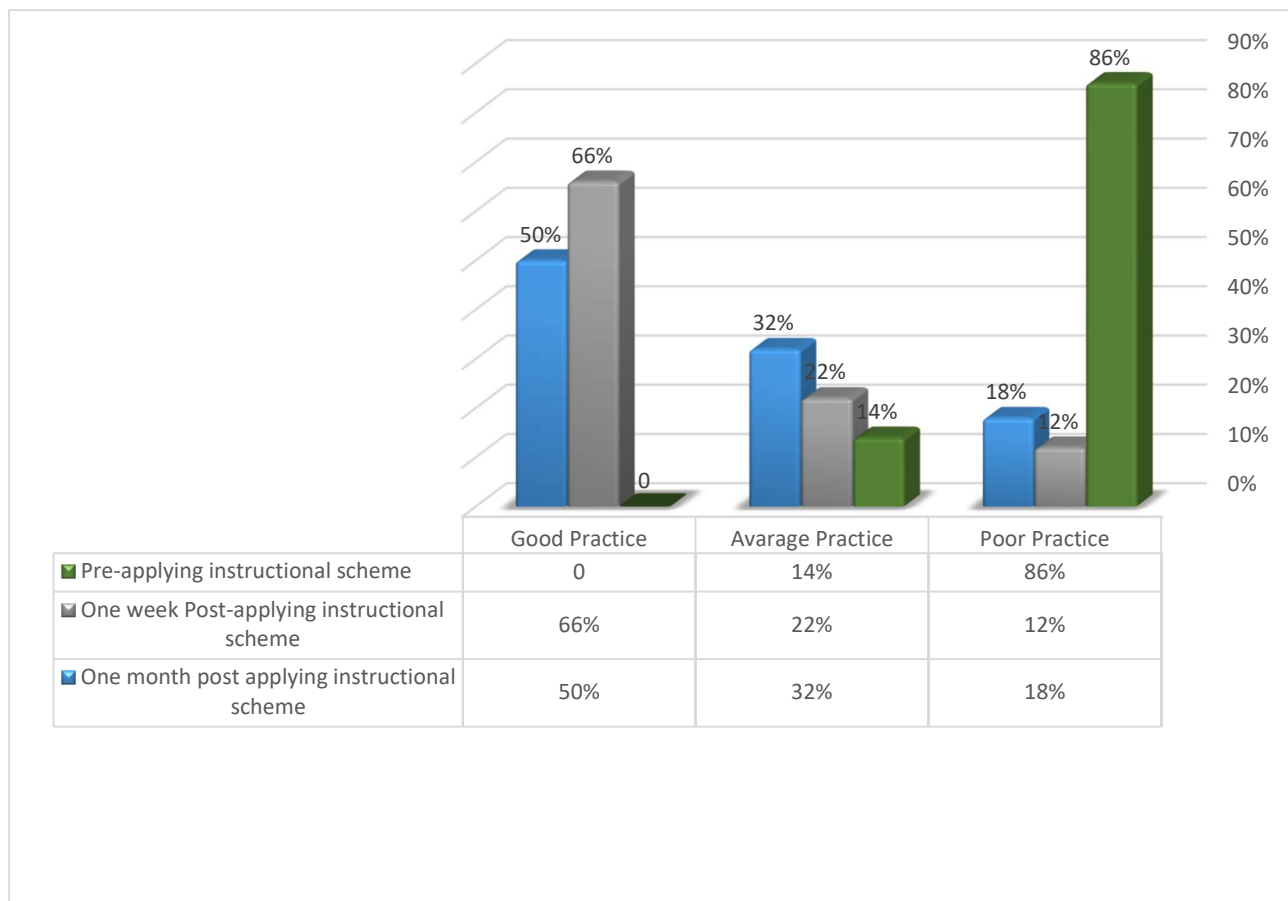


Figure (2): Comparison between the level of practice of patients in the study group after one week and after one month of application of the post-teaching scheme (n= 50).

Table (6): Correlation between level of patients' practice and post thyroidectomy pain & disability (n= 50).

Post thyroidectomy neck pain & disability	Patients' practice						χ^2	p-value
	Good n=33		Average n=11		Poor n=6			
No Disability	9	27.27%	3	27.27%	0	0.0%	16.6	0.0004*
Mild Disability	22	66.67%	2	18.18%	2	33.33%		
Moderate Disability	2	6.06%	6	54.55%	4	66.67%		
Severe Disability	0	0.0%	0	0.0%	0	0.0%		
Complete Disability	0	0.0%	0	0.0%	0	0.0%		

χ^2 Chi-square test,

* $p < 0.05$:
Significant

Discussion:

Regarding sociodemographic characteristics of patients who underwent thyroidectomy, the current study found that the present results showed that the mean ages of the study groups and the control group were 48.6 ± 10.2 and 47.7 ± 9.1 years, respectively. This finding disagreed with **Abo Shehata et. al., 2020**, and **Aly et. al., 2022**, who reported that the mean age was (39.82 ± 10.99 and 38.93 ± 10.88) years for the study and control groups, respectively. With regard to gender and marital status, the majority of patients were married females in both the study and control groups, and this result was agreed with **Mohamed et. al., 2022**, **Abd Elazeem et. al., 2020**, **Abo Shehata et. al., 2020**, **Ibrahim et. al., 2020**, **Abd-El Mohsen & Ahmed 2018**, **Hirshoren et. al., 2018**; and **Monisha et. al., 2018** who confirmed that the majority of patients were married female. This finding is consistent with findings from several studies, which indicate that women have a higher number of cases than men, with a ratio of 1:1.6. Thyroid disorders affect one in eight women at some point in their lives. Hypothyroidism affects up to 10% of women in the first year after giving birth. Also, **Al Qubaisi and Hague 2019**, **Genç et. al., 2019**, **Ha et. al., 2018**, **Li et. al., 2018** reported that women had more thyroid-related problems and neck pain than men.

The results of the current study reflect that more than half of the patients in the study group and the majority in the control group were unemployed. With regard to residence, the majority of patients in both the study and control groups lived in rural areas. This finding is consistent with

Türkmen et. al., 2022, and **Ibrahim et. al., 2020** who reported that the majority of thyroidectomy patients were not working. Moreover, **Mohamed et. al., 2022**, **El-Gammal et. al., 2020**, **Abd-El Mohsen & Ahmed 2018** and **Hashem et. al., 2018** mentioned that more than half of the patients in both groups were housewives.

This result is contradicted by **Abo Shehata et. al., 2020** who revealed that more than half of the studied groups, and the majority of the control group came from urban areas. Also with regard to the patients' occupations, the majority of the study group, and more than half of the control group, were workers.

Regarding the educational level of the patients who underwent thyroidectomy, the current study found that almost half of the study group was uneducated followed by more than a third of them graduated from secondary school. While more than a third of the patients in the control group were uneducated, followed by less than a third of those who graduated from secondary school. This result constant with the result of **Mohamed et. al., 2022**, and **Ibrahim et. al., 2020** which revealed that about two fifth are illiterate compared to the minority of those with a university education. In the same context **Abo Shehata et. al., 2020** found that less than half of the patients graduated from a secondary school and half of the study and control groups were uneducated, respectively. Otherwise, the results disagreed with **Hashem et. al., (2018)** who stated that more than two-thirds of the patients in the study group and half of those in the control group were illiterate.

The result of the current research showed that there were no statistically significant differences between the study group and the control group related to all elements of socio-demographic characteristics. This result is consistent with **Türkuman et. al. 2022**, whose analysis reported that the demographic characteristics of the intervention and control groups were homogenous ($P > 0.05$). This finding is also consistent with several researchers **Abd Elhafiez et. al., 2022**, **El Shafaey et. al., 2022**, and **Abo Shehata et. al., 2020**, **Mohamed 2019** who did not find significant differences between the study and control groups regarding sociodemographic characteristics.

With regard to surgical indications, the results of the current study illustrated that more than one-third of the patients in both the study group and the control group had a diagnosis of Graves' disease. Regarding the type of surgery, approximately half of the patients in both the study group and the control group underwent partial thyroidectomy. The results also showed that there were no statistically significant differences between the two groups with regard to surgical induction or type of surgery. This result is consistent with **Abd-El Mohsen & Ahmed 2018**, who stated that regarding the type of surgery, the highest proportion of patients in the study and control groups (53.3% and 43.3%, respectively) underwent total thyroidectomy and who found no statistically significant difference between the two groups regarding the type of surgery. These results are also in the same context as **Abo Shehata et. al., 2020**, who confirmed that with regard to the type of

operation, the current research results showed that the majority of study and control patients underwent partial thyroidectomy.

On the contrary, the results of **Mohamed 2019** reported that approximately half of the patients in the study group and about two-thirds of the patients in the control group had also undergone total thyroidectomy. The current study results also disagreed with **Al Qubaisi & Haigh 2019; Ha et.al., 2018, Faisal et. al., 2018**, who indicated that total thyroidectomy is most often surgical intervention for thyroid diseases, and more than half of the patients underwent a total thyroidectomy. More contradiction with **Türkuman et al., 2022**, who found that two-thirds of the intervention group and the control group had a diagnosis of multinodular goiter. Total thyroidectomy was performed in more than two-thirds of the intervention group and only 3.81% of the control group. While in the same research, there is an agreement with our findings regarding that there were no statistically significant differences between the two groups with regard to surgical induction or type of surgery.

Regarding the level of knowledge about prevention of post thyroidectomy neck pain and disability, the current study clarified that the majority of the patients in the study and control groups had unsatisfactory levels of knowledge at the pre-intervention stage. However, the majority of patients in the study group post-implementing the instructional scheme had a satisfactory level of knowledge compared to only one-fifth of patients in the control group who had a satisfactory level of knowledge. There was a highly significant difference between the patients in the study group and the control group regarding total knowledge before and after implementing the instructional scheme. This finding is agreed by **Monisha et. al. 2018** who confirmed that educational guidelines have a good effect on the prevention of post-thyroidectomy neck pain and disability, and also had a positive effect on improving patients' Knowledge and practice. This result also was consistent with **Mohamed et. al., 2022**, who stated that In terms of total knowledge, about thyroid disease and thyroidectomy, the current study indicated that most of the patients under study had poor prior knowledge of the evidence-based guidelines regarding thyroid disease and thyroidectomy, while the majority of the patients studied had a good level of knowledge for 7 days and a month.

This result was supported by **Ibrahim et. al., 2020** who reported that the majority of study patients had poor knowledge of thyroidectomy care prior to the use of the health teaching handout. Whereas more than half of the patients studied had good knowledge of thyroidectomy care after using the health teaching handout, and about one-fifth had good knowledge compared to the minority with poor knowledge. The result of the current study also agreed by **El Shafaey et. al., 2022 and Hashem et. al., 2018** who stated that the majority of patients in the study and control groups had an unsatisfactory level of knowledge. However, after fulfilling the instructional guidelines, there was a highly significant difference between the patients in the study group and the control group regarding total knowledge before and after implementing the educational

guidelines. On the contrary, the result of **Abd Elhafiez et al, 2022** regarding the comparison of the level of knowledge between the two groups studied before surgery, the first week after surgery, and the fourth week after surgery there were no statistically significant differences between them regarding the total level of knowledge.

Regarding the relationship between the level of knowledge and neck pain and disability, the results of the current research illustrated that more than half of the patients in the study group with a satisfactory level of knowledge suffered from mild disability after applying the instructional scheme. While less than one third of those with unsatisfactory levels of knowledge had moderate disabilities. Moreover, there was a highly significant relationship between the knowledge level of the study group patients and the index of neck pain and disability after thyroidectomy. This result is agreed by **Abdelhafeez et. al., 2022** who confirmed that inadequate preoperative health education regarding pain management is associated with higher postoperative pain.

This result was supported by **El Shafaey et. al., 2022** who stated that postoperative instructional guidelines based on an assessment of patient need have a positive effect on clinical outcomes such as lower pain level, neck dysmorphia, and discomfort among study group patients compared to routine nursing care among the control group. Also found a statistically significant relationship between the level of patient knowledge of the study group patients and pain level, neck dysmorphia, and discomfort after thyroidectomy. This results also in the same context as **Dahodwala et. al., 2018**) who confirmed the effectiveness of health education by using video in improving outcomes, including increased knowledge and understanding of health-related medical information, alleviation of pain and anxiety, and improved patient satisfaction.

Concerning neck pain & disability index the findings of the present study reflect that after one week post-applying the instructional scheme more than half of the patients in the study group had mild disability and the majority of the control group had moderate disability. While after one month of post-applying the instructional scheme, approximately two third of the patients in the study group had no disability and less than half of the control group had a moderate disability. There was a highly statistically significant difference between the patients in the study group and control group related to Neck Pain & Disability Index after the first week and first month after surgery. According to the researchers' point of view, the lower level of pain and neck disability among the patients in the study group reflects the positive effect of applying an instructional scheme and effective demonstration and re-demonstration of stretching exercises before and after surgery.

This finding came in the same context as **Türkmen et. al., 2022** who confirmed a significant difference between the first week and the first month after surgery in the intervention group patients and the control group with regard to NPDS. The result showed that there was a statistically significant difference between the mean NPDS scores in the first week and the first month after surgery in the intervention and control groups. This finding is also supported by **Miyauchi et. al.,**

2021) found that the total symptom scores in the stretching group were significantly lower than those in the control group at all-time points after the surgery. Moreover, **Abd Elazeem, et al., 2020** and several researchers confirmed that neck pain and associated disability were significantly diminished in the study group when followed one week after thyroidectomy compared to the control group. In addition to the existence of statistically significant differences in the levels of the degree of total discomfort and disability between the study and the control groups in the first, second-, and third weeks (**Pan et. al., 2021, Abo Shehata et. al., 2020, and Mohamed 2019**).

This result is agreed by **Abd-El Mohsen & Ahmed 2018** who revealed a significant difference between the study and control groups regarding neck pain and disability, one month after total thyroidectomy. Whereas in the same research, they disagreed with our findings and confirmed no significant difference between the study and control groups regarding neck pain and disability, one month after total thyroidectomy.

Concerning the patients practice the result of the current study confirmed that there was a highly statistically significant correlation between study group patients' practice and post thyroidectomy neck pain & disability index. This result is consistent with **Ha et.al. 2018** who confirmed early head and neck exercises can reduce neck pain and discomfort. Moreover, this result supported by **Monisha et.al. 2018** who stated that neck education and stretching exercises significantly improve the neck condition of patients with neck pain and disability. This finding came in the same context as **Abd-El Mohsen & Ahmed 2018** who confirmed that teaching and practicing neck stretching exercises significantly improved the neck condition with regard to neck pain and disability in patients in the study group. General surgery nurses should include neck stretching exercises in their care and follow-up protocols for patients undergoing total thyroidectomy and monitor patients using the neck pain and disability questionnaire.

The result of the current research clarified that there is a significant difference between the level of patient practice in the study group concerning post-thyroidectomy prevention of neck pain and disability after one week of implementing the instructional scheme compared to the level of practice one month after the implementation of instructional scheme. This result in the same context as **Türkmen et al., 2022** who revealed a significant difference was observed between the groups in neck pain and disability in the first week and the first month. It was found that head and neck stretching exercises were an effective nursing intervention in decreasing postoperative neck pain and disability in patients. This result was supported by **Mohamed 2019** who found a significant change in disability and pain in the neck was observed between the study and control groups 7 days after total thyroidectomy. In addition, there is a significant difference between the study and control subjects 30 days after thyroidectomy. This finding came in the same context as **Mohamed et. al., 2022** who revealed that regarding the relationship between patients' general practice and the neck pain and disability index, there was a negative relationship between the

patient's practice with neck pain and the disability index before and on the seventh day and one month after the implementation of the evidence-based nursing guidelines.

Moreover, these results were endorsed by **Bhavani 2019** who revealed that the application of neck stretching exercises resulted in a significant improvement in the condition of the neck with regard to neck pain and impotence a week after a complete thyroidectomy. Patient compliance with a range of motion exercises significantly improved neck mobility in order to be able to perform activities of daily living and reduced pain for the study group compared to the control group. This finding came in the same context as **El-Shafaey et. al. 2022** who found that implementation of the nursing care protocol has a positive effect on clinical outcomes such as statistically significant improvements in patient knowledge, lower pain level, and decreased neck weakness and discomfort among the study group patients compared to routine care in the nursing hospital among the control group.

Finally, the current study findings evidence the first research hypothesis, which suggested that the patients' knowledge and practices are expected to be improved post-implementing Instructional Scheme more than those who did not. Furthermore, the current study findings also prove the second hypothesis of the study, which indicates that it is expected that the level of neck pain will decrease in patients after implementing the instructional scheme regarding the prevention of post-thyroidectomy neck pain and disability than those who did not.

Conclusion:

According to the results of the current study, it was found that instructional scheme has a positive effect on the prevention of post-thyroidectomy neck pain and disability, and also it has a positive effect on improving patients' knowledge and practice. There was a highly statistically significant difference between the patients in the study group and the control group related to Neck Pain & disability index. There was a highly statistically significant correlation between study group patients' level of knowledge and their level of practice with post-thyroidectomy neck pain & disability index.

Recommendations:

Based on the results of the present study it can besuggested that:

- ❖ Repetition of the present study on a greater possibility population is advised to gain generality as well as a long period of study time to confirm the results of the current study.
- ❖ Arabic-colored illustrated booklet with simple language and different simple pictures should be available and presented for undergoing thyroidectomy patients, involving procedures for therapeutic exercises and including all head-neck stretching exercises.
- ❖ Head and neck stretching exercises can be used as a non-pharmacological treatment modality in nursing care after surgery

Acknowledgment:

The researchers would like to express their great appreciation to the patients who voluntarily agreed to participate in this study. Finally, we would like to express our sincere gratitude to the hospital administrators and senior nurses for their cooperation in conducting the study in the general surgery department and surgical clinics

Study limitations:

The most important limitation of this study was that exercises could not be performed in the preoperative period because patients were transferred to surgery at the quick decision of the surgeons and their admission to the hospital was delayed for those with a pre-plan surgical appointment.

Conflict of interest:

The authors confirm that the publication of this paper does not involve any conflict of interest.

Financing:

No financial support.

References:

- Abd Elazeem Y, Abdel-Karim N, and Aly E.(2020): Effect of Perioperative Instructions on Postoperative Discomforts and Satisfaction Level among Patients Undergoing Thyroidectomy. Evidence-Based Nursing Research; 2(1):12. DOI: [10.47104/ebnrojs3.v2i1.109](https://doi.org/10.47104/ebnrojs3.v2i1.109).
- Abd-El Mohsen SA, and Ahmed NM. (2018): Effect of teaching patients neck stretching exercises on neck pain and disability following thyroidectomy. Journal of Nursing Education and Practice; 8 (1). Pp. 107-113.
- Abd-Elhafiez H. M, Rezk MM, Mohamed SS, and AliMM. (2022): Effectiveness of Neck Stretching Exercises on Neck Pain and Disability for Patients with Total Thyroidectomy. Journal of Nursing Science - Benha University; Vol. (3) No. (1). pp2682 – 3934.
- Abo Shehata OK, Shehata OS, and Abd Elalem SM. (2020): Effect of neck range of motion exercises on neck disability and pain among patients undergoing thyroidectomy. Clinical Nursing Studies; Vol. 8, No 4. Pp1-12.
- Alqahtani SM, Almussallam B, Alatawi AS, Alsuhaime NA, Alqahtani SM, Albalawi A, Albalawi NS, Alzahrani AM, and Alalawi Y. (2020): Post-Thyroidectomy Complications and Risk Factors in Tabuk, Saudi Arabia: A Retrospective Cohort Study. Cureus; 12(10):e10852. DOI [10.7759/cureus.10852](https://doi.org/10.7759/cureus.10852).

Altaf S, Mehmood Z, Baloch MN, and Javed A (2019): Experience of thyroid surgery at a tertiary care hospital in Karachi, Pakistan. *Open J Thyroid Res* 2(1):009-014.

Aly A. A., Gaballah S. H., El Gammal W., and G. Hafez (2022): Thyroid Hormone Disturbances Effects on Male Sexual Life. *Egyptian Journal of Health Care*, Vol. 13. No.4.P: 1458-1473.

Atasayar S, and Demir SG. (2019): Determination of the Problems Experienced by Patients Post Thyroidectomy. *Clinical Nursing Research*; Vol. 28(5). Pp. 615–635. doi:[10.1177/1054773817729074](https://doi.org/10.1177/1054773817729074).

Bawa D, Alghamdi A, Albishi H, Al-Tufail N, Sharma SP, Khalifa YM, Khan S, and Alhajmohammed MA. (2021): Post-thyroidectomy complications in southwestern Saudi Arabia: a retrospective study of a 6-year period. *Ann Saudi Med.*; 41(6): 369-375. doi: 10.5144/0256-4947.2021.369. Epub 2021 Dec 2. PMID: 34873936; PMCID: PMC8650599.

Bhavani D, Monisha R, and Kamalanathan P. (2019): Evaluating the Effects of Neck Exercise on Post Thyroidectomy Patients- A Pilot Study. *Indian Journal of Public Health Research and Development*; 10(8): 79-81.

Caulley L, Obaseki S.J., Luo L, and Javidnia H. (2017): Risk Factors for Postoperative Complications in Total Thyroidectomy. *Medicine*; 96(5):6–10.: doi: 10.1097/MD.0000000000005752.

Clayman, G., (2020): Thyroid Nodules Hyperthyroidism and Thyroid Cancer, available at:<https://www.endocrineweb.com>, accessed on 20-12-2020.

Dahodwala M, Geransar R, Babion J, Grood J, and Sargious P. (2018): The impact of the use of video-based educational interventions on patient outcomes in hospital settings: A scoping review. *Patient Education and Counseling*; Volume 101, Issue 12, pp 2116-2124

El Shafaey MI, Attia NR, Elnemr AA, and Salem FA. (2022): Efficacy of Implementing Pre and Postoperative Protocol of Nursing Care on Post Thyroidectomy Patients' Clinical Outcomes. *EJHC*; 13(1). Pp. 528-545.

El-Gammal AS, El-Melegy MH, and Badawy MA. (2020): Evaluation of Post-Thyroidectomy Complications in Autoimmune Thyroid Diseases versus Nodular Thyroid Diseases. *Med. J. Cairo Univ*; 88(5), Pp. 2023-2029.

Faisal M., Fathy H., Risk A., and Atwa M M., (2018): Incidental thyroid carcinoma after thyroidectomy for benign thyroid disease in Suez Canal region, *The Egyptian Journal of*

Surgery ; 37 (3): 361-367

Farhad, S.A., Anders, B., Erik, N. et al., (2022): Mortality after benign thyroid surgery in patients aged 80 years or older. *Langenbecks Arch Surg* 407, 1659–1665. <https://doi.org/10.1007/s00423-022-02463-2>.

Gerard M., Hamy A., Lifante J.C., Pattou F., Christou N., Blanchard C., and Mirallié E. (2021): Comparison of Morbidity After Total Thyroidectomy Among Adult Patients With and Without Preoperative Hyperthyroidism. *JAMA Otolaryngol Head Neck Surg*; 147(6):573-575. doi:10.1001/jamaoto.2021.0080.

Genç, A., Çelik, S. U., Genç, V., Gökmen, D., and Tur, B. S. (2019): The effects of cervical kinesiotaping on neck pain, range of motion, and disability in patients following thyroidectomy: A randomized, double-blind, sham-controlled clinical trial. *Turkish Journal of Medical Sciences*, 49(4), 1185–1191. <https://doi.org/10.3906/sag-1812-55>.

Gropper M. (2020): *Miller's Anesthesia: Anesthetic Implications of Concurrent Diseases*. 9th ed. Philadelphia: Elsevier Inc.: 999-1064.

Ha, T. K., Kim, D. W., Park, H. K., Shin, G. W., Heo, Y. J., Baek, J. W., Lee, Y. J., Choo, H. J., Kim, D. H., Jung, S. J., Park, J. S., Moon, S. H., Ahn, K. J., Baek, H. J., and Kang, T. (2018). Comparison of postoperative neck pain and discomfort, swallowing difficulty, and voice change after conventional open, endoscopic, and robotic thyroidectomy: A single-center cohort study. *Frontiers in Endocrinology*, 9, 416. <https://doi.org/10.3389/fendo.2018.00416>.

Hashem EM, Mohammed ZA, Ahmed MT, Azer SZ, and Abd- Elmohsen SA. (2018): Effect of Designed Nursing Guidelines on Minimizing Postoperative Complications for Patients Undergoing Thyroidectomy. *Assiut Scientific Nursing Journal*; Vol. 6 (13). Pp. 29-39.

Ibrahim R., Shereif W. ,Hassanein A., and El-Baea H.(2020): Effect of health teaching handouts on patient's Outcome who undergoing thyroidectomy in General surgical departments at Mansoura University hospitals. *Mansoura Nursing Journal (MNJ)*; vol.7 (1): 75-92.

Hirshoren N., Kaganov K., Weinberger J.M., Glaser B., Uziely B., Mizrahi I., Eliashar R., and Maze H.(2018): Thyroidectomy Practice After Implementation of the 2015 American Thyroid Association Guidelines on Surgical Options for Patients With Well-Differentiated Thyroid Carcinoma *JAMA Otolaryngol Head Neck Surg*; 144(5):427-432. doi:10.1001/jamaoto.2018.0042.

Kim K, Gu M, Jung J, Hahm J, Kim S, Kim J, Woo S. (2018): Efficacy of a home-based exercise program after thyroidectomy for thyroid cancer patients. *Thyroid*; 28(2), 236-45.

Lee J.S., Kim J.P., Ryu J.S. (2018): Effect of wound massage on neck discomfort and voice changes after thyroidectomy. *Surgery* 164:965–971.

Li N., Han X., Lv Z. and Wang P., (2018): "Clinical Observation and Nursing Experience of Complications in Thyroid Surgery," *2018 9th International Conference on Information Technology in Medicine and Education (ITME)*, Hangzhou, China, pp. 95-97, doi: 10.1109/ITME.2018.00031.

Miyauchi A., Ito Y., & Miya A. (2021): Stretching Exercise for the Prevention of Postoperative Neck Symptoms Following Thyroid Surgery. *VideoEndocrinology*;8(1).
<https://doi.org/10.1089/ve.2021.0003>.

Mohamed ZM. (2019): Effect of Neck Stretching Exercises on Patient's Neck Disability and Pain Thyroidectomy. *Egyptian Journal of Health Care*; Vol.10No.4.pp 424-434.

Mohammed R.R., Mohamed H.G., Taha A.S., & Omran E.S. (2022): Effectiveness of Evidence-Based Nursing Guidelines on Thyroidectomy Patients Health Outcomes at General Surgery Departments. *Journal of Nursing Science Benha University*;3(2): 811-826.

Monisha R., Ezhil B. D., and Kamalanathan P. (2018): Evaluating the effects of neck exercise on post thyroidectomy patients- a pilot study. *World Journal of Pharmaceutical Research* ;Volume 7(17): 350-355. DOI: 10.20959/wjpr201817-13298.

Othman A. F., Bosat B. E., and Elbadawy H. A. (2019): Incidental Thyroid Carcinoma Diagnosed after Total Thyroidectomy for Benign Thyroid Diseases: A Prospective Observational Study. *The Egyptian Journal of Hospital Medicine*, Vol. 77 (3), Page 5287-5292.

Nasir M, & Ahmed A. (2020): Knowledge about postoperative pain and its management in surgical patients. *Cureus*; 12(1): e6685. DOI 10.7759/cureus.6685.

Pan Z, Huang Q, Jiang L, Li M, Liu Z, Chen X, & Zhuang Y. (2021): Application effects of the targeted nursing model in patients undergoing thyroid surgery and its influence on patients' negative emotions. *Am J Transl Res*;13(4):2822-2830.

Rodríguez-Torres, J., López-López, L., Cabrera-Martos, I., Torres-Sánchez, I., Ortíz-Rubio, A., and Valenza, M. C. (2019): Musculoskeletal neck disorders in thyroid cancer patients after thyroidectomy. *European Journal of Cancer Care*, 28(4), e13053.
<https://doi.org/10.1111/ecc.13053>.

Sorensen JR, Printz T, Iwarsson J, et. al., (2019): The impact of post thyroidectomy paresis on quality of life in patients with nodular thyroid disease. *Otolaryngol Head Neck Surg* 161:589–597.

Srikanth v, Umarji j, Thomas A. (2018): A Morphological Variation in Thyroid Gland- A Case Report. *International Journal of Health Sciences & Research*, Vol.8; Issue: 9; September 2018.

Sulaiman, A.I., & Al- Saigh, T.H., (2020): assessment of nurses' knowledge towards post thyroidectomy management in Nineveh governorate hospitals, *Mosul Journal of Nursing*, 8(1), P:34, DOI: 10.33899/mjn.2020.164619.

Türkmen, A., Çavdar, İ. and Aksakal, N. (2022): The Effect of Head-Neck Stretching Exercises After Thyroidectomy on Postoperative Level of Pain and Disability. *Genel Sağlık Bilimleri Dergisi*, 4 (2) , 177-186 . Retrieved from <https://dergipark.org.tr/en/pub/jgehes/issue/72300/1135265>.

Yüksel S, Öztekin S, Temiz Z, et. al., (2020): The effects of different degrees of head-of-bed elevation on the respiratory pattern and drainage following thyroidectomy: a randomized controlled trial. *African Health Sciences*; 20(1), 488-97.

Wondwosen M., Bekele M., Abebe K., Tantu T and Zewdu. D (2019): Factors associated with thyroidectomy complications in resource-limited settings: An observational study. *International Journal of Surgery Open*. Volume 42, April, 100468. Retrived from <https://www.Sciencedirect.com/science/article/pii/S2405857222000316>.