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Impact of Implementing Nursing Guidelines on Knowledge and Habits of Patients Receiving Radioactive Iodine

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Abstract
Background: Radioactive iodine is widely used in nuclear medicine. The radioactive iodine 131 (I-131) is generally utilized in patient with different thyroid disease. **Aim of the study**: Is to evaluate impact of implementing nursing guidelines on knowledge and habits of patients receiving radioactive iodine. **Research design**: interventional research design (Pre / post test) was utilized in this study. **Setting**: This study was conducted in nuclear medicine department at Sohage University Hospital. **Sample**: 60 patients were included in this study. **Tools**: Data collected by three tools Interview questionnaire sheet, patient's knowledge questionnaire sheet and patient habits assessment sheet. Results: there were vital distinction between patients knowledge and habits post implementing nursing guidelines with P value (0.001*). **Conclusion**: providing nursing guidelines were largely effective on improving patients knowledge and correcting habits. **Recommendation**: Nurses should be aware by guidelines that given to patients after receiving radioactive iodine and inform patients about them, research should be applied on widely geographical area .
Keywords: Nursing Guidelines, knowledge and habits, Radioactive iodine**.**
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INTRODUCTION

Radioactive iodine improves the survival price of sufferers with papillary or follicular thyroid cancer (differentiated thyroid cancer) that has unfold to the neck or different body parts, and this remedy is now trendy practice in such cases **(American Cancer Society, 2016)**. The percentage of thyroid cancer has currently inflated from 4.9 to 14.3 per 100.000 individuals. The extremely proportion in females (from 6.5 to 21.4=14.9 per 100.000 women) was virtually fourfold accumulated than that of male (from 3.1 to 6.9=3.8 per 100.000 male). (**David et al, 2010**) incidence of patient treated with radioactive iodine are magnified in last decade everywhere the planet (**Megan et al, 2011**). In the last year approximately 150 case receive radioactive iodine (**Sohage University Hospital, 2018).**

Radioactive iodine is utilized to analyze and treat thyroid illnesses, such as goiter or to crush thyroid cancer cells**.** It present in many forms such as in liquid or capsule forms. Radioactive iodine destroys thyroid cells and helps to get rid of any remaining thyroid tissue. Patients receive the dose of radioactive iodine an outpatient clinic when the dose is not high **(National Institutes of Health Clinical Center, 2016).** Radioactive iodine present in two types; Iodine-123 (I-123) and Iodine-131 (I-131). Iodine-123 is utilized to test thyroid gland function. Iodine-131 (I-131) used in hyperthyroidism to minimize the gland size or to crush thyroid tissue in thyroid cancer (**Jianing et al, 2018**).

After the patients receive radioactive iodine I-131 is speedily preserved into the circulatory system within the digestive (GI) system and focused within the gland and destroys cells in which the medication still radiated for few days. The influence on the gland seems from thirty to ninety days once receiving treatment **(Radiological Society of North America, 2017).** The most common unpleasent effect of radioactive is hypothyroidism because of radioactive iodine often damage an excessive amount of thyroid cells, so the gland unable to provide enough hormones. Embody side effects of radioactive iodine include metal like taste in the mouth that will last for some weeks, nausea sometimes subsides one to 2 days when treated, inflamed salivary glands will last for some weeks. It's caused by iodine absorption by the salivary glands (**Louis, 2014**).

Nurses should give patient adequate instruction after receiving radioactive iodine because it was stays in patient body for a short time. Most of the radioiodine that will be eliminated from the body during the first few days after treatment. Radioiodine leaves body primarily through urine, but very small amounts can be found in saliva, sweat and bowel movements (**London, 2009)**. Risk to different people can be decreased through retaining a particular distance between person who is receiving the radioactive dose and others in addition to keeping less time in contacting the patient. These guidelines observe if affected person are returning to their own home, they have to use of personal transportation, use own bathroom and linens, arrange to sleep alone in a separate room, buy disposable dishes and utensils to use for meals, wear the gloves when patient clean or handle anything that has come into contact with body fluids, set up a separate garbage or bag for trash, planning to be off work or school for at least 7 days (**Society of Nuclear Medicine, 2019**).

Thyroid patients instruction is important to alleviate patient nervousness concerning medical care, facilitate patient grasp his own illness, scale back dependence on others. Sensible communication with patient impressed patient to finish with low complications, cut back variety of unneeded follow up visits **(Kresimira, 2014).**

Significance of the study

The thyroid gland absorbs the iodine that enters the body in food and uses this iodine to perform its normal function which is to make thyroid hormone. Radioiodine is similarly collected by the thyroid gland. The radiation given off by this form of radioiodine will shut down some of the cells in the thyroid gland and inhibit their ability to grow. Radioiodine treatment is a common, well accepted form of treatment that has been used all over the world for more than 40 years (**University of Chicago Medical Center, 2010).**

The researchers clinical observation explore that after receiving radioactive iodine therapy the patient's body become source of radiation for few days this is reflecting danger to others people who deal with patients, so the patient should receive adequate instructions about the radioactive iodine treatment.

AIM OF THE STUDY:

The aim of the study was to evaluate impact of implementing nursing guidelines on knowledge and habits of patients receiving radioactive iodine.

Hypothesis:

The mean score of knowledge and habits will be higher post implementing nursing guidelines instructions.

SUBJECTS AND METHODS:

Research design

Intervention research design (Pre / post test) was utilized in this study.

Study variables:

The independent variable in this study is impact of implementing a nursing guidelines while the dependent variables are: habits and knowledge of patients receiving radioactive iodine.

Setting:

The study was conducted in nuclear medicine department and out patient clinic at Sohage University Hospital.

Subjects:

A convenience sample of all available patients (60). The sample size calculated as the following diagram

$$n = \frac{NZ^2\sigma^2}{Z^2\sigma^2 + N e^2} = 50.21$$

$$n = \frac{150 * (1.96)^2 * (4)^2}{(1.96)^2 * (4)^2 + 150 * (0.05)^2}$$

Z =1.96 "standard scores", e =0.05 "error", σ = 4 "SD", N=150 "population"; n = "50.2"sample formula for calculated sample size

Inclusion criteria for the patients:

- Their ages ranges from 20 to 65 years.
- Male and female.
- Diagnosed with thyroid disease who received radioactive iodine in nuclear medicine department and outpatient clinic for first time.
- Are willing to participate in this study. Patients knowledge and habits was assessed pre and post implementing nursing guidelines.

Study tools: Three tools were used for data collection**:**

Tool I: Interview questionnaire sheet: to assess the demographic and medical data, it was designed by the researchers based on current national and international literature and it consists of two parts:

Part (1): Sociodemographic Characteristics of Patients: it includes age, gender, marital status, qualification.

Part (2): Assessment of patients medical data: it includes medical diagnosis, previous disease, most common side effects, patient living place, number and age of people live with patient in the same home.

Tool II: **Patient knowledge questionnaire sheet.** It was constructed by the researcher based on the literature reviews (**the American Thyroid Association, 2014- university of Washington 2017**). It was used to assess the knowledge of patients (pre-post) implementation of nursing guidelines regarding the intake of radioactive iodine therapy.

Tool III: Patient Habits Assessment Sheet: It was adopted from **(James, 2016)** It was used to assess (pre and post) implementing nursing guidelines.

Scoring system:

For knowledge assessment the total scores of questionnaire 20 grades, one grade was given for the incorrect answer and two for the correct answer. Those who obtained less than (50%) were considered having poor level of knowledge. (60%) were considered having fair level of knowledge and above (60%) were considered having good level of knowledge

For habits assessment: the total scores 14 grades, those who obtained less than (50%) were considered having wrong habits. Above (50%) were considered having correct habits.

Methods:

A. Ethical consideration

- An informed consent was obtained from patients to participate in the study and the nature and purpose of the study were explained to them.
- The researchers initially introduced themselves to all optional subjects and they were assured that the collected data would be absolutely confidential, they were informed that participation is voluntary and that they could withdraw at any time of the study, confidentiality of the patient's data was ascertained. Confidentiality and anonymity were assured and Patient's names were coded for data entry so that their names could not be identified.

B. Pilot study

- A pilot study was conducted on 10% of sample (6 patients) in a selected setting to evaluate the applicability & clarity of the tools. According to this pilot study, the required modifications were made. Those patients who were involved in the pilot study were not included in the study. Baseline data was obtained from patients to fill in Tools (I, II and III (pre-test)

C. Field of work:

The study was done according to three phases which are:

I- Preparatory phase (assessment & planning)

- Tools development.
- Content validity was done by 5expertise from the medical-surgical nursing field. Modifications were made accordingly, and then the tools were designed in their final format and tested for reliability using internal consistency for all of the tools which was measured using Cronbach test. The tools proved to be reliable (0.73.0.71 and 0.81, respectively).
- An official permission was obtained from the head of the nuclear medicine department at Sohage University Hospital to conduct the study, data collected from August 2017 to June 2018 .
- The researcher prepare Nursing guidelines Booklet: before implementing individual meetings which are established to assess their knowledge regarding radioactive therapy and their habits after receiving treatment it was used to provide knowledge and improve patients habits**.** It is consisted of two parts:
  Part I: Knowledge regarding radioactive iodine (definition, types, indication, contraindications, side effect of radioactive iodine).
  Part II: Nursing guidelines after receiving radioactive iodine (transportation guidelines, pregnant women guidelines, guidelines for work, precaution when dealing with children**).**
- Each patient answered the question during the assessment phase.

II - Implementation Phase:

- At initial interview the researcher introduce herself to initiate line of communication, explain the nature & purpose of the study and fill out the patient assessment sheet (tool I).
- Education has been implemented for patients in terms of meeting and education on the spot before receiving radioactive iodine dose. There were 2 meetings for every patients. Number of patients in each meeting ranged between 2- 3 patients. The duration of each meeting was 20 – 30 minutes, including 10 minutes for discussion and receiving feedback. Each meeting usually started by a summary of what has been taught during the previous meeting and the objectives of the new topics were presented. Feedback and reinforcement of education was performed according to the patients needs to ensure their understanding**. III-Evaluation phase:** It was started after Immediate implementation of nursing guidelines booklet. The patients' knowledge questionnaire

assessment sheet and patients 'habits assessment sheet has been evaluated by the researchers through filling the tool II and tool III.

Method of data Analysis:

The collected data were coded then transformed into specially designed form so as to be suitable for entering into computer. All entered data were verified for any error using Statistical Package for Social Science (SPSS) version 22 for windows. Descriptive statistics as number, percentage, mean, and standard deviation were used. Data were collected, tabulated and statistically analyzed using Chi- square test, Fisher's exact test and correlation coefficient (r) were calculated between continuous variables.

RESULT:

Table (1): Socio- Demographic Characteristics related to the studied patients (n=60).

Variables	**Studied patients (N=60)**	
1. Age	**No**	**%**
• 20-35 years • 36-50 years • 51 -65 years	9 44 7	15 73.3 11.7
Age groups Mean + SD	**45.33 + 6.21**	
2. Gender:		
• Male	20	33.3
• Female	40	66.7
3.Marital status:		
• Single	5	8.3
• Married	43	71.7
• Divorced	5	8.3
• Widow	7	11.7
4.Educational level:		
• High education	12	20
• Secondary school	22	36.7
• Read and write	14	23.3
• Non educated	12	20
5.Occupation:		
• Employee	33	55
• Farmer	15	25
• House wife	12	20

Table (1) shows that majority of patients were between age (36-50) years (73.3 %). More than two third of patients were female (66.7%), the highest was married (71.7%).As regard level of education more than one third of patients (36.7 %) were secondary educated. Looking at the occupation the highest percentage were employee (55%).

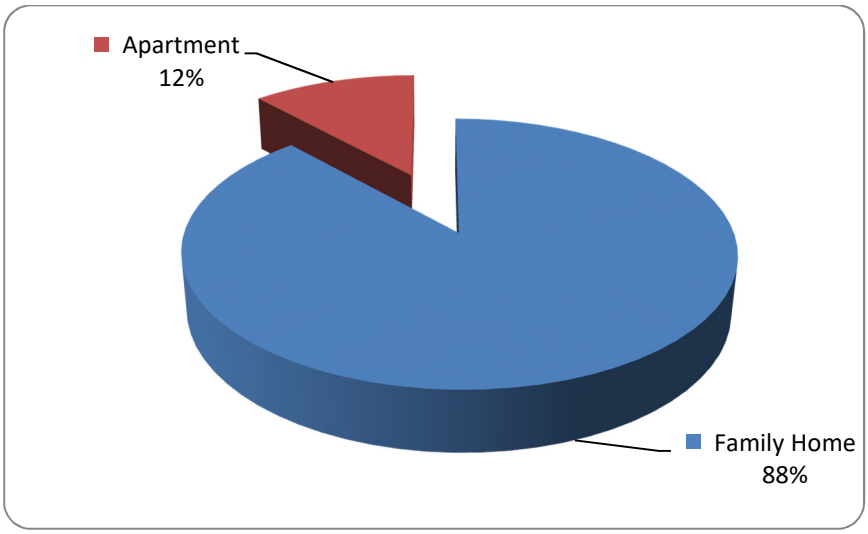

Figure (1): Frequency distribution of patients as regard to patient living

Figure (1) show frequency distribution of patients as regard to patient living. It was observed that the majority of patients (88%) are living in family home.

Table (2): Present Medical Data and living of studied patients (n=60).

Patients Medical Data	No	%
Chronic diseases:		
• Endocrine	23	38.3
• Hypertension	16	26.7
• Cardiovascular	11	18.3
• None	10	16.7
Radioactive iodine Side effect:		
• Nausea	15	25
• Metallic taste in the mouth	19	31.7
• Swollen salivary glands	24	40
• Hypothyroidism	2	3.3
Number of People living in the same home with patients:		
• 2-4 persons.	21	35
• 4-6 persons.	26	43.3
• 6-8 persons.	13	21.7
Number of children are less than 2 years old live in the same home with patients:		
• 2- 4 child.	49	81.7
• 4- 6 child.	11	18.3
People are between 2 and 16 years old live in the same home with patients:		
• 2-4 person	47	78.3
• 4-6 person	13	21.7
Time spend within 3 feet of a coworker (Hours)		
• Mean + SD	**3.81 + 1.11**	
Time spend to get home (minutes)		
• Mean + SD	**40.56 + 15.32**	

Table (2) illustrate medical data and living of studied patients. It was observed that more than one third of patients (38.3 %) have endocrine disorders as a chronic diseases in the past compared to less than one quarter (16.7%) of patients were not had chronic diseases. Regarding to radioactive iodine side effect, near half of patients (40%) have swollen salivary gland. **As for the number of people living in the same home with patients, there were 4-6** persons are living and represent (43.3 %). On other hand the majority of patients (81.7 %) have 2-4 children who are less than 2 years old living in the same home with patients. Also More than two third of patients (78.3 %) have 2-4 persons who are between 2 and 16 years old living with patient in the same home. Mean score of time spend within 3 feet of a coworker (3.81 ± 1.11 hour) and Means score of Time spend to get home was (40.56±15.32 minutes).

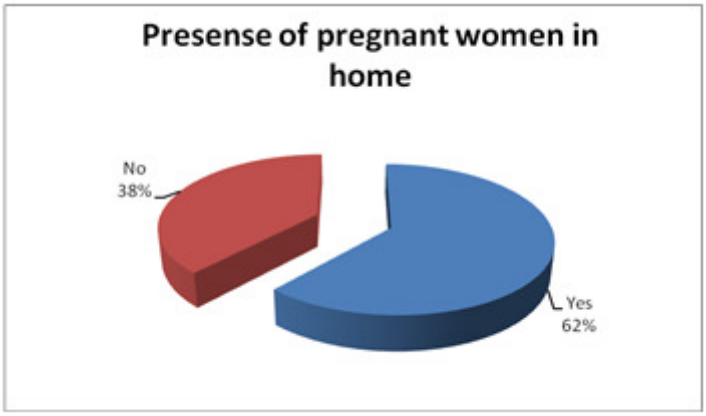

Figure (2) Frequency distribution of patients as regard presence of pregnant women at the same home with patients

Figure (2) show frequency distribution of patients as presence of pregnant women at the same home with patients. It showed that more than half of patients (62%) have pregnant women live at the same home with patients .

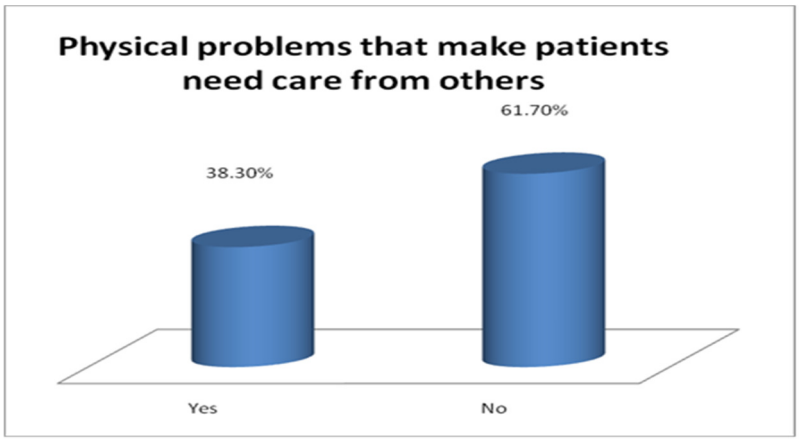

Figure (3) Frequency distribution of patients as regard physical problems make patients need care from others:

Figure (3) show that more than half of patients (61.70 %) who had physical problems did not need care from others.

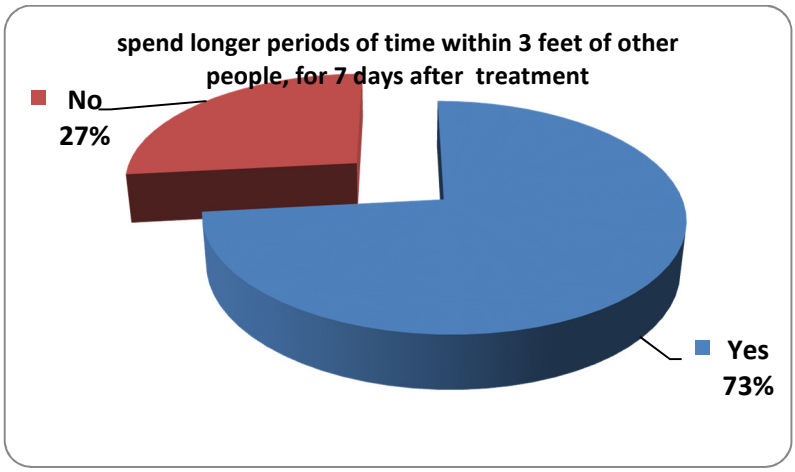

Figure (4) Frequency distribution of patients as regard spend long time within 3 feet of other people.

Figure (4) illustrate Frequency distribution of patients as regard spend long time within 3 feet of other people. It is observed more than two third of patients(73%) spend long periods of time within 3feet of other people for 7 days after treatment.

Table (3): knowledge assessment questionnaire of studied patients (pre and post) implementation of nursing guidelines 0f radioactive iodine therapy. (n=60).

Patients Knowledge	Pre-implementation			Post-implementation			P-Value
	Good	Fair	poor	Good	Fair	Poor	
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	
1-Strucure and function of thyroid gland.	4 (6.7)	5 (8.3)	51 (85.0)	49 (81.7)	6 (10.0)	5 (8.3)	0.021*
2- Definition of iodine therapy	6 (10.0)	2 (3.3)	52 (86.7)	55 (91.7)	3 (5.0)	2 (3.3)	0.010*
3-Uses of iodine therapy	3 (5.0)	8 (13.3)	49 (81.7)	54 (90.0)	2 (3.3)	4 (6.7)	0.003*
4-Side effects of iodine therapy	7 (11.7)	5 (8.3)	48 (80.0)	57 (95.0)	2 (3.3)	1 (1.7)	0.002*
5- Contact with children/pregnant women	1 (1.7)	3 (5.0)	57 (95.0)	58 (96.6)	1 (1.7)	1 (1.7)	0.001*
6-Sharing instrument with others	2 (3.3)	2 (3.3)	56 (93.4)	55 (91.7)	4 (6.7)	1 (1.7)	0.013*
7-Distance space to contact others	1 (1.7)	1 (1.7)	58 (96.6)	54 (90.0)	3 (5.0)	3 (5.0)	0.001*
8- Transportation and traveling	2 (3.3)	3 (5.0)	55 (91.7)	51 (85.0)	7 (11.7)	2 (3.3)	0.010*
9-Sleeping distance with others	4(6.7)	3 (5.0)	53 (88.3)	58 (96.6)	1 (1.7)	1 (1.7)	0.001*
10-Using of bathroom	1 (1.7)	5 (8.3)	54 (90.0)	56 (93.4)	3 (5.0)	1 (1.7)	0.040*
Mean ± SD	5.55 ± 2.44			18.133 + 6.13			0.001*

Tables (3) revealed knowledge assessment questionnaire of studied patients (pre and post) implementation of nursing guidelines of radioactive iodine therapy. The majority of patients (96.6%) represent poor knowledge score in relation to distance space to contact others pre-implementation compared to 5 % of them after implementation of nursing guidelines. Meanwhile (95%) of patients had poor knowledge regarding contact with children / pregnant women pre implementation compared to 1.7 % of them after implementation. Significant statistical differences were observed among patients' knowledge pre and post implementation of nursing guidelines about radioactive iodine therapy.

Figure (5): Distribution of studied patients according to their level of knowledge pre and post implementing nursing guidelines.

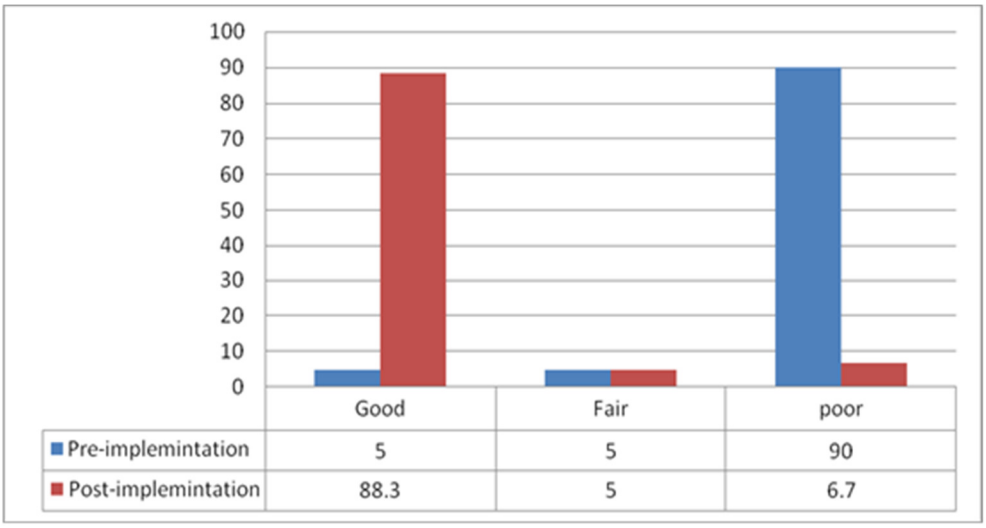

Figure (5) Patients' knowledge level pre and post implementing nursing guidelines

Figure (5) illustrate total knowledge level among studied patients pre and post implementation of nursing guidelines. The minority of patients (5%) represented good knowledge level preimplementation and the percentage improved to 88.3% after implementing nursing guidelines of radioactive iodine therapy.

Table (4): Habit assessment questionnaire of Studied Patients (pre and post) implementation of nursing guidelines (n=60).

Patient Habits	Pre		Post		X^2/FET	p-value
	No	%	No	%		
1.Stay far from family for 7 days after treatment:					0.145	0.006
-Yes	14	23.3	52	86.7		
-No	46	76.7	8			
2.Stay far from pregnant for 7 days after treatment:					0.173	0.005*
-Yes	17	28.3	45			
-No	43	71.7	15	25		
3.Off work for at least 7 days after treatment:					0.201	0.003*
-Yes	11	18.3	42	70		
-No	49	81.7	18	30		
4.Type of transportation use to go home after treatment:	48	80	35	58.3	1.000	0. 002*
-Public transportation						
-Special transportation	12	20	25			
5.Use of separate bathroom after treatment:					0.083	0.003*
-Yes	7	11.7	41	68.3		
-No	53	88.3	19	31.7		
6.Use isolated bed for sleep after treatment:					0.045	0.001*
-Yes	14	23.3	51	85		
-No	46	76.7	9	15		

FET= Fisher's Exact Test Statistical significant (P≤0.05)

Tables (4) shows habit assessment questionnaire of studied patients (pre – post) implantation of nursing guidelines. Statistical Significance difference were observed among all items of patient habits except stay far from family after implementing nursing guidelines.

Table (5): Relationship between patients' knowledge level and sociodemographic characteristics (post implementation of nursing duidelines regarding receiving radioactive iodine.

Sociodemographic characteristics	Patients Knowledge						P-Value
	Good n=53		Fair n=3		Poor n=4		
	No	%	No	%	No	%	
1-Age • 20-35 years	42	79.2	2	66.7	0	0.0	0.020*
• 36-50 years	8	15.1	1	33.3	1	25.0	
• 51 -65 years	3	5.7	0	0.0	3	75.0	
2-Gender:							
• Male	28	52.8	1	33.3	3	75.0	0.6
• Female	25	47.2	2	66.7	1	25.0	
3-Marital status:							
• Single	4	7.5	1	33.3	0	0.0	
• Married	41	77.4	2	66.7	0	0.0	0.000*
• Divorced	2	3.8	0	0.0	2	50.0	
• Widow	6	11.3	0	0.0	2	50.0	
4-Educational level:							
• Higher education	28	52.8	0	0.0	0	0.0	
• Secondary school	14	26.5	3	100.0	0	0.0	0.000*
• Read and write	7	13.2	0	0.0	2	50.0	
• Non educated	4	7.5	0	0.0	2	50.0	

Table (5): show that there is relationship between patient knowledge level and age, marital status and educational level.

DISCUSSION

Although the treatments with 131-I are generally safe,RAI produces radiation so patients must do their best to avoid radiation exposure to others, particularly to pregnant women and young children **(American Thyroid Associatio, 2014).**

The result of present study showed that most of patient between age (36-50) years. More than two third of patients were female, the highest was married, as regard level of education more than one third of patients were secondary educated. Looking at the occupation the highest percentage was employee. Thyroid disease more common in age between 36-50 years in Egypt. This study agree with **Perry et al, (2000)**, who reported in their study about "**Radiation Exposure From Outpatient Radioactive Iodine (^{131}I) Therapy for Thyroid Carcinoma "** that the majority of patients were females, disagree in occupation most patients were household, age ranging from 9 to 76 years old (mean, 42 years). According to **Yair Liel, (2002)**(), in **Preparation for radioactive iodine administration in differentiated thyroid cancer patients, Clinical Endocrinology** mentioned that the majority of patient were female and their age range from 32 to 60 years old.

As regard chronic diseases this study illustrate that more than one third of patients have endocrine disorders. It could be explained thyroid function disturbance may affect other body gland functions. Mean while swollen salivary gland presenting more than one third of patients were suffering as side effects from radioactive iodine therapy. In the same line **Ravinder et al, (2009)**() revealed that salivary gland side effects occurred in more than one third of patients after radioactive iodine treatment. **Juliana et al,(2010)**() obvserved that radioactive iodine was associated with impairment of saliva excretion.

In this study, it was observed more than one third of patients have 4-6persons live in the same home with patients it could be interpreted the economical status and social aspect of Egyptian family always living in family home. on other hand the majority of patients have 2-4 children are less than 2 years old live in the same home that may refer to Egyptian culture and family constructors with early marriage in small homes. It is in the same line of the study of **Ravinder et al. (2009**) who reported that there were usually transient the highest percentage was live in family home, mean number of people live in the home (4.83 + 1.10), where as other studies revealed mean of People are less than 2 years old living with patient in the same home (1.48 + 0.87)(). additionally, this study revealed more than half of patients have 2-4 persons who are between 2 and 16 years old living with patient which is in the same line of **Ravinder et al.2009** who mentioned -- **Salivary Gland Side Effects Commonly Develop Several Weeks After Initial Radioactive Iodine Ablation**, mean of People are between 2 and 16 years old living with patient in the same home (2.90 + 1.31). As regard patients knowledge; our study toward radioactive iodine therapy revealed that knowledge improved after implementing nursing guidelines. It was in the same line with **James et al, (2011)**. Radiation Safety in the Treatment of Patients with Thyroid Diseases by Radioiodine 131I who

suggested that groups responsible for treatments should instruct patients and caregivers in the attainment of instruction after treatment, this instruction can help physicians and patients maintain radiation safety after treatment with radioactive iodine. Based on current study regulations and understanding of radiation exposures, nurse guidelines have been made to guide physicians and patients in safe practices after treatment with radioactive iodine**.**

As regard patients habits this study found that statistical significance difference in all items of patients habits except stay far from family after implementing nursing guidelines. **James(2016)** reported in **Patient Guide to Radioactive Iodine** that patients should stay away from home for at least 7 days after treatment with radioactive iodine. If that is not possible, patients need to stay in a separate area of home, staying in a hotel after treatment is not recommended. Patients also should be off work or school for at least 7 days**.** In our study most patients were not stay away from home after treatment, most of patient use public transportation and go work after treatment**.**

James et al, (2011) recommended **Radiation Safety in the Treatment of Patients with Thyroid Diseases by Radioiodine 131I** that it is prefer to use a separate toilet. If this isn't possible, flush the toilet twice after use. It's important to keep the toilet area clean; use toilet paper to wipe up any drips and then flush it down the toilet. Maximize distance from children and pregnant women (6 feet) (one feet = 2,5cm). Do not travel by airplane or public transportation 3 days, do not travel on a prolonged automobile trip with others 2-3 days, sleep in a separate bed (6 feet of separation) from pregnant partner, child or infant for 6-23 days after receive radioactive iodine.

The result of study found that there is relation between knowledge and patient age, marital status, level of education in researchers opinion highly educated patient have ability to access to knowledge through different sources such as books or internet than others patients who secondary educated or read and write**.** According to **(Louis, 2007)** mentioned that patient teaching is important because the patient has the right to know and to be informed about diagnosis, prognosis of illness, treatment options, risks associated with treatments. And assigned patient teaching to the professional nurse and rationalized the advantages of a well-designed comprehensive teaching plan that fit patients' unique learning needs that it reduces health care costs and improve the quality of care.

CONCLUSION

Providing nursing guidelines was largely effective on improve patients knowledge and correct habits.

RECOMMENDATIONS

For nurses:

1. Continued nursing education and in service training programs at nuclear department should be organized within Sohage University Hospital and equipped with the necessary educational facilities and materials necessary to upgrade the knowledge and skills of nurses, which will be reflected on better outcome for patients.
2. Nurses should be aware by guidelines that given to patients after receiving radioactive iodine and inform patients about them.

For patients:

1. Patients are to be provided with sufficient written information to remind them with guidelines. It is essential for such patients to avoid possible trauma and to avoid hard work essentially for about one month postoperative after receiving radioactive iodine.

For the researches

Applying research on widely geographical area.

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