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Effect of Self Care Practice Guidelines on Acute Radiotherapy Side Effects among Lung Cancer Patients

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Abstract: **Radiotherapy plays an important role in the management of lung cancer, with over 50% of all lung cancer patients receiving this modality at some point during their treatment. In the radical setting, the ultimate aim of radiotherapy is to achieve local tumor control while limiting damage to the surrounding normal tissue nursing teaching program play a critical role in reducing acute radiotherapy side effects. Objective: Determine the impact of nursing teaching program on reducing acute radiotherapy side effects among lung cancer patients. Setting: The study was conducted at in the Radiotherapy Unit at Ayadi Almostakble Charity Hospital at Alexandria and the affiliated out patients clinics. Subjects: A convenience sample of 70 patients determined to have lung cancer and scheduled for radiotherapy. They were sequentially divided into 2 equal groups; the first was the control groups which comprised 35 patients and exposed to routine hospital care only, the second was the study group and comprised 35 patients and they received the nursing teaching program. Tools: Three tools were used Tool I: Socio-demographic and clinical data., Tool II: Lung cancer patient's knowledge structured interview schedule, Tool III: Assessment of radiotherapy side effects and patients self -care structured interview schedule, Results: The study result revealed that all (100%) of control group patients had poor knowledge pre and post self-care practice guidelines application, however the study group patients showed marked improvement in their knowledge within the study group with significant difference ($\chi 2$= 18.720,P = 0.000*).Furthermore, it was observed that there was significant difference between control and study group patients pre and 2,3 weeks post self- care practice guidelines application ($\chi 2$= 5.384, P = 0.020*, $\chi 2$=28.571, P = 0.000*, $\chi 2$=13.732, P = 0.000*) respectively. patient total score of self-care practice, it was found that all control group (100%) had poor self- care practice preprogram, while the vast majority (91.5%) of them had poor self-care practice post 2, 3 weeks of program application. However, all study group (100%) had poor self- care practice preprogram, while the majority (71.4%)of them had faire self- care practice 2 weeks post program application, compared to the vast majority of them (57.1%) of them had good self-care practice 3 weeks post program application. The difference was highly statistically significant within the study group patients (P= 0.000*), and between control and study group patients 2 and 3 weeks post self- care practice guidelines application (P= 0.000*, p=0.000*,) respectively. Conclusion: applying the nursing teaching program had statistically significant improvement of patients' knowledge, self-care practice of acute radiotherapy side effects. Recommendations: In service training program should be carried out for nurses working in oncology department, especially radiation therapy department about acute radiotherapy side effects and self-care practice guidelines.**

Keywords: **Self-Care Practice Guidelines Program, Acute Radiotherapy Side Effects, Lung Cancer.**

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I. INTRODUCTION

Lung cancer (LC) is the leading cause of death in the United States.2In 2017, an estimated 222,500 new cases (116,990 in men and 105,510 in women) of lung and bronchial cancer will be diagnosed, and 155,870 deaths (84,590 in men and 71,280 in women) are estimated to occur because of the disease. Only 17.7% of all patients with lung cancer are alive ≥5 years after diagnosis [(1)]. The number of lung cancer-related deaths in Europe for 2017 is estimated to represent the leading cause of cancer deaths in both genders, accounting for 24% in males and 15% in females, respectively The World Health Organization (WHO) estimates that lung cancer is the cause of 1.59 million deaths globally per year, with 71% of them caused by smoking [(2,3)]. In Egypt, lung cancer is one of the most common cancers, 5.0%-7.0% of all cancers. It's incidence increased during1980-2014, from 11.9 to 63.3/100.000 populations for men and from 3.7 to 13.8/100.000 populations for women. Lung cancer ranks the fifth in males and both sexes, and ninth among females[(4,5)].

There are many different types of lung cancer treatment, including surgery, radiation therapy (RT), and/or systemic therapy (e.g., chemo-therapy, hormonal therapy, immune therapy, and targeted therapy). Treatments may be used alone or in combination depending on the type and stage of cancer; tumor characteristics. Radiotherapy plays an important role in the management of lung cancer, with over 50% of all lung cancer patients receiving this modality at some point during their treatment. In the radical setting, the ultimate aim of radiotherapy is to achieve local tumor control while limiting damage to the surrounding normal tissue [(6)].

RT side effects on the lung are classified as acute and chronic. Acute or short term side effects occur during treatment or just after its completion, and usually resolve within four to six weeks. Late adverse effects are observed several months to years after completion of treatment and may be permanent [(7)]. Short-term side effects often begin within a few weeks after patients start radiation therapy as **skin Irritation, cough, shortness of Breath, fatigue, esophagitis and nausea. While** chronic or long term side effects also occur following RT. Since some of these may not begin for weeks or years after treatments are completed, these side effects includes; **pulmonary Fibrosis** (lung scarring)**, Cardiac Toxicity, pericardial Effusion, and secondary Cancers**, radiation pneumonitis (coughing, fever and a sensation of fullness in the chest that can occur several months after RT) [(8-10)].

RT is used in approximately half of all cancer cases and is applied as a component of curative and/ or palliative treatment. While RT can have health benefits for cancer patients, its side effects can negatively impact quality of life (QOL). There is a need to objectively examine the ways in which RT affects QOL[(11)]. A diagnosis of lung cancer may negatively affect a patient's well-being. Causing psychological distress, socioeconomic problems, depression, social isolation and altered body image have been reported in patients who undergoing RT Up to one third of patients treated with radiation therapy have been identified as having unmet psychosocial needs. These unmet needs can result in refusing to undergo radiation therapy, treatment delays, reduced adherence to medical advice, decreased quality of life, decreased satisfaction with services and increased resource use [(12)].

The participation of cancer patients in self-care programs causes behavioral changes and health promotion. Currently, the best management approach to this chronic condition is self-care, which refers to patients' involvement in self-observing, recognizing, and labeling symptoms and judging their severity, assessing, and adopting treatment choices, and evaluating the efficiency of self-care. Therefore raining self-care is essential for self-management and self-treatment so that patients with no self-care education may be hospitalized more frequently [(13,14)]. Effective self -care management strategies should be provided through nurses this is to improve the quality of life of such patients, and reduce the adverse impacts of treatment. Oncology nursing plays an important role in developing effective instructional programs for lung cancer patients to manage their acute radiotherapy side effects and assisting patients in performing effective self -care management and in providing information about treatments, so that patients can make better decisions about their treatment [(15)].

Therefore, this study will be conducted to determine the impact of self-care practice guideline program on reducing acute radiotherapy side effects among lung cancer patients.

II. MATERIALS

Research Design:

A Quasi experimental research design was utilized to fulfill the aim of this study.

Setting:

- This study was conducted in the Radiotherapy Unit at Ayadi Almostakble Charity Hospital at Alexandria. The radiotherapy department consists of 4 linear accelerators in addition to, C.T simulator and brachytherapy unit.

Subjects:

A convenience sample of 70 adult patients admitted to the above mentioned settings and diagnosed with lung cancer undergoing radiotherapy will be included in the study**.** The study sample was selected based on Epi info -7 program which used to estimate the minimum sample size using the following parameters;

- Population size 160 over 12 months,
- Expected frequency 50%,
- Acceptable error of 10%, and
- Confidence coefficient 95%.
- The minimal sample size required is 50 patients.

The study subjects divided randomly into two equal groups; study and control group (35 for each group), the study group received self- care practice guidelines and the control group exposed to routine care only.

Inclusion criteria: The patients, who participated in this study, were selected according to the following criteria

Patients aged range from 30-60 years old.

Patients with lung cancer and who received radiotherapy for less than one month.

Patients who do not receive chemotherapy in combination with radiotherapy (chemo-radiation).

Study Tools: -

Three tools were used for data collection:

Tool I: Socio-demographic and clinical data.

This was developed by the researcher and included the following:

Socio-demographic characteristic: included as age, sex, marital status, level of education, occupation, income and residence area.

Clinical data which included: family history related to disease occurrence, patients history related to previous medical and surgical history, causes of previous hospitalization, time of starting treatment, and patient's habits related to smoking and over counter medication.

Tool II: Lung cancer patient's knowledge structured interview schedule:

This tool was developed by the researcher based on review of relevant literature (Berkey, 2010; Rao, Castelino, Shetty & Babu, 2015; Baker & Fairchild, 2016; Pollom et al., 2016), to assess lung cancer patient's knowledge about acute side effects of radiotherapy.

Assessment of radiotherapy side effects and patients self -care structured interview schedule:

This tool comprised two main parts to assess severity of acute radiotherapy side effects as well as self -care behaviors toward these side effects, and its effectiveness on lung cancer patients.

It consisted of two parts:-

-The first part: Assessment of severity of acute radiotherapy side effects.

This part of tool was developed by National cancer institute (2010) according to common terminology criteria for adverse events (CTCAE) (National Cancer Institute (NCI), 2010; Bernier et al., 2011; Sourati, Ameri & Malekzadeh, 2017). To assess severity of acute radiotherapy side effects on lung cancer experienced by those under radiotherapy such as:

-Severity of side effects will be assessed by using rubric from normal (0) to severe (3).

-Scoring system:

-Patients' score related to severity of side effects was summed up together for each patient then it was calculated as the following:

- From zero was considered as **mild**.
- From 30% was considered as **moderate**.
- From 70% was considered as **severe**.

b- The second part: Patients' practice for their acute radiotherapy side effects. This part developed by the researcher based on review of literature (National Cancer Institute (NCI), 2010; Bernier et al., 2011; Sourati et al., 2017). To assess and describe how the lung cancer patient deals with acute radiotherapy side effects it include 29 statements and 145 sub statements.

Scoring system:

- The patients' self- care practices was scored on 3 points Likert scale as follow; (**0=Never, 1= Sometimes, and 2= Always**).

- The total health promoting self -care practices score was summed up and converted to percent then patient evaluated as follow:

- < 50% was considered **Poor.**
- 50 % was considered **fair.**
- 75% and more was considered **good.**

III. METHOD

The study was accomplished as follows:

1- Written approval from ethical committee, faculty of nursing, Alexandria University was obtained.

2- An official permission was obtained from Ayadi Almostakble charity Hospital after explanation of the aim of the study.

3- Development and content validity of the study tool:

The study tool I and II was developed by the researcher, while tool III was adopted by the researcher from national cancer institute (2010) after extensive reviewing of relevant literature and translated to Arabic to assess severity of acute radiotherapy side effects on lung cancer.

4- Validity:

The Content validity of the tools and booklet were tested by five experts in the field of Medical-Surgical nursing in Alexandria University, to test content validity ,completeness and clarity of items and appropriate translation. Comments and suggestions of the jury were considered and the tool was modified accordingly.

5- Reliability:

The reliability of the developed tools were tested by using Cronbach's Alpha test. The tool for the study was applied to patients. Reliability coefficient value was 0.891.

6- A pilot study:

A pilot study was conducted on 7 adult patients with lung cancer (10% of the study sample, who were not included in the study sample) from the previously mentioned settings in order to evaluate the clarity and applicability of the study tools. The data obtained from the pilot study were analyzed, and the final form of tools was reconstructed and ready for use. Those patients was excluded from the actual study sample

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7- Sample size:

Based on **Epi info 7** program, a convenient sample of seventy adult patients with lung cancer were recruited according to the previously mentioned inclusion criteria and assigned into two sequential equal groups as follows:

Group (I): subjects were receiving only the routine hospital care.

Group (II): subjects were receiving the self- care practice guidelines.

8- Data collection:

The final draft of the structured tool was used to collect data in order to achieve the objective of this study. The data were collected by the researcher for each patient using individualized interview. Data was collected for a period of 10 months starting from August 2018 to May 2019 .Data was collected from radiotherapy departments The interview ranged from 30-60 minutes on individual session.

The study was carried out on three phases.

Phase I: Assessment

The researcher started by introducing herself to the patients and built therapeutic communication with patients to get cooperation after explaining the purpose of the study

a. **Initial assessment** was carried out on the second week **(after 10-15 radiotherapy sessions)** from the starting of sessions using tools I, II, and III for both group subjects to collect baseline data about patients health history, existing knowledge about lung cancer, radiotherapy, side effects of radiotherapy and self- care practices, as well as, assessing the patients' needs preceded the planning for developing the self -care practice guidelines.

b. Subsequent assessment was done after 2 weeks **(after 20 radiotherapy sessions)** and 3 weeks **(after 25 radiotherapy sessions)** from administration of radiotherapy sessions in order to evaluate the effect of the teaching program and evaluate patient's progress.

Phase II: Planning

Based on assessment of patients' needs, the teaching program goals, priorities, contents, and expected outcomes were developed by the-researcher according to the individual needs and problems. It was formulated based on the guidelines of the American and European oncology association, relevant literatures **(Bernier & Russi 2011 & Vanessa et al., 2011 & Ainaz et al., 2017 & National Cancer Institute, 2010a**), and on the identified patients' needs. The content will be organized according to a feasible learning sequence (from easy to difficult) to enhance patients' understanding.

Goals and expected outcomes of the program:

- Identify lung and its function
- Identify the meaning of lung cancer
- Illustrate different line of lung cancer treatment.
- Discuss the meaning of radiotherapy, its goal and how it work.
- Discuss side effects of radiotherapy and self- care practice guidelines used to reduce these side effects.

- Methods of teaching strategies used included the following: interactive lecture, discussion, demonstration and re-demonstration.
- The nursing teaching program included three sessions for each patient. Each session lasted for one hours ,
- Illustrated colored booklet was formulated by the researcher and distributed to each patient of study group in the implementation phase.

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Phase III: Implementation

- After the completion of patient assessment and obtaining complete picture about patient's needs The developed teaching program was conducted and applied individually to each patient after beginning the radiotherapy sessions for 2 weeks in the radiotherapy department in Ayadi Almostakble Charity hospital in Alexandria, using verbal instructions and was supported by using written booklet as an illustrative guide for more clarification.
- Patients were asked to repeat the guidelines until the investigator was assured that the patient had gained the knowledge.
- The nursing teaching program consisted of the following three sessions :

***The first session contents will include the following:**

- Specification of the objective.
- Information about the disease (definition, risk factors, types, sign and symptoms of lung cancer, and different line of lung cancer treatment).

*** The second session will include content about:**

- Definition of radiotherapy, it's types, how it work, and steps done to deliver radiotherapy sessions.
- The goal of radiotherapy.
- Mechanism of radiotherapy.

***The third session will include contents about the following:**

- Acute radiotherapy side effects.
- Self- care practice to deal with each acute radiotherapy side effects of cancer patients.
- Reinforcement for patients and answer any patients questions.

-Patients were asked to repeat the knowledge learned several times until the researcher make sure that given knowledge was successfully mastered in the three sessions.

-The illustrative booklet was given to each patient's in the study as a reference before the first session of health education. A time to read and understand the information included in the booklet and the researcher clarifies any question and information if needed post sessions.

Phase IV: Evaluation phase:

All patients were evaluated 2 weeks (20 sessions), and 3weeks (25 sessions) after the implementation of teaching program using the study tools II and tool III, to assess the impact of education related to self- care practice performed and its effectiveness for a given side effects among the studied patients with lung cancer.

IV. INDENTATIONS AND EQUATIONS

Statistical Analysis

A- After the data were collected, they were coded and transferred into special design formats, so as to be suitable for computer feeding. Following data entry, checking and verification processes were carried out to avoid errors during data entry. Data was computed and statistically analyzed using the Statistical Package for Social Sciences "SPSS" software version 20.

B- Descriptive statistics

- Count (numbers) and percentage, used for describing and summarizing qualitative data.

- Mean median and standard deviation, used for describing and summarizing quantitative data.
- Minimum- Maximum used for presenting non parametric quantitative data.

B-Analytical statistics

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0**. (**Armonk, NY: IBM Corp**)** Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard deviation. Significance of the obtained results was judged at the 5% level.

The used tests were

1 - Chi-square test

For categorical variables, to compare between different groups

2 - Fisher's Exact or Monte Carlo correction

Correction for chi-square when more than 20% of the cells have expected count less than 5

3 - Student t-test

For normally distributed quantitative variables, to compare between two studied groups

4 - ANOVA with repeated measures

For normally distributed quantitative variables, to compare between more than two periods or stages

5 - Friedman test

For abnormally distributed quantitative variables, to compare between more than two periods or stages

C- Graphical presentations

- Graphs were done for data visualization of study and control findings using Microsoft Excel.

V. RESULTS

Table (1): Shows the frequency distribution of the study and control groups according to their socio-demographic characteristics. Regarding patient's age, the results revealed that nearly three quarters of the control group (68.6%) and more than half of study group (54.3%) were aged from 50 or< =60years old . Concerning marital status, all of the studied patients in the control and study group were married. In relation to the educational level, it was observed that the highest percentage of both control and study groups (37.1%, 54.3%) respectively were illiterate. Concerning area of residence, this table also revealed that the all the study group (100%) and control group (85.7%) were from urban area. In relation to occupation, it was found that around half of the study group (51.4%) were retired while (37.1%) of them had no work. The highest percentage of control group (37.1%) had no work.

Table (2): Shows the frequency distribution of the study and control groups according to their family history. The table showed that, more than half of patients of study group (57.1%) had no family history of cancer. Moreover, the majority of patients of control group (68.6%) had no family history of cancer. In relation to the family history of other chronic diseases disease, it was noticed that the highest percentage of patients of both study and control group had chronic diseases (65.7%, 74.3%) respectively. Moreover, the majority of both control and study groups had family history of heart diseases diabetes mellitus (40%, 28.6%) respectively.

Table (3): This table revealed that, all studied patients of study and control group (100%) were smokers; out of them were cigarette smokers of study group and control group (42.9%, 22.9%) respectively compared to who smoked water pipe of study group and control group (8.6%, 37.1%) respectively. While, the majority of studied patients of study group and control groups (48.6%, 40%) respectively smoked cigarette and water pipe. Also it was found that, the highest percentage of smoker patients of study group and control group started smoking in the age group of less than 18 years (85.7%, 65.7%) respectively. In relation to number of cigarettes smoked per day the highest percentage of studied patients of study and control group were smoked 1-2 boxes of cigarettes /day (75.0%, 80.6%) respectively.

Table (4): Concerning total knowledge score, it was found that all (100%) of control group patients had poor knowledge pre self- care practice guidelines application, while the vast majority of study group (97.1%) had poor knowledge pre self- care practice guidelines application. However the study group patients showed marked improvement in their knowledge within the study group, more than half of the study group(57.2%) had good knowledge in the 2nd week post self- care practice guidelines application but declined to (42.9%) in the 3rd weeks post self- care practice guidelines application with significant difference ($\chi 2$ = 35.109,P = 0.000*).Furthermore, it was observed that there was significant difference between control and study group patients 2,3 weeks post self- care practice guidelines application ($\chi 2$=28.571, P = 0.000*, $\chi 2$=13.732, P = 0.000*) respectively.

Table (5): Concerning patient total score of self-care practice, it was found that all control and study group (100%) had poor self- care practice preprogram. There was an improvement 2 weeks post self- care practice guidelines application as more than half of study group (57.1%) had faire self -care practice. Increased to (71.4%) of study group had good self-care practice 3 weeks post self- care practice guidelines application. The difference was highly statistically significant within the study group patients (P= 0.000*), and between control and study group patients 2 and 3 weeks post self- care practice guidelines application (P= 0.000*, p=0.000*,) respectively.

Table (6): Concerning the overall severity of side effects, it was found that all study and control group (100%) had severe side effects pre implementation of self-care practice guidelines. However, the study group patients showed marked improvement in overall severity of acute radiotherapy side effects as more than half of study group patients (57.1%) had moderate side effects after 2 weeks of application of self-care practice guidelines, compared with (68.6%) had mild side effects after 3 weeks of application of nursing teaching program . The difference was highly statistically significant within the study group patients (P= 0.000*), and between both group patients 2nd and 3rd week post self- care practice guidelines application (P= 0.002*, p=0.000*) respectively**.**

VI. DISCUSSION

Lung cancer is the major cause of oncologic-related death worldwide. Due to delayed diagnosis, 5-year survival rate accounts for only 15%. Treatment includes surgery, adjuvant chemotherapy, and radiation therapy; however, it is burdened by many side effects. Progress of the disease, severity of its symptoms, and side effects decrease significantly the quality of life in those patients [(17)] **(Polanski et al., 2016).**

Lung cancer patients need information concerning treatment, its side effects, physical pain, the body's response to side effects, and the impact on activity of daily living. If these information needs are not met, patients may feel uncertain or possibly choose to discontinue treatment. As patients obtain more information, their decision-making capacity increases and their response to the disease improves, thereby enhancing their quality of treatment and care, reducing anxiety and emotional distress, and promoting emotional stability with family members. So nursing teaching program is an important and potentially powerful tool that can have beneficial effects in restoring patient daily living activity. Understanding patients' unmet needs is important to develop best practices and to direct resources to address those needs [(18)]**(Giuliani et al., 2016)**.

However, the current study evaluated the effect of self- care practice guidelines on acute radiotherapy side effects among lung cancer patients.

Socio-demographic and clinical data of the studied lung cancer patients.

Regarding sex, the results of the present study revealed that all of the study and control group patients were males this may be due to in Egypt males are the most persons exposed to direct, indirect smoking and occupational hazard that it can be risk factors of LC. This finding agrees with **(Urman et al.,2016)** [(19)] who found that lung cancer incidence in males rates higher than females worldwide; 3:1, also In Egypt, male to female ratio is 3.2:1.Moreover,it can be justified that the male patients stay outdoor most of time especially in café so they may exposed to indirect smoking.

Regarding age group, the results of the present study revealed that the majority of the study and control group patients were in the age group ranging from 50 to less than 60 years. This finding may be justified that the aging process is the biggest risk factor for lung cancer because of the respiratory system undergoes a number of structural, physiological and immunological changes with age. This finding agrees with **(Abo-Elkheir et al., 2018)** [(20)] who found that the Most of

lung cancer patients in Egypt were in the fifth (55.3%) and sixth (29.3%) decades. In addition, **(Venuta et al., 2016)** [21] stated that the highest incidence of increased risk of developing lung cancer that is primarily a disease of populations of 60 years old. This result is similar to those of **(Ferlay, 2015)** [22] who found that the incidence of lung cancer is low in people aged <40 years and increases up to age 60–75 years in most populations.

Regarding the level of education. This finding is supported by **(Wang et al., 2016)** [23] who reported that there was a positive associations were found between education and lifestyle factors and the perception of genetic knowledge on the development of lung cancer patients. Strategies developed to improve the perception of genetic knowledge of lung cancer may target on individuals who are young, have lower education, and lack correct smoking attitude or exercise.

In relation to the area of residence, this study showed that the highest percentage of the study and control groups was living in urban areas. This finding was supported by **(Essam & Atef, 2018)** [24] who mentioned that urban residence is risk factor; in Egypt urban to rural residence ratio is 2.1:1. This attributed to tobacco smoking, air pollution, and type of occupation. Air pollution (car exhaust) and occupational exposure as asbestos and arsenic are important risk factors. In addition in Egypt, 47.2% of the patients were workers in cement construction and production. Moreover, this result is in accordance with **(Kauczor et al, 2015)** [25] who stated that, environmental pollution (air pollution) is among the most common risk factors especially in urban area. Evidences confirm an association between air pollution and increased lung cancer mortality. This is in the same line with **(Loomis & Huang, 2013)** [26] who stated that, there is a positive association between various indicators of air pollution and lung cancer risk.

Regarding occupation and income the highest percentage of study and control group were retired and all of them not have enough income as the most of the studied patients have an early retirement due to the disease, its consequences and treatment schedule affect their work production. The result of this study was supported with **(Matsuyama et al., 2013)** [27] who reported that 50% of lung cancer patients were unable to continue working because of disease related factors, also there were an increase in medical expense at a time when the household income suddenly decreased often leaving family with a heavy financial burden.

In addition this study supported with **(Sesto et al., 2013)** [28] who found that cancer survivors had a greater risk for early retirement as well as unemployment. Previous studies have shown that 30-50% of cancer survivors may experience treatment- or disease-related long-term and late effects that can adversely impact work activities Work activities with increased physical or cognitive demands can be particularly problematic for cancer survivors to perform Treatment related side effects (e.g., fatigue, pain, and physical and cognitive limitations), in combination with age-related physical and cognitive changes, may exacerbate work-related difficulties for cancer survivors. **Furthermore,** from the researcher's view the high cost of treatment expenses, high cost of the basic human requirement for life and imbalance between income and outlay is the main causes.

As regard to patients family history the present study revealed that, the highest percentage of the study and control groups had family history of cancer. This finding was explained by **(Malhotra et al., 2016)** [29] **and (Kanwal et al., 2017)** [30] who stated that genetic factors play a role in cancer cell development; abnormal chromosomal patterns and cancer have been associated with extra chromosomes change. A positive family history of lung cancer has been found to have high familial risk for early-onset lung cancer. Increased relative risks were found even after careful adjustment for smoking.

Also, the present study revealed that the majority of studied patients had history of chronic diseases most of them had previous history of diabetes mellitus This result could be justified by that the majority of the sample were in the age group from50- 60 years old they are liable to develop chronic diseases in addition to the burden and stress of lung cancer may have a role, this study contradicts with **(Abd-Elhamid,2014)** [31] who found that most of studied patients had a negative history of other associated diseases as hypertension, congestive heart failure and diabetes mellitus..

Regarding patients' smoking habit, in the present study all study and control group patients were smokers. This result was parallel with **(Yunlong & Ming, 2017)** [32] who stated that cigarette smoking is a common adverse behavior resulting in various cancers. Notably, smoking confers a higher risk for lung cancer, on average between 5- and 10-fold. In developed countries, smoking is responsible for more than four of five cases of lung cancer.

Furthermore, in the present study the majority of smoker patients of study and control group smoked cigarette and water pipe. These results were explained by **(Grando,2014)** [33] who reported that cigarette smoke contains more than 60

known carcinogens have been detected in cigarette smoke, which include polycyclic aromatic hydrocarbons (PAHs), nitrosamines, and aromatic amines; all play a crucial role in tumor genesis. Other types of tobacco smoking, such as pipe, cigar, and water-pipe (shisha) smoking, are also linked to lung cancer, although the relative risks are not as high as for cigarette smoking.

This study also is congruent with **(Wen et al.,2016)** [34] who report that there was a significant association with both nicotine dependence and lung cancer Nicotine not only is the main addictive compound causing smokers to continue to their habit but also makes a genotoxic contribution to the pathogenesis of cancer. Most of these carcinogenic substances require metabolic activation to form DNA adducts that evoke genetic mutations and epigenetic reprogramming, which have been linked to genomic instability and other alterations. Additionally, nicotine appears to depress the immune response to malignant growths in exposed tissue.

In relation to over counter medications, the highest percentage of the study and control group patients received over the counter medication, and the majority of them received analgesic, this result explained by **(Hochberg et al., 2017)** [35] , **(Van den Beuken et al., 2016)** [36] **(Aldarouish & Wang, 2016)** [37] who stated that Cancer and pain are clinical entities closely associated. Recent reviews suggest a prevalence of pain in cancer patients of 51% regardless of the type and stage. This prevalence increases with the type of tumor (head and neck, lung, and breast cancers are the ones with higher prevalence) and with the staging (advanced, metastatic, or terminal) reaching a 66% of cases people with cancer can experience pain from a variety of sources; it can arise from local invasion of chest structures or metastatic disease invading bones, nerves, or other anatomical structures potentially painful. Pain can also be a consequence of therapeutic approaches like surgery, chemotherapy, or radiotherapy.

In relation to overall patient's knowledge, the results of the current study showed that there were statistically significant difference between study and control group pre implementing of self-care practice guideline program related to patient knowledge. This result in the same line with **(Aminian N, Arbatani TR, Khajeheian D, Zangi M, Shadmehr, 2013)** [38] who stated that the higher the level of patients' education, the more active their participation in treatment process and the higher information and awareness about treatment related side effects. This result in the same line with **(Aminian N, Arbatani TR, Khajeheian D, Zangi M, Shadmehr, 2013)** [39] who stated that insufficient information provided by the physician would result in patients' anxiety and reduction of patients' active participation and cooperation in treatment.

In addition this result could be due to that the studied patients had no experience about lung cancer and radiotherapy as they consider the lung cancer as a stigma and so they did not ask relative, friends and neighbors. This result in the same line with **(Hamaan et al., 2013)** [40] who reported that stigma negatively affects every facet of the lung cancer community from patients and caregivers to physicians, researchers and funders. This makes lung cancer stigma particularly hard to address. The effects of stigma are real, especially for lung cancer patients. Moreover this study supported with **(Chambers, 2012)** [41] who stated that stigma appears to be experienced more by lung cancer patients than by other patient groups; and more by smokers compared to nonsmokers. Fear of being denied treatment, concealment of their condition and psychosocial distress such as anxiety, depression and isolation are all negative impacts of stigma that affect lung cancer patients. Also, influence patterns of care with regards to patients' help seeking behaviors; as well as treatment adherence.

In relation to overall patient's self-care practice, the results of the current study showed that there was no statistically significant difference between study and control group pre implementing of teaching program related to patient self-care practice guidelines. This result in the same line with **(Aminian N, Arbatani TR, Khajeheian D, Zangi M, Shadmehr, 2013)** [42] who stated that The majority of lung cancer patients did not receive any information about their disease from health care team. In spite of the large amount of medical information available in the media, insufficient use of media by cancer patients indicated the absence of appropriate communication between the media and patients. Television was the mass media commonly used by patients and as a result of no access to Internet and medical books as well as lack of proficiency in English language they were deprived of specialized resources of information. Mass media should focus on raising awareness about prevention and treatment of lung cancer.

As regards severity of side effects, the results of the present study showed that all the control and the study group had severe side effects preprogram. This goes in the same line with **(HsiehL et al., 2018)** [43] who found that more than 83% of patients with lung cancer undergo radiotherapy and treatment induced complications lead to the need for additional

information. Also revealed that newly diagnosed patients in the treatment phase needed information on the stages of the disease treatment plans and treatment related side effects; yet patients who completed treatment still expressed a need for information side effects, rehabilitation, and self- care.

This finding was contradict with **(Jyothi1et al., 2018)** [44] who stated that a majority of radiotherapy receiving patients (51%) were having moderate side effects and (41%) were having inadequate knowledge on coping strategies. So, patient education and counseling should be planned on impact of radiation therapy side effects and its coping strategies. So he suggest that it is essential to raise awareness on cancer treatment and its impact on health and to develop health seeking behaviors among the patients and caregivers to provide better cancer care and to improve the quality of life.

The current study results revealed that there was statistically significant improvement among the study group than control group regarding total knowledge after 2 and 3 weeks after implementing the nursing teaching program. These results in accordance with (**Hekmatpou, Nasiri, Mohaghegh, 2019)** [45] who stated self-care education programs can increase life expectancy in patients by empowering patients in terms of self-care and increasing their awareness in dealing with the side effects of illness and treatment related side effects. Furthermore, these results in the same line with **(Liba & Shinde, 2014)** [46] who concluded that care takers had inadequate knowledge regarding non-curative care of cancer patients. The planned teaching program on non-curative care of cancer patients was highly effective in improving the knowledge of care takers regarding non-curative care of cancer patients. The Mean posttest knowledge 29.65 was higher than Mean pre-test knowledge score 15.75. The computed t' value 33.944 ($P< 0.05$).

The current study results revealed that there was statistically significant improvement among the study group than control group regarding total self –care practice after 2 and 3 weeks after implementing the nursing teaching program. From the researcher's point of view ,this improvement is due to continuous follow up of patient to remonstrate the self -care practice at regular interval and the program was provided to patient five days per week with continuous repetition of missed or malpractices performed skills , also patient was provided with colored booklet to facilitate accessed to information when needed .This finding may be due to self-management program was given to study group with special attention and continuous follow up which improved functional abilities of patients .Furthermore ,the researcher emphasized up on the importance of reinforcement of patient's self- care practice.

These results in accordance with **(Changizi et al., 2016)** [47] who stated that, health education resulted in the increase of knowledge, change in the attitude and intention for cancer screening, acceptance of vaccine, vulnerability, perceived self-efficacy intensity and facilitation and reduction of obstacles of social support for adopting the healthy behavior and timely diagnosis of cancer, change of behavior and reduction of the disease risk factors and it was an approach with a high cost-effectiveness. Also, one of the most effective and low-cost intervention methods for creating healthy behavior and changing life style for preventing and controlling diseases is health education.

Also the present results revealed that there was statistically significant improvement among the study group than control group regarding severity of side effects, this indicates that the offered health education program had a positive impact on healthy practices of self-management among the study group. The implementation of health education program could helped the current study subjects to become self-confident, competent in self-management, aware of their needs, and able to access resources to meet their needs. In other words, it has helped them become better partners in patient-centered care.

This study agreed with **(Tian et al., 2015)** [48] who reported that there was a significantly improved average pain severity in the experimental group than in the control group ($p = 0.014$) after teaching program. Patient education is one type of psychosocial intervention. Educating patients about their disease, its treatment, potential side effects, and can reduce anxiety, enhance coping mechanisms, reduce decisional conflicts, promote patient autonomy, and improve the patient experience. Patients who understand their disease and its treatment also comply better with therapy, which translates into better outcomes. In addition significant differences between the intervention and control groups with respect to low prevalence of depression (51.61% vs. 70.91%, $p = 0.011$), prevalence of severe side effects of treatment (14.52% vs. 37.27%, $p = 0.002$), and good performance status (75.81% vs. 55.45%, $p = 0.008$). So results suggest that educating patients about cancer treatment and rehabilitation can lead to a lower prevalence of depression, lesser side effects from cancer treatments, and improved performance status.

Finally, the present study emphasized that a well-planned teaching program carried out by the researcher could be a successful tool to help in improving lung cancer patients self-care related to acute radiotherapy side effects and essential information should be included about; disease, treatment, side effects of treatment, importance of follow up and compliance with treatment. Nurses play an important role in planning and applying teaching program .So, nurses should incorporate teaching program into their routine general practice activities .Successful implementation combines education for patients, training for nurses in the context of an organization committed to both the concept and practice of supported teaching program. Trusting relationship between the patient and nurses enables a feeling of working together to achieve the aim of teaching program.

VII. CONCLUSION

In the light of the study findings, it can be concluded that there were not statistically significant differences among the study and control group preprogram, while there was statistically significant differences and improvement was observed in the study group than in control group after application of nursing teaching program, indicating a greater improvement of knowledge and self- care practice related to acute radiotherapy side effects.

Recommendations for patients:

- All lung cancer patients who had acute radiotherapy side effects must demonstrate self -care practice early after receiving radiotherapy sessions and comply with them for at least one months after radiotherapy sessions.
- A colored illustrated educational booklet should be available and distributed to all lung cancer patients who had acute radiotherapy side effects.

Recommendations for nurses:

- In service training program should be carried out for nurses working in radiation therapy department about acute radiotherapy side effects on lung.
- Newly recruited nurses should be attending teaching program about acute radiotherapy side effects on lung.

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APPENDICES - A

Table (1): The frequency distribution of the study and control groups according to their socio-demographic characteristics

Socio demographic data	Study (n = 35)		Control (n = 35)		χ^2	P
	No.	%	No.	%		
Sex						
Male	35	100.0	35	100.0	–	–
Female	0	0.0	0	0.0		
Age						
20 < 30	0	0.0	0	0.0	5.467	^{MC}p= 0.068
30 < 40	5	14.3	0	0.0		
40 < 50	11	31.4	11	31.4		
50 or< =60	19	54.3	24	68.6		
Marital Status						
Single	0	0.0	0	0.0	–	–
Married	35	100.0	35	100.0		
Divorced	0	0.0	0	0.0		
Widowed	0	0.0	0	0.0		
Level of education						
Illiterate	19	54.3	13	37.1	9.680	^{MC}p= 0.063
read and write	9	25.7	5	14.3		
Primary	3	8.6	2	5.7		
Preparatory	0	0.0	4	11.4		
Secondary	0	0.0	2	5.7		
University	4	11.4	9	25.7		
Area of residence						
Urban	35	100	30	85.7	5.385	^{FE}p= 0.054
Rural	0	0	5	14.3		
Occupation						
Manual work	4	11.4	9	25.7	6.948	^{MC}p= 0.053
Office works	0	0.0	3	8.6		
No work	13	37.1	13	37.1		
Housewife	0	0.0	0	0.0		
Retired	18	51.4	10	28.6		
Other remember	0	0.0	0	0.0		
Income						
Enough	0	0.0	0	0.0	–	–
Not enough	35	100.0	35	100.0		
Enough and save	0	0.0	0	0.0		
Other remember	0	0.0	0	0.0		

χ^2: **Chi square test**

MC: **Monte Carlo** FE**: Fisher Exact**

p: p value for comparing between the studied groups

*: Statistically significant at $p \leq 0.05$

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Table (2): The frequency distribution of the study and control groups according to their family history

	Study (n = 35)		Control (n = 35)		χ^2	P
	No.	%	No.	%		
8. Family member suffer from cancer.						
No	20	57.1	24	68.6	1.429	0.232
Yes	15	42.9	11	31.4		
Father	3	20.0	5	45.4		
Mother	4	26.6	1	9.1		
Grand father	2	13.3	2	18.1		
Grand mother	6	40.0	3	27.3		
Brother	0	0.0	1	9.1		
9. Type of cancer that family member suffered.						
No	20	57.1	24	68.6	1.429	0.232
Yes	15	42.9	11	31.4		
Brain tumor	0	0.0	3	27.3		
Thyroid gland tumor	1	6.6	2	18.2		
Breast cancer	12	80.0	5	45.5		
Cancer colon	1	6.6	0	0.0		
Lung cancer	0	0.0	0	0.0		
Prostatic cancer	2	13.3	1	9.1		
10. Family complains of other chronic diseases.						
No	12	34.3	9	25.7	0.612	0.434
Yes	23	65.7	26	74.3		
Heart disease	1	2.9	14	40.0		
Hypertension	9	25.7	9	25.7		
Diabetes mellitus	10	28.6	3	8.6		
Liver diseases	3	8.6	0	0.0		

χ^2: **Chi square test**

p: p value for comparing between the studied groups

Table (3): The distribution of the study and control group in relation to their smoking and medication habits. (n= 70)

	Study (n = 35)		Control (n = 35)		χ^2	p
	No.	%	No.	%		
Smoking						
15. Presence of smoking.						
Yes	35	100.0	35	100.0	–	–
No	0	0.0	0	0.0		
16. Age of starting smoking?						
less than 18 years	30	85.7	23	65.7	3.807	0.051
18-25 years	5	14.3	12	34.3		
17. Type that you smoke.						
Cigarette	15	42.9	8	22.9		
Water pipe	3	8.6	14	40.0	8.671*	0.013*
Cigarette and water pipe	17	48.6	13	37.1		
18. The number of cigarette smoked a day.	**(32)**		**(31)**			
1-2 boxes	24	75.0	25	80.6	0.068	0.794
More than two boxes	8	25.0	6	19.4		
19. According to water pipe, the number of times that patient use it a day.						
	(20)		**(27)**			
1-2 times	5	25.0	8	29.6	6.563	FEp= 0.025
3-4 times	9	45.0	15	55.5		
More than 4 times	6	30.0	4	14.8		
20. Smoking after illness.						
Yes	0	0.0	0	0.0	–	–
No	35	100.0	35	100.0		

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Drugs						
21. Over counter medication.						
No	12	34.3	13	37.1	1.077	$^{MC}p=$ 0.827
Cough drugs	5	14.3	5	14.3		
Analgesics	16	45.7	13	37.1		
Cold drugs	2	5.7	4	11.4		

χ^2: **Chi square test**

MC: **Monte Carlo** FE**: Fisher Exact**

p: p value for comparing between the studied groups

*: Statistically significant at $p \leq 0.05$

Table (4): Comparison between control and study group patients with lung cancer regarding their total knowledge score pre, 2weeks and 3 weeks post implementation of teaching program.

Total Knowledge score	Control (n = 35)						Study (n = 35)						Significance test		
	Pretest		After 2 weeks		After 3 weeks		Pretest		After 2 weeks		After 3 weeks		P1	P2	P3
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
Poor knowledge	35	100	31	88.5	31	88.5	30	85.7	5	14.3	13	37.1	$\chi^2 = 5.384$ P = 0.020*	$\chi^2 = 28.571$ P = 0.000*	$\chi^2 = 13.732$ P = 0.000*
Fair knowledge	0	0.0	4	11.5	4	11.5	5	14.3	20	57.2	15	42.9			
Good knowledge	0	0.0	0	0.0	0	0.0	0	0.0	10	28.5	7	20			
Significance test	$\chi^2 = 4.242$ P = 0.069						$\chi^2 = 18.720$ P = 0.000*								

χ^2: Calculated value for **Chi square test**

p_1: p-value comparing between study and control group before teaching program

p_2: p-value comparing between study and control group 2 week teaching program,

p_3: p-value comparing between study and control group 3weeks teaching program after,

*: Statistically significant at $p \leq 0.05$

Table (5): Comparison between control and study group patients with lung cancer regarding total score of the effect of Self- care practice guidelines on radiotherapy side effects pre, 2 weeks and 3 weeks post implementation of teaching program.

Self- care practice Guidelines	Control(n = 35)						Study group(n = 35)						Significance test		
	Pretest		After 2 week		After 3week		Pretest		After 2 week		After 3 week		P_1	P_2	P3
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
• Poor	35	100.	32	91.5	32	91.5	35	100.0	2	5.7	1	2.9			
• Fair	0	0.0	3	8.5	3	8.5	0	0.0	25	71.4	20	57.1			
• Good	0	0.0	0	0.0	0	0.0	0	0.0	8	22.9	14	40.0			
Significance test	FET= 2.561 P= 0.265						FET= 77.420 P= 0.000*						FET= - P= -	FET= 51.765 P= 0.000*	FET= 55.686 P= 0.000*

FET= Fisher's exact test.

*Significant difference at P level ≤ 0.05.

P1=p value comparing between both group patients pre self- care practice guidelines application.

P2=p value comparing between both group patients on the 2nd week post self- care practice guidelines application.

P3=p value comparing between both group patients on the 3th week post self- care practice guidelines application.

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Table (6): Comparison between study group and control group according to total severity score of acute radiotherapy side effects in pre, 2weeks and 3 weeks post implementation of self-care practice guidelines.

Over all severity of acute radiotherapy side effects	Control (n = 35)						Study (n = 35)						Significance test		
	Pretest		After 2 weeks		After 3 weeks		Pretest		After 2 weeks		After 3 weeks		P1	P2	P3
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
• Mild	0	0.0	2	5.7	2	5.7	0	0.0	0	0.0	24	68.6	FET= - P= -	FET= 12.000 P= 0.002*	FET= 42.979 P= 0.000*
• Moderate	0	0.0	3	8.6	3	8.6	0	0.0	20	57.1	8	22.8			
• Severe	35	100	30	85.7	30	85.7	35	100	15	42.9	3	8.6			
Significance test	FET= 4.605 P= 0.330						FET= 43.399 P= 0.000*								

FET= Fisher's exact test. *Significant difference at P level ≤ 0.05.

P=p value comparing within study group patients pre and 2nd, 3th week post self- care practice guidelines application.

P1=p value comparing between both group patients pre self- care practice guidelines application.

P2=p value comparing between both group patients on the 2nd week post self- care practice guidelines application.

P3=p value comparing between both group patients on the 3th week post self- care practice guidelines application..