Effect of Educational Program on Post-Operative Health Outcomes of Lung Cancer Patients

Hala Abd El-Salam Sheta[1]

1(Lecturer of Medical surgical Nursing, faculty of Nursing, Benha University, Egypt)

Abstract: *Lung cancer is the deadliest type of cancer for both men and women. Each year, more people die of lung cancer than of breast, colon, and prostate cancers combined. Lung cancer is more common in older adults. It is rare in people under age 45. Clinical nurse specialists play a vital role in delivering a high-quality care to patients from diagnosis, through to and beyond treatment. The aim of this study: To evaluate effect of educational program on post-operative health outcomes of lung cancer patients. Subjects and Methods: A quasi-experimental research design was conducted at department of cardiothoracic surgery, Nasser Institute. The study included (90) patients, who divided into (45 study & 45 control groups). Tools of the current study involved two main tools were used; Socio-demographic characteristics, patients' health relevant data, and Post-operative patients' health outcomes sheet (diagnostic studies assessment sheet, complications assessment sheet, quality of life assessment sheet). Results: the study revealed mean ages of patients of the current study were 42.67±8.3 and 15.82 +2.03 for study and control groups respectively, more than half of the patients were males. There was a highly statistically significant difference between the study & control groups regarding to quality of life and occurrence of complications. Conclusion: Application of the educational program has a positive effect on the study group compared to control group among lung cancer patients. Recommendations: the educational program for patients with lung cancer should be applied to improve patients' condition and quality of life. Health care professionals involved in patients care with these diseases faces several complex challenges, compounded by the limited evidence base regarding cost-effectiveness of different treatment systems for these types of cancer. Health care personnel must provide continuous patient educational program for Postoperative patients' with cancer to acquire and develop the knowledge needed to modify the patients' views and experiences of living with these type of cancer through the educational programs and alternative strategies.*
Keywords: *Lung cancer patients, Health Educational Program, Post-operative health outcomes*

I. Introduction

Lung cancer is a malignant tumor that grows in an uncontrolled way in one or both of the lungs. Cancer that starts in the lungs is known as primary lung cancer. It can spread to other parts of the body such as the lymph nodes, brain, adrenal glands, liver and bones. Sometimes a cancer starts in another part of the body and spreads to the lungs. This is known as secondary or metastatic cancer in the lung **(Cancer Council Australia Lung Cancer Guidelines, 2016).** There are several types of primary lung cancer, which are classified according to the type of cells affected, and a number of less common subtypes. Cancers are named for the way the cells appear when viewed under a microscope **(Weber et al., 2015).** Non-small cell lung cancer (NSCLC) – Makes up over 80% of lung cancers. NSCLC may be classified as: ●Adenocarcinoma (begins in mucus-producing cells and is more often found in the outer part of the lungs). ●Squamous cell carcinoma (most commonly develops in the larger airways). ●Large cell undifferentiated carcinoma (the cancer cells are not clearly squamous or adenocarcinoma).Small cell lung cancer (SCLC) – Makes up about 15–20% of lung cancers. SCLC tends to start in the middle of the lungs, and usually spreads more quickly than NSCLC **(Australian Institute of Health and Welfare, 2016).** Other tumors starting in the space between the lungs (Mediastinum) or chest wall – Thymus gland tumors, germ cell tumors, tumors of nerve tissue and lymph gland tumors (lymphoma) can arise in the mediastinum. These are not strictly lung cancer. Primary tumors of bone, cartilage or muscle can also arise in the chest wall but these are rare. Mesothelioma – A type of cancer that affects the covering of the lung (the pleura). It is different to lung cancer. There are two main types of mesothelioma: pleural and peritoneal. In most cases, exposure to asbestos is the only known cause of pleural mesothelioma **(Govindanet al., 2013).** Lung cancer is the most wide-spread cancer globally, mainly in developed countries. It correlates with old age **(American Cancer Society, 2015) and (Jemal et al., 2014).** While the causes of lung cancer are not fully understood, a number of risk factors are associated with developing the disease. These include: Tobacco smoking-Smoking causes almost 9 out of 10 lung cancers. The risk of developing lung cancer is strongly linked to the age a person starts smoking, how long they smoke and the number of cigarettes they smoke. Second-hand

----

smoking, Exposure to asbestos, people who are exposed to asbestos have a greater risk of developing cancer, particularly pleural mesothelioma, Exposure to other elements – Contact with the processing of steel, nickel, chrome and coal gas may be a risk factor. Exposure to radiation and other air pollution, such as diesel particulate matter, also increases the risk of lung cancer. Family history, having a family member diagnosed with lung cancer increases the risk. Personal history – The risk of developing lung cancer is increased if the client has been previously diagnosed with another lung disease such as lung fibrosis, chronic bronchitis, emphysema or pulmonary tuberculosis. Older age – Lung cancer is most commonly diagnosed in people aged 60 years and older, though it can occur in younger people **(National Cancer Institute, 2015)**. The main symptoms of lung cancer are: • A new cough or change in an ongoing cough• Breathlessness• Chest pain• Repeated bouts of pneumonia or bronchitis• Coughing or spitting up blood. A person may have also experienced symptoms such as fatigue, weight loss, hoarse voice, wheezing, difficulty swallowing, and abdominal or joint pain. Lung cancer symptoms can be vague and the disease is often discovered when it is advanced (has spread to other parts of the body) **(Australian Institute of Health and Welfare, 2014).** These symptoms can directly impair quality of life particularly for elderly patients and those with comorbidities. It is essential to find non pharmacological therapies for cancer survivors to improve quality of life and long term health status outcomes **(Williams and Darrah, 2017).**Lung cancer nurses play a vital part in helping to coordinate care as well as to offer psychological support at time of diagnosis, information and support through treatment decision making, preparation for treatment; ongoing assessment and care during and after treatment to beyond treatment **(Metz et al., 2017)**. Quality of Life (QOL) is defined as it is a multidimensional construct, representing an individual' subjective perception of physical, social and psychological well-being **(Brenner and Jansen, 2015) and (World Health Organization, 2014).** Quality of life in lung cancer survivors improved through a wide range of interventions as reducing psychological morbidity, facilitating crisis adaptation with educational programs, self-help groups, psychosocial interventions, cognitive behavioral therapy, coping, and certainly drugs. Clinical nurse specialists with specific expertise in lung cancer and excellent communication skills should be available for delivering a high-quality continuous care to patients since diagnosis, through and beyond treatment as cancer specialists are the primary source of information for patients. Clinical nurse specialists who has definite expertise in lung cancer as well as skills for communication. For providing up-to-date and comprehensive patient information, a Clinical nurse specialist becomes a vital point for contact between patients as well as multidisciplinary team members **(Wheeler, 2014).**

Significance of the study

Lung cancer is one of the most frequent cancer types, and it is estimated that about 1.6 million people are diagnosed with lung cancer annually **(Jemal et al., 2014).**And definitely a killer number one among all cancer types, standing for as much as 30% of all cancer related deaths in the world. Up to 80% of lung cancer patients have an advanced disease at the time of diagnosis and overall survival of 10-15% was over a long time **(Ferlay, 2010).** Lung cancer accounts for 17% and 9% of all cancers in men and women, respectively **(Torreet al., 2015) and (David et al., 2016).** In Egypt, the lung cancer incidence rates for both genders in 2017- 2018 based up on data of national center registry program (NCRB) was 27%**(Jamal et al., 2018).**Because of its extraordinary disease burden and the international variability in trends for population growth, aging, and smoking behavior, the global epidemiology of lung cancer requires continual monitoring. Potential differences in lung cancer rates by levels of socioeconomic development between countries a higher Human Development Index (HDI) indicates that on average, a country's people live longer, are healthier, are more knowledgeable, and have a better standard of living than those in countries with a lower Human Development Index (HDI)**(United Nations Development Programme., 2013).** And therefore it's important for nurse to be educated patient because it gives nurses a possibility to share their knowledge with patients, and provide them with psychological and emotional support when they are facing a difficult situation as cancer diagnosis. It is important for nurses to have reliable information about neoplastic disease .Therefore it is very important to assess the effect of educational program on post-operative health outcomes of lung cancer patients.

Aim of the study:

The present study aimed to assess the effect of educational program on post-operative health outcomes of lung cancer patients.

Research hypothesis:

Implementation of educational program may have a positive effect or no effect on post-operative health outcomes of lung cancer patients.

II. Subjects and Methods

Research design:
Quasi-experimental research design was used to meet the aim of this study.
Setting:
The study was conducted at department of cardiothoracic surgery, Nasser Institute.
Subjects:
Purposive sampling technique was used to select the samples. It was according to power analysis using the program epi-info to estimate the sample size. The sample size was calculated according to the equation of a sample size calculation based on the number of patients who admitted in the above mentioned setting .These were 600 patients in the year 2017.The sample comprised of ninety male and female patients who admitted in the above mentioned setting and divided into (45 study & 45 control groups).**Group I (Control group)**: A consisted of (45) patient who was received routine hospital care. And **Group II (Study group):** A consisted of (45) patient who was received hospital care in addition to health educational program pre-operatively. Under the following criteria:

Inclusion criteria:
1-Patients with lung cancer and undergoing surgical procedures.
2- Both male and female.
3-Patients' age is between 20 and 70 years old.
4-Patients are conscious and able to communicate.
5- Patients who accepted to participate in the study.
Exclusion criteria:
1- Patients with other type of cancer.
2- Patient with lung cancer metastasis.
Data Collection Tools:
Two tools were used to collect study data:
Tool 1: Consist of two items as follows:
Part (1): Demographic variables: An interviewing Questionnaire: It was developed by the researchers to collect baseline data which consist of seven items namely, age, sex, domicile, educational level, occupation, marital status, and nature of work.
Part (2): Patients' health relevant data:
It was developed by the researcher based on reviewing literatures, and scientific references, to assess the past, present and family history for studied subjects, as follows: **a)** Patients' Past and present health history, which consist of eight closed ended questions namely, type of chronic illness, drugs used before operation, any past operations, smoking habits, knowing of disease, time of diagnosis of lung cancer, signs and symptoms appear, and stage of lung cancer .**b)** Family health history, which consists of three closed ended questions namely, family health history of lung cancer, the degree of relativity, and family history of lung cancer operation.

Tool II: Post-operative patients' health outcomes sheet: Consist of three items as follows:
Part (1): Complications assessment sheet: It was designed by the researcher based on reviewing of literatures and scientific references, **(Ali et al., 2016) and (Mulholland and Doherty, 2014).**To assess the presence of complications consist of 4 selected complications, respiratory complications, wound complications, cardiac complications, cerebrovascular complications, and others (fever, bed sores, Prolonged air leak (>7 days), urinary tract infection, Delirium, Atelectasis, and Supraventricular arrhythmia).
Part (2): Diagnostic studies and tests assessment sheet: It was designed by the researcher based on reviewing of literatures and scientific references, **(National Institute for Health and Clinical Excellence,2015)**to assess imaging results as (Chest x-ray, Computed tomography (CT) scan, Magnetic resonance imaging (MRI) scan, Positron emission tomography (PET) scan, Bone scan, Endobronchial ultrasound, Endoscopic esophageal ultrasound) and laboratory tests of biopsy and other samples as (Immunohistochemical tests, Molecular tests, Blood tests as complete blood count (CBC),Blood chemistry tests such as the liver or kidneys, Pulmonary function tests and arterial blood gas).
Part (3): Quality of Patients' Life Scale:
TheSF-36 tool ((version-10).This tool was adopted from**(War and Sherbourne, 1992) and (Hays and Shapiro,1992).**It contains (36 items) to assess eight dimensions of health status namely: Physical functioning questions (3-12);role limitation due to physical health problems questions (13-16); role limitations due to emotional problems questions:(17-19) energy / fatigue questions (23-27-29-31); emotional well-being questions: (24-25-26-28-30); bodily pain questions: (21& 22); social functioning questions: (20 &32) and general health perception questions: (1,2,33,34,35,36).All the QOL items were scored on a scale ranged from (0 to 100). Score

(100) representing the highest level of functioning possible. The scores of the items were summed up and the total scores divided by the number of items, giving a mean score. These scores were expressed in means and standard deviations.

Method
Ethical Consideration
Human rights must be considered by explaining the aim and benefits of the study as well as the procedure of data collection to all participants clearly. The participants' approvals were taken after informing them that their participation is optionally, and that they have the right to withdraw at any time without any consequences or loss of medical care. Then, Verbal and written consent was obtained from each patient enrolled into the study. The researcher assures maintaining anonymity and confidentiality of objective data.

Validity and reliability of tools:
The tools were revised by a panel of (5) expertise from the field of medical surgical nursing and oncology medical staff to ascertain relevance and completeness and the required modifications were carried out. The tools used in this study were tested for its reliability using test – retest measurement and Cronbach's alpha. Reliability of lung cancer knowledge questionnaire is ranged from r = (Test 0.84 -- Retest 0.87) and Cronbach's alpha (r. alpha) = 0.68.

Pilot study:
A pilot study was conducted on10% of patients recruited to test the clarity and applicability of the tool and the necessary modification was done prior to data collection. Patients who participated in the pilot study were excluded from the main study sample.

Fieldwork:
Sampling and data collection were started and completed during the period from the beginning of May 2017to the end of April 2018. The study was conducted through the following phases:

Phase I: Preparatory and planning phase:
In the planning stage, approval was obtained from the director of department of cardiothoracic surgery, Nasser Institute. Meeting and discussion was held between the researcher and the nursing administration to make them aware about aims and objectives of the study, as well as, to get better cooperation during the implementation phase of the study. Based on the information obtained from pilot study, in addition to the recent related literatures, the researcher designed an educational program. Its main aim was to improve performance and health outcomes regarding post-operative health outcomes of lung cancer patients. A simple booklet was developed for patients, and written in Arabic-language. Which covered all information related to lung surgery. It's included the following items:

●Brief description of respiratory system and lung cancer (definition , causes, complication, and drugs needed).
● Health instructions needed for lung surgery related to respiration and keeping the chest clear, taking medications, infection control measures, general health care and daily routine, nutrition, daily activates, sun ray exposure, and sex.

Phase II: Prior health educational program implementation (Pre-test phase):
This phase was followed by collecting baseline data, the study sample was recruited according to the set criteria. Pre- test questionnaire was administered to the study sample to examine their actual level of knowledge and performance regarding lung cancer surgery. The researcher interviewed the patients and took the consent of them to be recruited in the study after explaining the aim of the study, and then distributed the questionnaire sheet after clear explaining the way to fill out. The researcher used tool 1, and tool 2 parts 2& 3 to assess health state before operation. During the interview, the researcher read each items on data collection sheet and explained its meaning to the patients.

Phase III: Program implementation phase:
●The researcher was available in the morning shift at the clinical field for three days / week by rotation.
●The appointment for starting educational sessions was scheduled with the patients according to their circumstances.
●The educational program implementation has been carried out in surgical unit in at Nasser Institute.
●The patients were divided into small groups including 4 – 5 patients considering time table for their operation.

 • The program was conducted with three sessions; through three days (1 session /day), each session took about 30- 45 minute for study group. Collecting data from control group took about 20- 30 minute.

•First session about (definitions, causes, complication, and drugs needed), second session about (health instructions needed for lung operation related to respiration and keeping the chest clear, drugs taking, infection control measures), third session about (health instructions needed for lung operation related to general health care and daily routine, nutrition, daily activates, sun ray exposure, and sex).

•Each educational session was guided by simple written instructions, and then orientation about objectives outline and expected outcomes was done.

•Different teaching and learning methods were used during the sessions which included; interactive lectures, group discussion, instructional media include: data show, posters, pictures, printed handout and video programs. Which was presented in clear and concise form to be used as memorial reference.

 • The researcher offered the booklet for every patient and showed a video for demonstration and re-demonstration.

•Patients were allowed to ask questions, explanation, or elaboration in case of misunderstanding.

•At the end of these sessions the researcher emphasized to the participants the importance of the follow up visits.

Phase IV: Program evaluation phase (follow-up tests)
At the end of the educational program implementation evaluation was done to assess patients' performance and health outcomes by using the same data collection tools, and comparing the results of the data collected to the pretest results by the researcher after 1 month of health educational program implementation (follow-up) by using tool 2.

Statistical analysis
The collected data were tabulated and analyzed using Statistical Package of Social Science (SPSS). A variety of statistical methods were used to analyze the data in this study as Qualitative variables were presented as number and percentage distribution., Quantitative variables were presented as Mean and standard deviation were used to estimate the statistical significance difference between two groups.

III. Results

Table (1) reveals that, the mean age of study and control groups were (42.67 ± 8.4&15.82 ± 2.03) respectively. Regarding to gender, the males were more predominant than females in study and control groups, more than half of the patients (53.3 % & 51.1%) were males. Concerning the marital status, the majority of study group (82.2%) was married, while more than three quarters of control group (77.8%) were married. The table also reveals that (71.8% and 73.3%) of study and control groups respectively were living in rural area. Regarding the educational level of patients, slightly more than one third of them and one third of them (35.5 and 33.3%) respectively were illiterate; equally 31.1% could read and write in both studied groups. As regard to occupation (62.2%) and (64.4%) of study and control group were working respectively. In relation to nature of work less than half of the study and control groups (44.4% and 48.9%) had moderate effort respectively.

Table (2) illustrates that, about a quarter of study groups (26.7%) and more than one third of control groups (33.3%) have had chronic diseases respectively. Regarding smoking the majority of study and control groups (77.8%) and (80%) respectively was a smoker previously. Concerning the knowing their diseases more than half of the study group (55.6%) knowing their diseases. The majority of study and control groups (37.8%) and (55.6%) respectively were diagnosed 1-4 months. The table also shows that (77.8%) and (91.1%) of study and control groups respectively didn't have family history of lung cancer. While, (24.4%) and (8.9%) of study and control groups respectively had first degree relative.

Table (3) shows that, a non-statistically significant difference between two groups regarding to occurrence of complications after one month post operatively.

Table (4) illustrates that, the study & control groups were statistical discrimination regarding to chest X-ray, electrocardiogram and   serum albumin post-implementation of health education program at p value= (0.021,0.022&0.000) respectively.

Table (5): illustrates that, there were highly statistical significant difference between the study group regarding radiological and laboratory examination pre, and after one month of implementing health educational program.

Table (6): reveals that, the mean score of SF-36 domains health related quality of life (HRQoL) between the control and study groups regarding the total score of SF-36 domains HRQoL, the total mean score of the study and control groups were (3.24 ± 1.18 & 2.56 ± 1.43) respectively pre-implementation of health educational program compared to (2.57 ± 1.44 & 2.59 ± 1.61) respectively post-implementation of health educational program with high statistical significant difference where P = (0.000).

Table (7): demonstrates that, there were highly statistically significant differences within the study group pre and post program implementation in relation to the total score of SF36 domains HRQOL.

Table (1): Number and percentage distribution of the studied subjects according to their socio-demographic Variables (study & control group) (n=90).

Items	Group			
	Study (n=45)		**Control (n=45)**	
Age in years	**Number (N)**	**Percentage (%)**	**Number (N)**	**Percentage (%)**
20-30	2	4.4	1	2.2
> 30 - < 40	10	22.2	1	2.2
≥ 40 - < 50	15	33.3	3	6.7
≥ 50	18	40	40	88.9
Mean ± SD	**42.67 ± 8.4**		**15.82 ± 2.03**	
Gender				
Male	24	53.3	23	51.1
Female	21	46.7	22	48.9
Educational level				
Illiterate	16	35.5	15	33.3
Read /writes	14	31.1	14	31.1
Primary School	9	20	10	22.2
Intermediate/high	6	13.4	6	13.4
Domicile (Residence)				
Urban	13	28.9	12	26.7
Rural	32	71.2	33	73.3
Marital status				
Married	37	82.2	35	77.8
Single / Widow	8	17.8	10	22.2
Occupation				
Working	28	62.2	29	64.4
Not working	17	37.8	16	35.6
nature of work				
Mild	15	33.3	14	31.1
Moderate	20	44.4	22	48.9
intense	10	22.2	9	20

Table 2: Medical history of patients in the study and control group (n=90):

Items	Group			
	Study (n=45)		**Control (n=45)**	
	Number (N)	**Percentage (%)**	**Number (N)**	**Percentage (%)**
Chronic diseases				
Yes	12	26.7	15	33.3
No	33	73.3	30	66.7
History of operation				
Yes	5	11.1	3	6.7
No	40	88.9	42	93.3
Medication taking				
Yes	14	31.1	16	35.6
No	31	68.9	29	64.4
Smoking				
current smoking	7	15.5	5	11.1
previous	35	77.8	36	80
No	3	6.7	4	8.9
Knowledge of the disease				
Yes	25	55.6	13	28.9
No	20	44.4	32	71.1
Current diagnosis				
<1 month	14	31.1	10	22.2
1- 4 month	17	37.8	25	55.6
>4 months	14	31.1	10	22.2
Signs and symptoms appears	**Mean ± SD= 2.45±1.40**		**Mean ± SD=2.30±1.22**	
Knowing the stage of cancer				
Yes	5	11.1	0	0
No	40	88.9	45	100

Family history				
Yes	10	22.2	4	8.9
No	35	77.8	41	91.1
Degree of relativity				
1st degree	11	24.4	4	8.9
2nd degree	1	2.2	2	4.4

* Statistically Significant at P ≤ 0 .05

Table (3): Comparison between the control and study groups according to occurrence of complications after one month from operation (n= 90)

Items	Group				Chi-square test	p-value
	Study (n=45)		Control (n=45)			
	Number (N)	Percentage (%)	Number (N)	Percentage (%)		
Pleural effusion	2	4.4	1	2.2	0.322	0.570
Dyspnea	2	4.4	1	2.2	0.322	0.570
Nosocomial pneumonia	0	0.0	0	0.0	1.010	0.311
Chest infection	8	17.8	7	15.6	0.057	0.811
Sputum retention	14	31.1	15	33.3	0.026	0.871
Post pneumonectomy pulmonary edema (PPE)	1	2.2	1	2.2	0.521	1
Atelectasis	0	0.0	0	0.0	1.010	0.311
Venous occlusion	1	2.2	3	6.7	0.957	0.327
Coagulation disorders	2	4.4	3	6.7	0.189	0.663
Supraventricular arrhythmia	16	35.5	18	40	0.085	0.770
Wound infection	12	26.7	16	35.6	0.436	0.508
Wound hematoma	1	2.2	1	2.2	0.521	1
Wound dehiscence	0	0.0	0	0.0	1.010	0.311
Prolonged air leak > 7 days	3	6.7	4	8.9	0.132	0.715
Infection	4	8.9	6	13.3	0.360	0.548
Fever	17	37.8	14	31.1	0.216	0.642
Bed sores	0	0.0	0	0.0	1.010	0.311
Delirium	4	8.9	3	6.7	0.132	0.715
Memory loss	0	0.0	0	0.0	1.010	0.311
Gastrointestinal bleeding	1	2.2	2	4.4	0.322	0.570

Table (4): Comparison between the control and study groups according to radiological and laboratory examination pre and post implementation of health educational program (n=90)

Items	Pre				Post				Chi-square test	p-value
	Study (n=45)		Control (n=45)		Study (n=45)		Control (n=45)			
	No	%	No	%	No	%	No	%		
Chest X-ray										
Normal	0	0.0	0	0.0	10	22.2	9	20	4.259	0.021 *
Abnormal	45	100	45	100	35	77.8	36	80		
MRI										
Normal	1	2.2	0	0.0	44	97.8	45	100	2.042	0.360
Abnormal	44	97.8	45	100	1	2.2	0	0.0		
PET										
Normal	6	13.3	5	11.1	40	88.9	38	84.4	2.041	0.240
Abnormal	39	86.7	40	88.9	5	11.1	7	15.5		
CT scan										
Normal	0	0.0	0	0.0	45	100	45	100	1.010	-
Abnormal	45	100	45	100	0	0.0	0	0.0		
Bone scan										
Normal	4	8.9	5	11.1	30	66.7	33	73.3	2.041	0.153
Abnormal	41	91.1	40	88.9	15	33.3	12	26.7		
Endobronchial ultrasound										
Normal	0	0.0	0	0.0	43	95.5	45	100		
Abnormal	45	100	45	100	2	4.4	0	0.0	1.010	-
Endoscopic esophageal ultrasound										
Normal	1	2.2	0	0.0	45	100	43	95.5	2.042	0.330
Abnormal	44	97.8	45	100	0	0.0	2	4.4		
ECG										
Normal	38	84.4	45	100	42	93.3	45	100	5.269	0.022*
Abnormal	7	15.5	0	0.0	3	6.7	0	0.0		

Hgb									
Low	30	66.6	28	62.2	40	88.9	43	95.5	0.544	0.461
Normal	15	33.3	17	37.8	5	11.1	2	4.4		
ABGs									
Normal	8	17.8	5	11.1	40	88.9	35	77.8	1.041	0.163
Abnormal	37	82.2	40	88.9	5	11.1	10	22.2		
Serum albumin									
Low	11	24.4	2	4.4	34	75.5	45	100		
Normal	34	75.5	43	95.5	11	24.4	0	0.0	12.391	0.000 **

Table (5): Comparison between the study group according radiological and laboratory examination pre, and after one month of implementing health educational program (n=90)

Items	Study group				Chi-square test	p-value
	Pre (n=45)		Post (n=45)			
	No	**%**	**No**	**%**		
Chest X-ray						
Normal	0	0.0	10	22.2	4.259	0.021 *
Abnormal	45	100	35	77.8		
MRI						
Normal	1	2.2	44	97.8	87.165	0.000**
Abnormal	44	97.8	1	2.2		
PET						
Normal	6	13.3	40	88.9	90.081	0.000**
Abnormal	39	86.7	5	11.1		
CT scan						
Normal	0	0.0	45	100	92.080	0.000**
Abnormal	45	100	0	0.0		
Bone scan						
Normal	4	8.9	30	66.7	1.043	0.153
Abnormal	41	91.1	15	33.3		
Endobronchial ultrasound						
Normal	0	0.0	43	95.5	90.314	0.000**
Abnormal	45	100	2	4.4		
Endoscopic esophageal ultrasound						
Normal	1	2.2	45	100	87.166	0.000**
Abnormal	44	97.8	0	0.0		
ECG						
Normal	38	84.4	42	93.3	5.269	0.022 *
Abnormal	7	15.5	3	6.7		
Hgb						
Low	30	66.6	40	88.9	3.356	0.027*
Normal	15	33.3	5	11.1		
ABGs						
Normal	8	17.8	40	88.9	0.370	0.535
Abnormal	37	82.2	5	11.1		
Serum albumin						
Low	11	24.4	34	75.5	28.755	0.000**
Normal	34	75.5	11	24.4		

Table 6: Comparison between the study and control groups according to quality of life for patients with lung cancer pre and post- implementation of health educational program (n=90)

SF-36Domains	Pre		Post		t-test	p-value
	Study (n=45)	Control (n=45)	Study (n=45)	Control (n=45)		
	Mean ± SD	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**		
General health	3.80 ± 0.92	3.90 ± 0.92	2.90 ± 0.65	3.47 ± 0.83	8.33	0.000*
Physical function	2.80 ± 0.40	2.75 ± 0.46	1.51 ± 0.57	1.16 ± 0.45	10.50	0.000*
Limitations due to physical health problem	1.92 ± 0.27	1.80 ± 0.40	1.04 ± 0.19	1.01 ± 0.10	1.69	0.09
Limitations due to emotional problem	1.92 ± 0.27	1.80 ± 0.40	1.03 ± 0.18	1.01 ± 0.08	1.65	0.10
Social function	4.12 ± 0.90	3.80 ± 1.05	2.83 ± 0.54	3.88 ± 0.53	13.17	0.000*
Bodily pain	4.55 ± 0.87	4.47 ± 0.92	3.22 ± 0.73	4.26 ± 0.73	9.92	0.000*
Energy and fatigue	4.01 ± 1.30	3.93 ± 1.11	4.42 ± 0.69	4.32 ± 1.24	1.00	0.32
Emotional well-being	3.82 ± 1.31	3.75 ± 1.09	4.51 ± 0.73	4.00 ± 1.15	5.87	0.001*
Total	**3.24 ± 1.18**	**2.56 ± 1.43**	**2.57 ± 1.44**	**2.59 ± 1.61**	**0.41**	**0.000**

N.B. For all statistical tests done; P value > 0.05 insignificant, P value P ≤ 0 .05significant,
and P value< 0.001 highly significant.

Table (7): Comparison between the study group according to quality of life for patients with lung cancer pre and post- implementation of health educational program (n=90)

SF-36Domains	Study group		t-test	p-value
	Pre (n=45)	Post (n=45)		
	Mean ± SD	Mean ± SD		
General health	3.80 ± 0.92	2.90 ± 0.65	13.63	0.000**
Physical function	2.80 ± 0.40	1.51 ± 0.57	39.70	0.000**
Limitations due to physical health problem	1.92 ± 0.27	1.04 ± 0.19	36.30	0.000**
Limitations due to emotional problem	1.92 ± 0.27	1.03 ± 0.18	31.40	0.000**
Social function	4.12 ± 0.90	2.83 ± 0.54	10.60	0.000**
Bodily pain	4.55 ± 0.87	3.22 ± 0.73	9.80	0.000**
Energy and fatigue	4.01 ± 1.30	4.42 ± 0.69	2.66	0.000**
Emotional well-being	3.82 ± 1.31	4.51 ± 0.73	5.45	0.000**
Total	**3.24 ± 1.18**	**2.57 ± 1.44**	**20.930**	**0.000****

IV. Discussion

The current study aimed to assess the effect of educational program on post-operative health outcomes of lung cancer patients. Patient education may help to increase patients' knowledge about their health, their condition and their self-care possibilities. This discussion of the results will be presented in three sections; First section will high light the socio-demographic variables and medical history. The second section will concerned with comparison between the control and study groups according to occurrence of complications after one month from operation**,** comparison between the two groups according to radiological and laboratory examination pre and post implementation of health educational program, Comparison between the study group according radiological and laboratory examination pre, and after one month of implementing health educational program, Third section will conducted with the Comparison between the study and control groups according to quality of life for patients with lung cancer pre and post- implementation of health educational program, Comparison between the study group according to quality of life for patients with lung cancer pre and post-implementation of health educational program.

I-A- **Socio-demographic variables of the sample:**

Our study shows statistical significant difference was shown between two groups regarding age, this analysis was agreement with **Ali et al., (2016)** who reported that, the majority of the studied subjects aged more than forty years old. The result also comes in consistent with **Torre et al., (2015)** who stated that the incidence of lung cancer increases with age, in (50-70) years of age and more than eighty percent of diagnosed cases of lung cancer occur in the age fifty five years. This analysis disagreed with **Brown et al., (2015)**who mentioned that, the lung cancer had no tendency to a specific age group, thirty-eight percent of the tumors occurred in patients aged less than forty years, and only fifteen percent of patients were aged above sixty years**.** Concerning gender the current study revealed that more than half of the patients were males. This could be explained in light of the known fact that the majority of males in Egypt are smokers, this findings supported by **Samet et al., (2016)**who mentioned that the majority of the respondents were male as approximately thirty percent higher in men than in women. This finding in contrast with a study done in England by **Richards et al., (2015)**who noted that slightly more than half of the patients were females. Regarding the marital status the present study revealed that, the majority of the study and control groups were married. This result was in accordance with **Elkhodary et al., (2017) and Ali et al., (2016)** who reported that more than half of the study and control groups were married. As to education, slightly more than one third and one third of study and control groups respectively were illiterate. While less than one third of patients could read and write, and almost one third of patients were educated. This finding was in accordance with **Elkhodary et al., (2017)** who reported that the majority of the lung cancer patients were or just could read and write. There was controversy in another study by **Jamal et al., (2018**) who stated that all the respondents in their study expressed that they were educated. Referring to occupation more than half of the study groups have had moderate nature of work and two third of control group were working. This finding in contrast with **Davis et al., (2017)**who found that, the majority of the study was retired and didn't working.

B-Medical history of the sample:

In the current study, regarding patients' medical history, the presence of the chronic diseases between the study and control group, the result showed that, about a quarter of study groups and more than one third of control groups have had chronic diseases. This analysis comes in the same line with **Davis et al., (2017**) who stated that the most common co-morbidities were high blood pressure and this chronic disease may be related to old age. Also these results agree with the study done by **Jamal et al., (2018**) who noted that, more than half of

respondents have been diagnosed with cardiac disease, hypertension and diabetes mellitus. While there was controversy in another study by **Elkhodary et al., (2017)** whose study results revealed that the majority of the patients have no chronic disease. Regarding smoking the majority of study and control groups was a smoker previously. This result was in accordance with **Ali et al., (2016)** who mentioned that the majority of the sample wasn't smoked currently. The result also comes in consistent with **Miller et al., (2017)** who found that, the majority of study wasn't smoked while; about forty-five percent were currently smoked. The results of the present study revealed that the majority of the study subjects had not family history, this agree with **Jamal et al., (2018)** who reported that the majority of the 2 groups had no family history of lung cancer, this result was incongruent with **Goren et al., (2017)** who mentioned that the majority of the study subjects had lung cancer and about half of them that of first-degree relatives aged fifty or older.

II) - A- Comparison between the control and study groups according to occurrence of complications after one month from operation

As to the occurrence of complication after one month of operation, the present study present study revealed that a non-statistically significant difference between two groups regarding to occurrence of complications after one month post operatively. This finding is supported by **Davis et al., (2017) and Ali et al., (2016)** who reported that the most common surgical complications, affecting health outcomes, are wound infection, fever, Sputum retention and Post pneumonectomy pulmonary edema (PPE).

B-Comparison between the two groups according to radiological and laboratory examination pre and post implementation of health educational program

Concerning to laboratory investigation, the results of the present study revealed that the study and control groups were statistical discrimination regarding to chest X-ray, electrocardiogram and serum albumin post-implementation of health education program compared to pre-implementation of educational program. This analysis comes in agree with **Bonita et al., (2017)** who reported that associations remained statistically significant difference between the two groups regarding to serum albumin in the patients with albumin levels <3.5 g/dL.

C- Comparison between the study group according radiological and laboratory examination pre, and after one month of implementing health educational program

As regarding to laboratory investigations between study groups, the current study illustrates that, there were highly statistical significant difference between the study group regarding radiological and laboratory examination pre, and after one month of implementing health educational program. These results come in agree with **Weber et al., (2017)** who stated that the majority of the study subjects were highly statistical significant difference regarding radiological and laboratory examination after implementing health educational program.

III) -A-Comparison between the study and control groups according to quality of life for patients with lung cancer pre and post- implementation of health educational program

The study revealed that, there was statistically significant difference between the study and control groups as regarding to overall quality of life in general health, Physical function, limitations due to physical health problem, limitations due to emotional problem, social function, bodily pain (pain intensity),energy and fatigue and emotional well-being post-implementation compared to pre-implementation of health educational program The above findings comes in accordance with **Alencar et al., (2017) and Ali et al., (2016)**who mentioned that the study group reported significantly better general health compared with the control group and physical QoL subscale was highly statistically significant differences for lung cancer patients postoperatively, also there was statistically significant difference between the study and control groups in other related quality of life domains(physical health, mental health, social functioning, and role functioning, general health perception) were found between groups. While the above findings was incongruent with **Lynch et al., (2017)**in the domains of (Physical function, fatigue and emotional well-being)who reported that, a significant difference in HRQoL scores was detected in two groups for physical function, fatigue dimension and emotional well-being that did not associate with sedentary time between two groups statistically..

B- Comparison between the study group according to quality of life for patients with lung cancer pre and post- implementation of health educational program.

The present study showed that, there were highly statistically significant differences within the study group pre and post program implementation in relation to the total score of SF36 domains HRQOL. This analysis comes in agree with **Lynch et al., (2017) and Ali et al., (2016)**who showed that, the presence of satisfaction with HRQoL, that the presence of positive influence of rehabilitation program on HRQoL among lung cancer undergoing surgery. While the above findings was incongruent with **Jack et al., (2017)** who

reported that, there was no evidence that variation in pain, fatigue, mental health perceptions, insomnia and physical health perceptions observed from pre and post intervention program and there was no significant difference within study group. That reflects the presence of negative influence of rehabilitation program on HRQoL among lung cancer patients undergoing surgery.

V. Conclusion

The current study concluded that, implementation of health education program has a positive effect on enhancing overall quality of life domains of the study group in their health outcomes compared to control group. These results justified the research hypothesis.

VI. Recommendations

Recommendations based up on this study, this study recommended that emphasize the importance of adequate knowledge and skill for patients and their families to help them to adapt with their life after operation. Psychological rehabilitation program should be held to meet the lung cancer patients' needs. Develop the family role as a caregiver for patients with chronic lung disease. Initiation of studies (qualitative & quantitative) to identify and develop nursing strategies that improve quality of life among lung cancer patients. Further study with replication of the current study on a larger probability sample is recommended to achieve generalization of the results and wider utilization of the designed educational program.

References

[1].   Alencar G, Jarrett M, Damiani L., et al.Social support is a predictor of lower stress and higher quality of life and resilience in Brazilian patients with lung cancer. Cancer nursing, 2017; 40(5), 350-360.
[2].   Ali A, Sheble M, El- Shafiey E, et al.,Impact of an Instructional Scheme for Patients Undergoing Lung Surgery on Their Performance and Health Outcomes, Unpublished Thesis for Doctoral Degree in Nursing Science, Medical Surgical Nursing, Faculty of Nursing, Port Said University, Egypt; 2016; PP. 40-45.
[3].   American Cancer Society, Cancer facts and figures. Atlanta, Ga: American Cancer Society, 2015; P. 22.
[4].   Australian Institute of Health and Welfare (AIHW), Cancer in Australia: an overview, AIHW, Canberra, 2014; PP. 50-75.
[5].   Australian Institute of Health and Welfare (AIHW), Australian Cancer Incidence and Mortality (ACIM) books: Lung cancer, AIHW, Canberra, 2016;PP.8-10.
[6].   Bonita D, Ades P, Jiang S,.et al. Pre-operative serum albumin level substantially predicts post-operative morbidity and mortality among patients with lung cancer. European journal of cancer care, 2017; 26 (2).
[7].   Brenner H, and Jansen L, Quality of life among long-term lung cancer survivors-Systematic review. Thora,oncol. Cancer Nursing; 2015; 30(3):180-90.
[8].   Brown C, Tawk R, Abner A, Ashford A.,Differences in lung cancer outcomes by race and insurance. International journal of environmental research and public health, 2015; 13(1), 48.
[9].   Cancer Council Australia Lung Cancer Guidelines Working Party, Clinical practice guidelines for the treatment of lung cancer, 2016; P. 8 Available at: http://wiki.cancer.org.au/australia/Guidelines:Lung_cancer.
[10].   David Susanna M, Peter D, Danny R, et al., The International Epidemiology of Lung Cancer: Latest Trends, Disparities, and Tumor, Journal of Thoracic Oncology Characteristics, 2016; 11(10), 1653-1671.
[11].   Davis S, Christy S, Chavarria E, Abdulla R, et al. A randomized controlled trial of a multicomponent, targeted, low-literacy educational intervention compared with a nontargeted intervention to boost lung cancer screening in community clinics. Cancer, 2017; 123(8), 1380-1400.
[12].   Elkhodary T,Hassnaen A,Boughdady A, Effect of Reflexology Training for Family Caregivers on Health Status of Elderly Patients with lung Cancer, Doctoral Disseration, Cairo University, International Journal of Nursing Didactics; 2017; 7 (09), 12 - 20.
[13].   Ferlay J, Shin H, Bray F, Forman D, Mathers C, et al., Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. Int J Cancer, 2010; 125: 2892-2915.
[14].   Goren P, Ades P,James A, et al. Peer Reviewed: lung cancer Screening Among US Adults Aged 40 or Older With a Family History of lung Cancer. Preventing chronic disease, 2017; 12.
[15].   Govindan R, Waqar S, James A, et al., Advances in lung cancer: the American Society of Clinical Oncology (ASCO), J Thoracic Oncology, 2013; 8:263-264.
[16].   Hays R, and Shapiro M, "An Overview of Generic Health-Related Quality of Life Measures for HIV Research," Quality of Life Research. 1:91-97, 1992
[17].   Jack S, Burke S, West Burke S, et al. The effects of exercise on pain, fatigue, insomnia, and health perceptions in patients with operable advanced stage lung cancer prior to surgery: a pilot trial. Cancer, 2017; 17(1), 155.
[18].   Jamal A, Nabil H, Khalid H, &Kamel H, Cancer incidence in Egypt: results of the national population-Based cancer registry program. Journal of national cancer epidemiology, 2018; Available at: http:// dx.dio.org/indx.htm, reviewed on Oct 24-2017.
[19].   Jemal A, Bray F, Ward E, et al., Global cancer statistics. CA Cancer J Clin, 2014; 60: 67-90.
[20].   Lynch B, Boyle T, Courneya K, Boyle T, et al. Associations of objectively assessed physical activity and sedentary time with health-related quality of life among lung cancer survivors. Cancer, 2017; 120 (18), 2918-2925.112.
[21].   Metz J, Hill-Kayser C, Bach C, et al., Survivorship and the chronic cancer patient: Patterns in treatment-related effects, follow-up care, and use of survivorship care plans. Cancer, 2017; 123(21), 4260-4275.
[22].   Miller K, Meester R, Barzi A, Siegel R, et al. Lung cancer statistics, 2017;: a cancer journal for clinicians, 2017; 67(3), 178-192.
[23].   Mulholland M, and Doherty G, Complications in Surgery, Lippincott Williams & Wilkins, Awolters Kluwer, USA, 2014; P.530.
[24].   National Cancer Institute Web site. Cancer trends progress report, 2015; PP.610-621Availableat: http://progressreport.cancer.gov.
[25].   National Institute for Health and Clinical Excellence. The Diagnosis and Treatment of Lung Cancer NICE Clinical Guideline, 2015; P. 121.
[26].   Richards M, Corner J, Downing A, et al. Health-related quality of life after lung cancer in England: a patient-reported outcomes study of individuals 12 to 36 months after diagnosis. Journal of Clinical Oncology, 2015; 33(6), 615-624.

[27].   Samet J, Avila-Tang E, Boffetta P, et al. Lung cancer in never smokers: clinical epidemiology and environmental risk factors. Clin Cancer Res. 2016; 15:5622–5645.

[28].   Torre L, Bray F, Siegel R,Jemal A, et al., Global cancer statistics, Cancer J Clin. 2015; 65:87–108.

[29].   United Nations Development Programme. Human Development Report 2013. The rise of the South: human progress in a diverse world. New York, NY: United Nations Development Programme; 2013.

[30].   War J, and Sherbourne C, (1992). The MOS 36- Item Short form Health Surcey (SF-36). Medical Care, 30 (6), 473-483, from the Web: Http: // www.measuring impact. Org/S 4-Sf-36, Retrieved on December, 30, 2017.

[31].   Weber B, Hager H, et al. EGFR mutation frequency and effectiveness: a prospective observational study in Danish patients with non-small cell lung cancer. Lung Cancer; 2015; 82: 222-230.

[32].   Weber B, Reck M, Heigener D., et al   Recent advances in lung cancer: summary of presentations from the 47th annual meeting of the American Society of Clinical Oncology (ASCO) 2017. J Thorac Oncol 7: 260-265.

[33].   Wheeler A, The modern role of the clinical nurse specialist in lung cancer in a district general hospital. Current lung Cancer Reports, 2014; 14 (2), 140-145.

[34].   Williams V, and Darrah, N, Importance of Supportive and Palliative Care in Lung Malignancies. In Multidisciplinary Management of Lung Cancers, 2017; PP. 558-590.

[35].   World Health Organization related QOL, 2014; Available at: http:// WHOQOL@who.int. Accessed on:14/6/2014.