Effect of Protocol of Care on Dyspnea of Patients with Lung Cancer

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Abstract- Dyspnea is one of three most frequently reported symptoms by patients with lung cancer. Thus, relief of dyspnea in patients with lung cancer is important to functional health and health-related quality of life. **Aim**:-This study aimed to evaluate the effect of protocol of care on lung cancer patient dyspnea. **Material and methods**: - A quasi-experimental study was conducted in the Intensive Care Unit at Tanta Cancer Center, Affiliated to Ministry of Health at El Garbeia Governorate, Egypt. Data were collected over a period of 7 months. A convenient sample of 105 patients with lung cancer suffering from dyspnea and under prescribed medical management was selected. The subjects were divided into three groups: *Group I*: - (Control group), It consisted of 35 patients with lung cancer and treated according to routine dyspnea management of the Intensive Care Unit. *Group II*:- (Study group), It consisted of 35 patients with lung cancer meeting all inclusion criteria and received protocol of care for dyspnea (positioning and breathing exercises) by the researcher with routine care management of the unit. *Group III*:- (Study group), It consisted of 35 patients with lung cancer meeting all inclusion criteria and received protocol of care for dyspnea (positioning, and relaxation technique) by the researcher with routine management of the unit. Three tools were used for data collection for this study as follow. *Tool (I)*: Assessment tool which included Patient's socio-demographic characteristics, past and present medical history, history of cancer treatments, history of pulmonary disease, routine laboratory investigations, vital signs and smoking history and Present history of dyspnea. *Tool (II)*: Dyspnea visual analogue scale. *Tool (III)*: Cancer Dyspnea Scale (CDS). **Results**: The main results revealed that physiological parameters were improved in the two study groups. The results revealed that the mean scores of Pa O2 and SaO2 were increased among the two study groups after session of 7th day compared the control group. Also, severity of dyspnea measured by visual analogue scale and cancer dyspnea scale was improved in dyspnea scores in the two study groups than control group. **Conclusion and recommendations**: Breathing exercises and relaxation techniques have an effect on decreasing the severity of dyspnea in lung cancer patient. It was recommended that breathing exercise and progressive relaxation technique should be used as routine nursing intervention for all lung cancer patients.

Key words: dyspnea, lung cancer, protocol of care, relaxation technique.

1. Introduction

Lung cancer is the most common cancer worldwide and the leading cause of all cancer-related deaths and responsible for approximately 1 in 5 cancer deaths [1]. More people die from lung cancer than from other types of cancer [2]. Over 1.8 million new cases of lung cancer are diagnosed worldwide each year and there are nearly 1.6 million deaths annually [1].

In the year 2013, the American Cancer Society estimates 228,190 new cases was diagnosed and 159,480 deaths due to lung cancer occurred in the United States [3]. According to statistics released by the National Cancer Institute, lung cancer cases in **Egypt** represent 8.2 percent of total cancer cases in men and about 2.4 percent of total cases among women [4].

Lung cancer is an abnormal, uncontrolled cell growth in the lung tissues, resulting in a tumor. The tumor in the lung may be primary, when it develops in the lung tissue or secondary, when it spreads from cancer in other areas of the body such as the liver, brain or kidney [5]. There are two major categories of lung cancer, Small cell (about 15-20 % of lung cancers) and non-small cell (more common) [6]. Repetitive exposure to inhale irritants such as coal, gasoline, diesel exhaust, uranium, nickel chromates, or radon gas increase the person's risk to develop lung cancer. Cigarette smoke, occupational exposures, air pollution containing benzopyrenes, and hydrocarbons all have been shown to increase risk [7].

One of the most important symptoms of lung cancer is dyspnea. It is a term used to characterize a subjective experience of breathing discomfort that

consists of qualitative distinct sensations that vary in intensity. The experience of dyspnea derives from interactions among multiple physiological, psychological, social and environmental factors, and may induce secondary histological and behavioral responses [8, 9].

Dyspnea referred to as the 6th vital sign by leading authorities. It is defined as respiratory demand exceeding the body's ability to meet that need [10, 11]. It is associated with sensation of uncomfortable breathing, suffocating, difficult or labored breathing, inability to get enough air, or tightness in the chest [12]. It has been associated with physical, emotional, and cognitive changes including poor concentration, anorexia, memory loss, sweating, fatigue, depression, anxiety, panic, and decreased mastery [13, 14]. Patients with lung cancer describe dyspnea as frightening and limiting to daily activities and function, Reductions in functional status and subsequent disability are frequent consequences of dyspnea. Thus, relief of dyspnea in patients with lung cancer is important to functional health and health-related quality of life [15, 16].

Management of dyspnea is based on three main elements: oxygen therapy, pharmacologic therapy, and general support measures. Support measures that may help patients to cope with dyspnea are breathing retraining, positioning, and education about relaxation and distraction [17, 18, 19].

The role of the critical care nurses for Patients diagnosed with lung cancer is receiving intervention for their dyspnea or received best supportive care. Nursing intervention consisted of a range of strategies combining breathing control, activity pacing, relaxation techniques, and psychosocial support. Best supportive care involved are receiving standard management and treatment available for breathlessness, and breathing assessments [20]. So, this study will be done on implementing protocol of care to relieve or reduce the severity of dyspnea among lung cancer patients.

Aim of the study

To evaluate the effect of protocol of care on lung cancer patient dyspnea.

Research hypothesis:

1- Patients in the study groups exhibit no dyspnea or reduction in severity of dyspnea after application of protocol of care than control group.

2- Both the two study groups exhibit improvement in their physiological and behavioral manifestations associated with dyspnea than the control group.

2. Materials and Method

Research design:

This study was used a quasi- experimental design.

Setting:

The study was conducted at The Intensive Care Unit at Tanta Cancer Center, Affiliated to Ministry of Health at El Garbeia Governorate.

Subjects:

A convenient sample of 105 patients with lung cancer suffering from dyspnea and under prescribed medical management was selected. The sample size calculation according to patient admission to the hospital was found to be 105 patients. This calculation was based on expected improvement on dyspnea outcomes among studied groups at 95% confidence power of the study. The subjects were divided into three groups:

-**Group I** (**Control group**): It consisted of 35 patients with lung cancer and treated according to routine dyspnea management of the Intensive Care Unit.

- **Group II (Study group):** It consisted of 35 patients with lung cancer meeting all inclusion criteria and received protocol of care for dyspnea (positioning and breathing exercises) by the researcher with routine care management of the unit.

- **Group III (Study group):** It consisted of 35 patients with lung cancer meeting all inclusion criteria and received protocol of care for dyspnea (positioning, and relaxation technique) by the researcher with routine management of the unit.

Inclusion criteria:

Subjects were selected according to the following criteria:-

- Adult patient: 21- 55 years old.
- Conscious patient diagnosed with lung cancer of stage I and II suffering from dyspnea.
- Patients receive treatment regimen (chemotherapy & radiotherapy).
- Pre-operative lung cancer patients.

Data collection tools:

Three tools were used for data collection:

Tool (I): An Assessment tool:

-A structured interview sheet was developed by the researcher to collect the data after extensive review of literature. It was consisted of two parts:

Part (1) Patient's socio-demographic assessment tool: It was used to collect data about the following items: patient's age, sex, date of admission, level of education and occupation.

Part (2) lung cancer patient health assessment tool that included: past and present medical history, history of cancer treatments, history of pulmonary disease, current medication, routine laboratory investigations, vital signsand smoking history, and Present history of dyspnea (timing, onset, severity, relieving factors, predisposing factors and associated symptoms.

Tool (II): Dyspnea Visual Analogue Scale:-

The visual analogue scale is a horizontal line, usually 10 cm long that is widely used in the measurement of symptoms such as breathlessness and pain, at a specific point in time [21, 22]. A clear description of the sensation being measured must be given such as 'breathlessness', 'distress due to breathlessness' or 'effort of breathing'. A Clear anchors are defined at each end of the VAS such as 'not breathless at all' to 'extremely breathless'. The patient indicates a level of dyspnea by marking the line between anchor points and the distance from the left side or the bottom of the scale is measured.

The scoring system is 0-10 & interpreting as follow [21, 22]:

No dyspnea	Equal zero
Mild dyspnea	Range from 1-3
Sever dyspnea	Range from 7-9
Extremely dyspnea	Equal 10

Tool (III): Cancer Dyspnea Scale (CDS) [23]:

Dyspnea was measured by using the Cancer Dyspnea Scale (CDS), which was developed by (**Tanaka K, et al, 2000) to** evaluate the multidimensional nature of dyspnea in cancer patients. The CDS consists of three items: 1- Sense of effort 2- Sense of anxiety 3-Sense of discomfort. Each item is rated from 1 (not at all), 2 (a little), 3 (somewhat), 4 (considerably) to 5 (very much).

They were named as:

1) **Sense of effort**: It contains five sub items:

1- Shortness of breath   2-panting
3- shallow breath

4-airway narrowing   5-feeling of something stuck in the airway

The scoring system: Sense of effort scores range from 5 minimum to 20 maximum scores. Factor 1 = sense of effort = (scores of items $4 + 6 + 8 + 10 + 12$) $- 5$.

2) **Sense of anxiety**: It contains four sub items:

1- Palpitations and sweating
2- The patient doesn't know what to do about it
3- Feeling as though breathing might stop
4- Feeling as though drowning

The scoring system: Sense of anxiety scores range from 4 minimum to 16 maximum scores. Factor 2 = sense of anxiety = (scores of items $5 + 7 + 9 + 11$) $- 4$

3) **Sense of discomfort**: It contains three sub items:

1- Inhale easily 2- exhale easily 3- breathe slowly

The scoring system: Sense of discomfort scores range from 3 minimum to 12 maximum scores. Factor 3 = sense of discomfort = 15 - (scores of items $1 + 2 + 3$)

Method of scores calculation:-

1-Add the scores for each factor together, it means that add scores of factor 1 + factor2 + factor 3.

2- Add the total scores for each factor together = total dyspnea

-The total minimal scores of CDS are 12 and the maximal scores are 48, so the total higher the score of dyspnea, the more the severe the patient's dyspnea.

Method:

1-   Administrative process:

Written approval:

Hospital permission was obtained from the responsible authority of Ministry of Health at Garbeia governorate and The Intensive Care Unit at Tanta Cancer Center before conducting this study through official letters from faculty of nursing explaining the purpose of the study.

2-   Tools development:

Tool I:

It was developed by the researcher to collect the data after extensive review of literature.

Tool II:

Dyspnea Visual Analog Scale was developed by (**Atkin, 1969)** and adopted by the researcher and translated into Arabic**..**

Tool III:

Cancer Dyspnea Scale (CDS) was developed by (**Tanaka K, et al, 2000)** and adopted by the researcher and translated into Arabic**.** The CDS showed good feasibility (average time required to complete it was 140 s). Construct validity confirmed by repeating factor analysis, was good. Convergent validity confirmed by a relation to Visual Analogue Scale of dyspnea and modified Borg's scale, was also good (average: $r = 0.57$ and 0.52, respectively, and both $P < 0.001$).

The CDS had good internal consistency (average Cronbach's alpha $= 0.86$) and stability (average test-retest reliability $r = 0.66$, $P < 0.005$).

3-   Content validity:

The tools of the study were tested for content validity by nine experts in the Medical-Surgical, Critical Care and oncology field. Modifications were carried out accordingly.

4-   Patient s consent:

Oral witnessed consent was obtained from patients and or their families after explanation of the aim of the study. Confidentiality and privacy was assured.

A pilot study:

It was conducted before the actual study on ten lung cancer patients to test the clarity, feasibility and the applicability of the different items of the determent tools. Modification and some additional terms were done by the researcher before study according to the experience gained from this pilot study. Data obtained

from those patients were excluded from the subjects in the current study.

Data collection was done for 7months period from the first November 2014 to the end July 2015.

The study was conducted on 4 phases:

Phase I: Assessment phase:

-Each subject of the study was informed about the purpose, benefits and the nature of the study and that he or she had the right to with draw from the study at any time without any rationale**.**

- The researcher reviewed the related literature and developed a designed program was developed.

- The researcher selected the teaching methods including demonstration and re-demonstration with illustration graphs.

-Patients of control group and both study groups were assessed immediately within admission using tool I. Dyspnea visual analogue scale were used twice for three groups before & after implementation of protocol of care for the two study groups and routine care for control one.

-Cancer dyspnea scale was used twice for both groups before & after implementation of protocol of care for the two study groups and routine care for control group.

Phase II: The planning phase:-

Six sessions were used in this phase by the researcher for both two study groups to provide the patients with information about skills and exercises that necessary to overcome dyspnea in addition to training them to performing these exercises, a colored booklet was developed by the researcher.

Phase III: Implementation phase:

Teaching was presented to all patients included in the study groups II and III for two consecutive days for six sessions. These sessions were given individually for each patient. The content of sessions were covered the following:

Session I: -General information

The aim of this session was to provide the patient with general information about anatomy and physiology of respiratory system. It was taken the duration of 30 minutes. The method of teaching used was discussion.

Session II: - Lung cancer

The aim of this session was to provide the patient with information about lung cancer. The content including definition, causes, manifestation, and medical treatment. It was taken the duration of 30 minutes. The method of teaching used was discussion.

Session III: - Dyspnea

The aim of this session was to provide the patient with information about dyspnea. The content including path physiology, types, grades, aggravating and relieving factors and medical treatment. It was taken the duration of 30 minutes. The method of teaching

used was discussion. **Session IV: -Care of dyspnea by using positioning**

The session aimed to teach the patient different positions for group II and III. The content including Semi to high flower's position, Positioning on the affected side and Sitting position. It was taken the duration of 30 minutes. The method of teaching used was demonstration and re demonstration. Material used for teaching was booklets with pictures. This session was conducted for group II and III.

Session V: - Care of dyspnea by using breathing exercises.

The session aimed to teach the patient about management of dyspnea using breathing exercise. Its content including definition, benefits, and how performs breathing exercise. It was taken the duration of 30 minutes. The method of teaching used was demonstration and re demonstration. Material used for teaching was booklets with pictures. This session was conducted for group II.

Session VI:- Care of dyspnea using Progressive relaxation technique.

The session aimed to teach the patient about management of dyspnea using Progressive relaxation technique. Its content including definition, benefits, and how performs Progressive relaxation technique. It was taken the duration of 30 minutes. The method of teaching used was demonstration and re demonstration. Material used for teaching was booklets with pictures. This session was being conducted for group III.

-Protocol of care for dyspnea was carried out for 7 [th] days for every patient.

Phase IV: The evaluation phase:

- Evaluation was done for the three groups (the control & the two study groups) by using tool I, II & III for experiencing dyspnea in lung cancer patients.

- Severity of dyspnea was assessed using dyspnea visual analogue scale (tool II) and cancer dyspnea scale (tool III) before and after sessions.

- Comparisons were done between the three groups in relation to the effect of protocol of care on lung cancer patient dyspnea by using tool II & III before and after sessions at the 7th days.

Limitation of the study

1-The participants were ambulatory outpatients; therefore the results of this study may not apply to more severe dyspnea.

2- Lack of financial support and some laboratory investigation as arterial blood gases done two times at admission of the patient and after session of the 7th day.

3- There wasn't space in the critical care unit to practice breathing exercise with comfort.

4- Most of both male and female patients were showing embarrassment and increase d resistance

when performing Stretching the Muscles of the chest wall.

5- Data processing and Analysis:- The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 16, SPSS Inc. Chicago, IL, USA).

3. Results
Table (1) illustrates distribution of the studied lung cancer patients suffering from dyspnea in the control and both two study groups according to their socio demographic characteristics.

This table shows that (51.4 %) of the control group I and (57.1 %) of both two study groups II and III ranged from 51-55years old, with the mean age of (46.14±9.15, 49.25±10.19 and 49.68±9.87) respectively. Also it was found that about two third (65.7%) (68.6%) of both the control group I and the study group II were male and more than half (57.1%) of the study group III were female respectively.

This table shows that the majority (80%, 97.1%and 85.7%) of the control group I and the study groups II and III were married respectively. Also, it was found that more than one third (37.1) % of the control group I were illiterate, while more than two third (62.9 %and 60 %) of the study groups II and III were illiterate respectively. Also it was found that (11.4 %) of both study group II and III were read and write. Also the minority of the study group III (5.7 %) were university or high.

Further, it was found that (14.3%) of both control and study group III and (28.6 %) of the study group II were manual worker respectively. On the other hand (22.9 %) of the control group I and (17.1%and 37.1%) of the both study groups II and III were house wife respectively, while about one quarter (25.7%) of both control group I and one third (34.3%) of study group II were farmer respectively. Furthermore residence, it was found that near three quarter (74.3%) of total study subjects were from rural while only quarter (25.7%) were from urban. Finally, It was found that there was no a statistical significant difference in socio demographic characteristics among the three group, the control and the two study groups at P > 0.05.

Table (4-2): illustrates distribution of pulse rate and respiratory rate among the studied patients with lung cancer suffering from dyspnea at first and seventh day before and after implementation of protocol of care.

This table shows no a significant difference among control group I and both study groups II and III in relation to pulse rate before and after session of 1stday. Significant differences were observed among all groups before and after session of 1st day at p=0.018 and 0.022respectively. Also, no a significant difference was observed among control group I and both study groups II and III in relation to pulse rate before and after session of the 7th day. Also a significant differences were observed among all groups after session of the 7th day as χ^2= 9.479 at p=0.009.

In relation to respiratory rate, significant differences were observed among both the study groups II and III before and after session in the 1st day at p value =0.031 and 0.017 respectively. Also, in the 7th day, a high statistical significant difference was observed among all studied groups before and after sessions as χ^2=21.786 at p = 0.0001.

Table (4-3) represents assessment of dyspnea among the studied lung cancer patients suffering from dyspnea.

This table shows that the majority (85.7%) of both control group I and the study group II and half of the study group III (51.4%) had dyspnea at night. Also it was found that about half (57.1 % and 54.3 %) of the sample in both control group I and the study group II had Sudden onset of dyspnea and half (51.4%) of study group III were had gradual onset of dyspnea respectively.

In addition, it was found that two third (60 %) of the control group I and (45.7 %and 20 %) of both study groups II and III had severe dyspnea respectively. Finally a significant difference was found regarding severity of dyspnea among the studied group at χ^2= 39.616 and P = 0.0001.

Table (4-5) illustrate mean changes of total cancer dyspnea scale scores among the studied lung cancer patients suffering from dyspnea at follow up days before and after intervention of protocol of care.

Regarding the mean changes of total cancer dyspnea scale in the control group, it was found that the mean change in the first day was ↓5.37±3.44 compared with the mean change in the 7th day was ↓4.48±4.49. In relation to the study group II, it was found that the mean change in the first day was ↓8.51±2.97 compared with the mean change in the 7th day was ↓3.51±7.33.

Concerning the study group III, it was observed that the mean change in the first day was ↓11.26±5.28 compared with the mean change in the 7th day was ↓3.11±6.16. Regarding the1st, 2nd, 4th, 5th day, a statistical significant differences were found before and after session among the control group I and both the two study groups II and III in relation to total cancer dyspnea scale scores as χ^2= 18.744, 18.213, 4.961 and 6.917 at P =0.0001,0.0001,0.009 and 0.002 respectively.

Table (4-6) shows mean changes of dyspnea of the studied lung cancer patients (the control group and both two study groups) pre & post intervention of protocol of care using dyspnea visual analogue.

This table shows that the mean changes of dyspnea visual analogue scale in control group I**,** it was found that the mean change in the first day was ↓1.11±1.05 compared with the mean change in the 7th day was ↓1.17±1.07. In relation to the study group II, it was found that the mean change in the first day was ↓2.34±0.64 compared with the mean change in the 7th day was ↓0.68±1.34.

Regarding the study group III, it was found that the mean changes in the first day were ↓2.97±1.07compared with the mean change in the 7th day was ↓0.54±1.15. Finally, in the1st, 2nd, 3rd and 4^{th}and5thday, statistical significant differences were found before and after session among the control group I and both the two study groups II and III in relation to total cancer dyspnea scale scores as χ^2 = 35.236, 28.417, 6.146, 5.269,9.278 at P = 0.0001, 0.0001, 0.003, 0.007and 0.0001 respectively.

Table (4-7) illustrates arterial blood gases (ABG) findings of the studied lung cancer patients for three study groups, control and both study groups suffering from dyspnea before and after intervention protocol of care for dyspnea.

In relation to blood acidity in 1st day before session, the mean scores were 7.38±0.06, 7.34±0.09, 7.37±0.06 in the control group and both the two study groups II and III respectively. On other the hand, at 7th day after session, the mean scores were 7.37±0.13, 7.37±0.05, 7.37±0.04 in the control group and both the two study groups II and III respectively.

Concerning arterial oxygen tension saturation (Pa O_2), in 1st day before Session, the mean scores were 89.01±7.80, 92.63±3.03, 93.77±2.10 respectively in the control group and both the two study groups II and III with very high statistical significant with P = 0.0001 respectively. As regard 7th day after session, the mean scores were 88.71±9.36, 94.03±2.19, 95.46±1.40 respectively in the control group I and both the two study groups II and III with statistical significant difference at P = 0.0001 respectively.

In addition, in 1st day before session it was found that the mean scores of partial pressure of carbon dioxide (Pa CO_2) were 41.10±5.60, 41.97±4.27, 41.17±3.36 in the control group and both the two study groups II and III respectively. On other the hand, at 7th day after session, the mean scores were 42.20±7.86, 41.04±3.96, 40.92±3.96 in the control group and both study groups II and III respectively.

Additionally, it was found that the mean scores of arterial oxy hemoglobin saturation (Sa O^2), in the 1st day before Session, were 3.10±4.33, 95.11±1.95, 95.74±1.95 in the control group and both the two study groups II and III with statistical significant difference as P = 0. 001 respectively. As regard (Sa O^2) in the 7th day after session, the mean scores were 93.20±4.99, 96.32±1.47, 97.52±1.39 in the control group I and both the two study groups II and III with very high statistical significant difference at P = 0.0001 respectively.

Table (1): Distribution of demographic data of the studied lung cancer patients (the control group I and both two study groups II and III) suffering from dyspnea (n=105).

Variables	Group I (control) (I) (n=35)		Group (II) (n=35)		Group (III) (n=35)		Total (n=105)		χ^2 P
	n	%	n	%	N	%	n	%	
Age:									
21-<31	3	8.6	0	0	1	2.9	4	3.8	4.531
31-<41	6	17.1	5	14.3	7	20.0	18	17.1	0.605
41-<51	8	22.9	10	28.6	7	20.0	25	23.8	
51-55	18	51.4	20	57.1	20	57.1	58	55.2	
Range	21-53		23-55		25-55		21-55		
Mean±SD	46.14±9.15		49.25±10.19		49.68±9.87		48.36±9.89		
F value	0.389								
P	0.625								
Sex:									
Male	23	65.7	24	68.6	15	42.9	62	59.0	5.750
Female	12	34.3	11	31.4	20	57.1	43	41.0	0.056
Marital status:									
Married	28	80.0	34	97.1	30	85.7	92	87.6	5.609
Divorced	2	5.7	0	0	1	2.9	3	2.9	0.468
Single	3	8.6	1	2.9	2	5.7	6	5.7	

Variables	Group I (control) (I) (n=35)		Group (II) (n=35)		Group (III) (n=35)		Total (n=105)		χ^2 P
	n	%	n	%	N	%	n	%	
Widow	2	5.7	0	0	2	5.7	4	3.8	
Educational level:									
Illiterate	13	37.1	22	62.9	21	60.0	56	53.3	6.939
Read and write	6	17.1	4	11.4	4	11.4	14	13.3	0.327
Secondary	12	34.3	5	14.3	8	22.9	25	23.8	
University or high	4	11.4	4	11.4	2	5.7	10	9.5	
Occupation:									
Manual work	5	14.3	10	28.6	5	14.3	20	19.0	13.735
Employee	5	14.3	5	14.3	5	14.3	15	14.3	0.185
Technical work	3	8.6	0	0	1	2.9	4	3.8	
Housewife	8	22.9	6	17.1	13	37.1	27	25.7	
Not work	5	14.3	2	5.7	6	17.1	13	12.4	
Farmer	9	25.7	12	34.3	5	14.3	26	24.8	
Residence:									
Urban	9	25.7	9	25.7	9	25.7	27	25.7	0.000
Rural	26	74.3	26	74.3	26	74.3	78	74.3	1.0000

Group I (Control group) =Patients with lung cancer treated according to routine dyspnea management of the Intensive Care Unit.

Group II=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **breathing exercises**) by the researcher with routine management of the unit.

Group III=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **relaxation technique**) by the researcher with routine management of the unit.

Table (4-2): Distribution of Pulse rate and respiratory rate among the studied patients with lung cancer suffering from dyspnea at first and seventh day before and after implementation of protocol of care (n=105).

Pulse and respiratory rates at 1st & 7th days		Group I (control) (n=35)				Group (II) (n=35)				Group (III) (n=35)				χ^2 P	
		Before		After		Before		After		Before		After		Before	After
		n	%	n	%	n	%	n	%	n	%	n	%		
▪ Pulse rate::															
1st day	Normal	26	74.3	27	77.1	0.08	32	91.4	34	97.1	0.27	22	62.9	26 74.3 0.60	7.980	7.644
	Tachycardia	9	25.7	8	22.9	0.780	3	8.6	1	2.9	0.607	13	37.1	9 25.7 0.440	0.018*	0.022*
7th day	Normal	28	80.0	28	80.0	0.000	34	97.1	35	100	1.01	30	85.7	33 94.3 0.63	4.916	9.479
	Tachycardia	7	20.0	7	20.0	1.000	1	2.9	0	0	0.313	5	14.3	2 5.7 0.425	0.086	0.009*
▪Respiratory rate (RR):															
1st day	Normal	11	31.4	14	40.0	0.25	13	37.1	23	65.7	4.63	11	31.4	22 62.9 5.73	0.343	5.648
	Tachypnea	24	68.6	21	60.0	0.618	22	62.9	12	34.3	0.031*	24	68.6	13 37.1 0.017*	0.842	0.059
7th day	Normal	17	48.6	19	54.3	0.06	31	88.6	33	94.6	0.18	27	77.1	32 91.4 1.73	14.560	21.786
	Tachypnea	18	51.4	16	45.7	0.811	4	11.4	2	5.7	0.669	8	22.9	3 8.6 0.189	0.001*	0.0001*

Group I (Control group)=Patients with lung cancer treated according to routine dyspnea management of the Intensive Care Unit.

Group II=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **breathing exercises**) by the researcher with routine management of the unit.

Group III=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **relaxation technique**) by the researcher with routine management of the unit.

*Significant (P<0.05)

Table (4-3): Assessment of dyspnea among the studied lung cancer patients suffering from dyspnea (n=105).

Assessment of dyspnea	Group I (control) (n=35)		Group (II) (n=35)		Group (III) (n=35)		χ^2	P
	n	%	n	%	n	%		
▪**Timing:**								
During the day	22	62.8	22	62.8	17	48.6	1.960	0.376
At the night	30	85.7	30	85.7	18	51.4	14.360	0.0008*
▪**Onset:**								
Sudden	20	57.1	19	54.3	17	48.6	0.536	0.765
Gradual	15	42.9	16	45.7	18	51.4		
▪**Severity:**								
Mild	1	2.9	0	0	17	48.6	39.616	0.0001*
Moderate	13	37.1	19	54.3	11	31.4		
Severe	21	60.0	16	45.7	7	20.0		
▪**Relieving factors:**								
Rest	20	57.1	22	62.8	18	51.4	0.930	0.627
Change in position	28	80.0	33	94.3	28	80.0	3.140	0.208
Medication	29	82.8	29	82.8	25	71.4	1.280	0.528
Other	2	5.7	0	0	0	0	4.080	0.130
▪**Predisposing factors:**								
Cold	19	54.3	23	65.7	14	40.0	4.670	0.097
Activity	27	77.1	33	94.3	31	88.6	4.620	0.099
Allergens	25	71.4	31	88.6	25	71.4	3.890	0.143
Other	1	2.9	0	0	0	0	2.020	0.364

Group I (Control group)=Patients with lung cancer treated according to routine dyspnea management of the Intensive Care Unit.

*Group II=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **breathing exercises**) by the researcher with routine management of the unit.*

*Group III=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **relaxation technique**) by the researcher with routine management of the unit.*

*Significant (P<0.05)

Table (4-5): Mean changes of total cancer dyspnea scale scores among the studied lung cancer patients suffering from dyspnea before and after intervention of protocol of care (n=105).

Total cancer dyspnea scale scores at follow up days	Mean change of total cancer dyspnea scale scores among the studied lung cancer patients suffering from dyspnea Before and after intervention (n=105)			χ^2 value P	Z value P
	Group I (n=35	Group II (n=35)	Group III (n=35)		
1st day	↓5.37±3.44	↓8.51±2.97	↓11.26±5.28	18.749 0.0001*	I vs II, P=0.006* I vs III, P=0.0001* II vs III, P=0.020*
2nd day	↓4.91±4.77	↓7.74±4.02	↓11.37±4.63	18.213 0.0001*	I vs II, P=0.035* I vs III, P=0.0001* II vs III, P=0.004*
3rd day	↓4.03±4.65	↓4.43±5.84	↓4.20±7.39	0.038 0.962	
4th day	↓4.83±3.66	↓7.06±6.99	↓9.11±5.91	4.961 0.009*	I vs III, P=0.009*
5th day	↓4.14±4.32	↓6.20±7.78	↓10.11±7.77	6.917 0.002*	I vs III, P=0.002*

6th day	↓4.63±4.79	↓7.00±8.08	↓7.60±7.82	1.735 0.181	
7th day	↓4.48±4.49	↓3.51±7.33	↓3.11±6.16	0.467 0.628	

Group I (Control group)=Patients with lung cancer treated according to routine dyspnea management of the Intensive Care Unit.

*Group II=Patients with lung cancer were unde7rgone protocol of care for dyspnea (**positioning** and **breathing exercises**) by the researcher with routine management of the unit.*

*Group III=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **relaxation technique**) by the researcher with routine management of the unit.*

χ^2 value of Kruskal Wallis test Z value of Mann Whitney U test *Significant (P<0.05)

Table (4-6): Mean changes of dyspnea of the studied lung cancer patients (the control group and both two study groups) pre & post intervention of protocol of care using dyspnea visual analogue.

Dyspnea visual analogue scores at follow up days	Mean changes of dyspnea visual analogue scale scores among the studied lung cancer patients suffering from Dyspnea before and after intervention (n=105)			χ^2 value P
	Group I (n=35	Group II (n=35)	Group III (n=35)	
1st day	↓1.11±1.05	↓2.34±0.64	↓2.97±1.07	35.236 0.0001*
2nd day	↓1.37±1.03	↓2.40±1.14	↓3.23±0.91	28.417 0.0001*
3rd day	↓1.40±1.22	↓2.17±1.48	↓2.57±1.54	6.146 0.003*
4th day	↓1.31±1.23	↓1.91±1.52	↓2.37±1.33	5.269 0.007*
5th day	↓1.06±1.16	↓1.37±1.50	↓2.43±1.50	9.278 0.0001*
6th day	↓1.11±1.02	↓1.40±1.70	↓1.03±1.50	0.640 0.529
7th day	↓1.17±1.07	↓0.68±1.34	↓0.54±1.15	2.669 0.074

Group I (Control group)=Patients with lung cancer treated according to routine dyspnea management of the Intensive Care Unit.

*Group II=Patients with lung cancer were unde7rgone protocol of care for dyspnea (**positioning** and **breathing exercises**) by the researcher with routine management of the unit.*

*Group III=Patients with lung cancer were undergone protocol of care for dyspnea (**positioning** and **relaxation technique**) by the researcher with routine management of the unit.*

χ^2 value of Kruskal Wallis test
Z value of Mann Whitney U test
***Significant (P<0.05)**

Table (4-7): Arterial blood gases (ABG) findings of the studied lung cancer patients suffering from dyspnea for three study groups, control and both study groups before and after intervention protocol of care for dyspnea (n=105).

Arterial blood gases (ABG) findings at 1st & 7th days	Group I (control) (I) (n=35)	Group (II) (n=35)	Group (III) (n=35)	F value	P
	Range Mean±SD	Range Mean±SD	Range Mean±SD		
▪Blood acidity (PH):					
1st day (B.S)	7.20-7.56 7.38±0.06	7.12-7.44 7.34±0.09	7.20-7.56 7.37±0.06	2.217	0.114
7th day (A.S)	7.04-7.89 7.37±0.13	7.20-7.45 7.37±0.05	7.23-7.46 7.37±0.04	0.008	0.992
Paired t test P	0.413 0.683	2.855 0.007*	0.106 0.916		
▪ Arterial oxygen tension saturation (PO^2):					
1st day (B.S)	65.00-97.80 89.01±7.80	82.00-97.00 92.63±3.03	89.00-97.00 93.77±2.10	8.694	0.0001*
7th day (A.S)	50.00-97.20 88.71±9.36	87.00-97.00 94.03±2.19	92.00-97.00 95.46±1.40	14.069	0.0001*
Paired t test P	0.549 0.586	6.803 0.0001*	8.717 0.0001*		
▪ Partial pressure of carbon dioxide ($PCO^{2)}$):					
1st day (B.S)	30.40-52.80 41.10±5.60	35.00-52.80 41.97±4.27	33.30-49.50 41.17±3.36	0.401	0.671
7th day (A.S)	33.40-74.80 42.20±7.86	33.40-50.00 41.04±3.96	35.40-46.00 40.92±3.96	0.615	0.543
Paired t test P	1.314 0.198	4.079 0.0001*	1.907 0.065		
▪ Arterial oxyhemoglobin saturation ($Sa\ O^2$): 1st day (B.S)	82.60-98.00 93.10±4.33	90.00-98.00 95.11±1.95	90.00-99.30 95.74±1.95	7.613	0.001*
7th day (A.S)	79.00-98.50 93.20±4.99	93.00-98.00 96.32±1.47	94.00-99.30 97.52±1.39	17.835	0.0001*
Paired t test P	0.411 0.683	6.372 0.0001*	10.440 0.0001*		

*Significant (P<0.05)

4. Discussion

Regarding socio-demographic characteristics of the study subjects, the results of the present study found that half of the control group I and both the two study groups (II and III) ranged from 51-55years old. It may be attributed that lung cancer affect this age group. Also, the elderly considered high risk group for lung cancer due to the impaired body defense mechanism against lung cancer. Similarly with the study results about "Pain characteristics of advanced lung cancer patients referred to a palliative care service" was done by **Lavoie (2000)** [24], reported that Patients age ranged from 35 to 87 years.

In relation to sex, about two third of the control group I and the study group II were male, and more than half of the study group III were female. This result was supported by **Dudgeon (2001)** [25], concluded that two third were male and is still greater than the incidence for females. **Regarding marital status**, it was found that the majority of the control group I and the study groups II and III were married. This result was in accordance with **Lavoie (2000)** [24] revealed that the majority of the patients were married.

In relation to educational level, it was found that more than one third of the control group I were illiterate, while more than two third of the study groups (II and III) were illiterate. Also, it was found that the minority of both the study groups (II and III) were read and write. Also, the minority of the study group III were university or high. This finding was incongruent with a study result about "factors correlated with dyspnea in advanced lung cancer patients" was done by **Tanaka (2002)** [26], mentioned that half of the patients were junior high school.

As regard occupation, the finding of present study revealed that the minority of both the control and the study group III and one third of the study group II were manual workers. On the other hand

about one quarter of the control group I and the minority and one third of both the study groups II and III were house wife. Also, one quarter and one third of both the control group I and the study group II were farmer. This result was in line with a study result about **"**value of pulmonary rehabilitation in patients with idiopathic pulmonary fibrosis" were done by **Nizar et. al**; **(2004)** [27], reported that less than one quarter of the sample were manual workers, about two third were house wife and the minority of the sample were farmers.

Concerning residence, the finding of present study revealed that near three quarter of the total study subjects were from rural while only quarter were from urban. This may be due to higher exposure to pollution, chemicals and carcinogenesis in rural areas. This result was in line with **Juhua et. al**; **(2011)** [28], reported in study about" Environment carcinogen release and lung cancer mortality in rural- urban areas of the united states", that exposure to higher carcinogen releases from industrial or chemicals facilities in rural areas may increase the risk of lung cancer. Also, this result was in contrast with **Lisa et. al**; **(2008)** [29], reported in study about "An Exploration of Urban and Rural Differences in Lung Cancer Survival among Medicare Beneficiaries", that urban lung cancer patients had a slightly higher than patients in rural areas.

Regarding the physiological parameters, the results of the present study revealed that pulse rate was decreased among all the groups before and after session of the 1st day with statistical significant difference. Also, significant differences were found among all the groups after session of the 7th day. This result also showed an improvement in respiratory rate among both the study groups II and III in the 1st day before and after session with statistical significant difference.

In addition, highly statistical significant differences were found among all the studied groups before and after sessions of the 7th day. A similar result was in line with the study results about "Effects of slow breathing exercise on cardiovascular functions, pulmonary functions & galvanic skin resistance in healthy human volunteers" were done by **Turankar et. al; (2003)** [30], revealed that regular practice of rhythmic slow breathing has been shown to reduce blood pressure, heart rate, electromyography (EMG) activity, and a rise in skin temperature and improves cardiovascular and respiratory functions.

Also, this result was similar to the study results about "Effect of progressive muscle relaxation using biofeedback on perceived stress, stress response, immune response and climacteric symptoms of middle –aged women" was done by **Jeong (2004)** [31], found that a mean heart rate was decreased to 6 b/m while

patients participated in a 45 minute progressive muscle relaxation by decreasing sympathetic nervous system activity and increasing vagal activity.

Also, this result was supported by **Khanna et. al; (2007)** [32] concluded in a study about "Efficacy of two relaxation techniques in reducing pulse rate among highly stressed females" that progressive muscle relaxation training were found to be more effective than biofeedback training in reducing the pulse rate, respiratory rate, blood pressure and anxiety in stressed female patients.

Regarding timing of dyspnea, the results revealed that the majority of both the control group I and the study group II and half of the study group III had dyspnea at night. This may be due to pulmonary congestion during recumbency and during sleep. This result was in accordance with **Hately and colleagues (2003)** [33], who mentioned in a study about "breathlessness clinics within specialist palliative care settings can improve the quality of life and functional capacity of patients with lung cancer", that the majority of patients were experiencing dyspnea at night.

Regarding severity of dyspnea, it was found that two third of the control group I and nearly half of the study group II had severe dyspnea while the minority of the study group III had sever dyspnea and this contributed that severity of dyspnea increase with the progression of the disease. This result was in accordance with **Claessens (2000)** [34], reported in study about "dying with lung cancer or chronic obstructive pulmonary disease", that one third of the patients had severe dyspnea.

In relation to dyspnea associated with chest pain, it was found that about near half of the sample had chest pain; this may be due to the direct spread of the tumor to the pleural surface. This result was in line with a study results about "Patient Assessment. In N. Houlihan, Site-specific cancer series, Lung cancer" was done by **Tyson (2005)** [35], stated that chest pain occurs in about near half of patients with lung cancer. Also, this result was supported by a study results about "initial evaluation of the patient with lung cancer" were done by **Beckles et. al; (2003)** [36], concluded that half of patients had chest pain at diagnosis in his study about initial evaluation of the patient with lung cancer.

The present findings showed that the mean changes of the total cancer dyspnea scale were decreased and showed more improvement in the 7th day among the study groups II and III than the control group I. These results were consistent with a study results about "Behavioural interventions for lung cancer-related breathlessness" were done by **Gallo and Pollack (2000)** [37], demonstrated that the breathing retraining has been proven to be beneficial, especially when initiated at the earliest possible stage.

Also, the current study results were in line with **Bredin et. al; (2015)** [38] showed in a study about "training in breathing control techniques, progressive muscle relaxation and distraction exercises", that patients attending the clinics for breathlessness experienced improvements in breathlessness, performance status and physical and emotional states at the end of the program. Also, this result was supported by a study results about "A Structured Exercise Program for Patients with Advanced Non-small Cell Lung Cancer" were done by **Jennifer et. al; (2009)** [39]**,** stated that patients who completed structured breathing program experienced an improvement in their lung cancer symptom and functional capacity.

The present findings showed that the mean change of dyspnea visual analogue scale scores were decreased and showed more improvement in the 7th day among the study groups II and III than control group I. These results were consistent with **Corner (2007)** [40], found in a study about "Non-pharmacological intervention for breathlessness in patients with lung cancer", that improvements in median scores of all measures of dyspnea visual analogue scale were observed in the intervention group compared with the control group where median scores were static or worsened. Distress from breathlessness was improved by more than half percentage.

Regarding arterial blood gases (ABG) findings of the present study, in the 1st day before session and the 7th day after session, it was found that the mean scores to blood acidity (PH) among the control group I and both study groups (II and III) reported no differences. Regarding Pa O2, the results revealed that the mean scores were increased among both the two study groups II and III compared with the mean scores of the control group due to the effect of the program after session of the 7th day.

Also, the results show that the mean scores of Pa Co2 were decreased among both the study groups (II and III) compared with mean scores of the control group I after session of the 7th day. In addition the results revealed that the mean scores of Sa o2 were increased among both the study groups (II and III) compared with the mean scores of the control group I after session of the 7th day.

This result was in line with **Miller (2012)** [41]**,** reported in study about " A physiological evaluation of the effects of diaphragmatic breathing training in patients with chronic pulmonary emphysema ", that patients with COPD who were adopted breathing and relaxation technique showed decreasing in Pa Co2 and there were an improvement in Pa O2 and Sa O2 after training.

Also, this result was in contrast with **Nizaret. al; (2004)** [27], stated that there were significant improvement in the mean dyspnea scores. However, arterial blood gas values showed no significant improvement at the end of the program.

Conclusion

Based on the results of this study, it could be concluded that the majority of both control group I and the study group II and half of the study group III had dyspnea at night. The physiological parameters were improved and the mean scores of Pa O2 and SaO2 were increased among the two study groups after session of 7th day compared to the control group. Also, the results of the current study were found that the severity of dyspnea measured by visual analogue scale and cancer dyspnea scale was improved in dyspnea scores in the two study groups than control group. So, Breathing exercises and relaxation techniques have an effect on decreasing the severity of dyspnea in lung cancer patient.

Recommendation:
A-For administration:
1. Protocols for dyspnea assessment should be available in the hospital and should be carried out.
2. Written polices for practicing breathing exercise and progressive relaxation technique to all lung cancer patients should be available in the hospital.
3. Breathing exercise and progressive relaxation technique should be included in the basic nursing education and should be learned to all nursing students.
B- For nurses:
1. Intensity of patient's dyspnea should be assessed by using different scales and documented daily at regular intervals in patient record.
2. Dyspnea assessment should be used as 6th vital signs to all lung cancer patients.
3. The daily flow sheet or nursing records must include a section on breathing exercise and progressive relaxation technique.
C- For patient:
1. All lung cancer patients should be given both written and verbal information about dyspnea assessment.
2. Simple illustrated booklet includes the most important instruction points regarding breathing exercise and progressive relaxation technique should be given to all lung cancer patients.
3. Breathing exercise and progressive relaxation technique should be used as routine nursing intervention for all lung cancer patients.
D –For education and training:-

1-New courses about breathing exercises and progressive relaxation techniques recommended to be added to under graduate, graduate and post graduate and provide training program to update nurses knowledge, skills and change attitude about breathing exercises and progressive relaxation techniques.

Recommendation For further studies:-

1. Assessing the obstacles facing the critical care oncology nurse regarding the usage of breathing exercise and progressive relaxation technique and their effect on nurses' performance and patient outcome.

2. Quality of life (physical, psychological, social, spiritual) related to dyspnea in early stage lung cancer patient.

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9/12/2017