https://menj.journals.ekb.eg
Print ISSN: 2735-3974
Online ISSN: 2735-3982
DOI:10.21608/menj.2024.387345

MNJ
Menoufia Nursing Journal
Faculty of Nursing
Menoufia University

Effect of Nursing Interventions on Symptoms and Functional Status among Patients with Lung Cancer

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Abstract: Lung cancer remains the leading cause of cancer mortality in men and women worldwide. Both lung cancer and its treatment specially chemotherapy cause a range of debilitating side effects that affect patient's functional status and the overall health related quality of life. **Purpose**: To evaluate the effect of selected nursing interventions (breathing and stretching exercises of upper body) on improving symptoms and functional status among patients with lung cancer. **Design**: A quasi experimental research design was utilized. **Setting**: This study was conducted at the inpatient wards and the outpatient clinics of the oncology department, Menoufia University Hospital, Shebin El- kom, Menoufia Governorate, Egypt. **Sample**: A consecutive sample of 60 adult patients with lung cancer were selected. They were randomly assigned into two equal groups, 30 patients in both study and control groups. **Instruments**: Six instruments were used in data collection: knowledge of patient's structured interview questionnaire, breathing exercises Observational Checklist, Fatigue Assessment Scale, Dyspnea Numeric Rating Scale, Insomnia Severity Index and Functional Assessment of Cancer Therapy - General Scale). **Results**: The main findings of the study revealed , a highly statistically improvement at follow up 1 (100%) of study group had mild to moderate fatigue also, there was statistically significant improvement at follow up 2 (60%, 40%) had mild to moderate fatigue and normal (no fatigue) respectively than control group. **Conclusion**: The study concluded that nursing interventions contributed to reduction of symptoms (fatigue, dyspnea, insomnia) & functional status among patients with lung cancer. **Recommendation**: The nursing interventions should be provided for lung cancer patients to improve symptoms and functional status among them.

Keywords*: Functional status, lung cancer, Nursing intervention; Symptoms*

Introduction

Cancer is one of the most fatal diseases of recent times that causes several deaths every year. It is estimated that there were approximately 19.3 million new cancer cases and 10 million deaths from cancer worldwide in 2020 (Chhikara & Parang, 2023).

Lung cancer has progressed to be one of the most frequent and deadly variations of cancer worldwide. Despite advances in diagnosing and treating this disease, lung cancer prevalence and mortality have increased. According to the last report of The Global Cancer Observatory, this type of cancer represents the leading cause of mortality in cancer, with 1.8 million new cas es being diagnosed and 1.6 million lung cancer related-deaths occur globally every year (Torres et al., 2023).

Lung cancer (bronchogenic carcinoma) is defined as a tumor that originates in the lung parenchyma or within the bronchi.

The most effective factors for developing lung cancer are family history, smoking, radon from underground decay of uranium occurring naturally, and occupational hazards from working with various substances including asbestos, increasing air pollution, contact with arsenic, history of pulmonary tuberculosis, and emerging evidence points at risk from electronic cigarettes and other tobacco products (Alduais et al., 2023).

Lung cancer is classified into 2 main types; non-small cell lung cancer (NSCLC, 85% of patients) and small cell lung cancer (SCLC,15% of patients). The three main types of NSCLC categorized by the World Health Organization are; adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. Non-small-cell lung cancer is frequently observed but small cell lung cancer spreads faster and is often fatal (Bishnoi et al., 2023).

The general stages of NSCL are stage 0 (in-situ) in which cancer is in the top lining of the lung or bronchus and it hasn't spread to other parts of the lung or outside of the lung. Stage I, in which cancer hasn't spread outside the lung. Stage II, in which cancer is larger than Stage I and spread to lymph nodes inside the lung or there's more than one tumor in the same lobe of the lung. Stage III, in which cancer is larger than Stage II and spread to nearby lymph nodes or structures or there's more than one tumor in a different lobe of the same lung. Stage IV, in which cancer has spread to the other lung, the fluid around the lung and the fluid around the heart or distant organs (Mithoowani & Febbraro, 2022).

Most lung cancers do not cause any symptoms until they have spread but some people with early lung cancer do have symptoms such as cough that does not go away or gets worse, coughing up blood or rust-colored sputum (spit or phlegm), shortness of breath, new onset of wheezing, chest pain that is often worse with deep breathing, coughing, or laughing, hoarseness, loss of appetite, unexplained weight loss, feeling tired or weak & Infections such as

bronchitis and pneumonia that don't go away (Elshami et al., 2022).

Also, there are symptoms related to metastasis of lung cancer to other parts of the body. If it spreads to lymph nodes it may cause swelling of lymph nodes (collection of immune system cells) such as those in the neck or above the collarbone. If it spreads to the brain, it causes nervous system changes such as headache, weakness or numbness of an arm or leg, dizziness, balance problems, or seizures. If it spreads to the bone, it causes bone pain like pain in the back or hips. If it spreads to the liver, it causes yellowing of the skin and eyes (jaundice) (Tsui & Rusthoven, 2022).

There are different options and recommendations for treatment of lung cancer which depend on several factors including the type, stage of cancer, possible side effects, the patient's preferences and overall health. These options include surgery, chemotherapy, radiotherapy, immunotherapy, targeted therapy, hormone therapy and/or a combination of these modalities (Alduais et al., 2023).

Research even shows that both the disease and its treatment specially chemotherapy cause a range of debilitating side effects including pain, dyspnea, fatigue, anxiety, depression, insomnia, anemia, pneumonitis, weight loss, muscle wasting, and reduced physical function. So, patients with multiple and severe symptoms of lung cancer had a worse performance status, physical, emotional, cognitive, social and overall health related quality of life than those who had a small number of symptoms and with lower severity of the disease (Ettinger et al., 2022).

So, nursing interventions are very important to reduce side effects and improve symptoms for lung cancer patients during treatment and recovery. These include cognitive behavioral therapy (CBT), psychosocial interventions, positive meditation, muscle relaxation, stress management therapy, nutritional management, Traditional Chinese Medicine (TCM), sleep management, exercises, and health education (Sharbafchi et al., 2023).

Several researches have suggested that exercises are the important step toward recovery among patients with lung cancer, and the most common form of self-management practice used for lung cancer patients. People using it for a variety of reasons, including to regain health and fitness, improve treatment adverse effects, relax the mind and body, and regain a sense of normality post lung cancer. Also, much research has focused on the effects of exercise in improving levels of self-efficacy, empowerment, coping mechanisms, healthy behaviors, and symptoms such as fatigue, dyspnea, insomnia, health outcomes and quality of life in lung cancer patients (Rao & Bansal, 2024).

The most effective exercises are breathing exercises and stretching exercises of upper body. Breathing exercises are the most effective exercises for improving symptoms among patients with lung cancer as it allows these patients to take a deep breath and increase oxygen intake by prolonging and slowing down inhalation and exhalation which leads

to reducing the respiration rate and dyspnea. Also, it builds up lungs, makes them more efficient and allows the patients to be more active, this leads to improving symptoms among these patients. Breathing exercises include pursed lip breathing exercise and diaphragmatic breathing exercise (Feng & Yang., 2022).

Several studies have found that stretching exercises of upper body also are important for lung cancer patients as it increases the flow of blood and oxygen to the muscles, improves muscle elasticity, and helps the body to repair itself. Moreover, daily upper body stretching exercises expands the chest cavity and increases lung capacity, this allows for freer movement of the lungs and diaphragm which encourages deeper breathing, helps with shortness of breath, improves functional status and overall health related quality of life for these patients. Stretching exercises of upper body include shoulder stretch, triceps stretch, and standing side stretch (Mao et al., 2022).

Several studies recommended that regular exercises (breathing and stretching exercises) for six weeks have been recognized to improve quality of life, mitigate illness symptoms or treatment-induced side effects, improve functional status and reduce mortality among lung cancer patients (Codima et al., 2021).

Also, the role of the nurse includes health education which is an effective intervention initiated by nurses to improve symptoms among patients with lung cancer. Several studies have found that health education for lung cancer patients raise the awareness of lung cancer-related knowledge, effectively reduce cancer pain, and improve the quality of life. It includes education about nursing interventions that have been recommended to improve breathing efficiency, manage shortness of breath, improve fatigue, insomnia, and functional status for lung cancer patients (Özbudak & Yıldırım 2023).

Lung cancer nurses are crucial in educating and supporting patients to self-manage physical and psychological consequences of lung cancer and its treatments. Effective patient education helps to engage people optimally in monitoring and managing symptoms and side effects which is imperative for patient safety. Evidence in the literature suggests that nursing interventions such as exercises and health education have a positive impact on symptoms of lung cancer within the dyspnea, fatigue, and insomnia (Leyns et al., 2024).

Therefore, the purpose of this study is to evaluate the effect of selected nursing intervention on improving symptoms and functional status among patients with lung cancer.

Significance of the study

Lung cancer has been reported to be the leading cause of cancer morbidity and mortality globally for several decades and accounts for approximately 1.8 million annual deaths. Moreover, 2 million people are diagnosed with lung cancer annually. These estimates are approximate with a large number of diagnoses and deaths going undetected, especially in the

low-and middle-income countries (Rao & Bansal, 2024).

In Egypt, the lung cancer incidence is about 4.6% of all cancers in both sexes, representing about 6.9% of male cancers (5017 cases) and 2.5% of female cancers (3634 cases) and mortality rate 6.8% in males and 3.8% in females. Lung cancer deaths in Egypt reached 4,429 per 100,000 of population in 2020 (Ibrahim & Shash 2022)

Lung cancer is recognized to carry a high symptom burden with associated lowered quality of life & impaired functional status as compared with other types of cancer. So, symptoms improvement is a priority for lung cancer patients and an important component for improving clinical outcome & survival. The presence of research targeting nursing interventions for symptom improvement remains a gap in the literature.

Therefore, in this study selected nursing interventions (breathing & stretching exercises) could be effective in improving symptoms and functional status among patients with lung cancer (Ramos et al., 2024). Hence this study was done to evaluate the effect of selected nursing interventions on improving symptoms and functional status among patients with lung cancer.

Purpose of the study

The purpose of this study is to evaluate the effect of selected nursing interventions on symptoms and functional status among patients with lung cancer.

Research Hypotheses

1) Patients with lung cancer who apply the selected nursing interventions (breathing and stretching exercises of upper body) will have fewer symptoms of fatigue, dyspnea & insomnia than patients who do not apply.

2) Patients with lung cancer who apply the selected nursing interventions (breathing and stretching exercises of upper body) will have a higher score of functional status than patients who do not apply.

Methods:

Research design:

A quasi-experimental

Research setting:

Inpatient wards and the outpatient clinics of the oncology department, Menoufia University Hospital, Shebin El- kom, Menoufia Governorate, Egypt.

Sampling:

A consecutive sample of 60 adult patients with lung cancer who fulfill the inclusion criteria was assigned randomly and alternatively into two equal groups, 30 patients for each group:

- The study group (I) was exposed to the designed selected nursing intervention along with routine hospital care.
- The control group (II) was exposed only to routine hospital care.

Inclusion criteria:

- Adult patients of both sexes aged between 18-60 years.

- Patients are clinically diagnosed with stage I, II, III of non-small cell lung cancer undergoing chemotherapy treatment, and willing to participate in the study.

Exclusion criteria

Patients who have one or more of the following disorders: Musculoskeletal disorders, cardiopulmonary diseases, any metastatic disease, severe anemia less than 8mg/dl, tingling in hands or feet (peripheral neuropathy), problems with balance

Calculation:

Based on review of past literature (Rutkowska et al., 2019), It was found that there was significant improvement in the perception of dyspnea and fatigue in the Exercise Training Group (P =.04, effect size 0.12).Sample was calculated at power 80% and confidence level 95%,with following equation $N = 2SD^2 [Z_{\alpha/2} + Z_{\beta}]^2 / d2$, where SD is the standard deviation, $Z_{\alpha/2}$ is the standard normal variate at 5% type I error, Z_{β} is the standard normal variate at power 80% it equal 0.84 and d is the effect size, the calculated sample was 60 participants divided into two groups with case to control ratio 1:1.

$$N = 2SD^2 [Z_{\alpha/2} + Z_{\beta}]^2 / d2$$

$$\frac{N = 2SD2 [Z\alpha/2 + Z\beta] 2}{d2} = \frac{2 (2.1)2 (1.96+0.84)2}{1.25}$$

$$= 55.2$$

To avoid drop out of sample, the sample size was increased by 10% so total sample 60 participants.

Instruments of the study:

Six instruments were used for data collection.

Instrument one: Structured Interview Questionnaire:

It was developed by the researcher after reviewing of the related literature (Scott et al., 2018 & Rosenbæk et al., 2024) to assess base line patient's socio-demographic data and medical data as well as patient's knowledge. It includes of three parts as the following:

- **Part 1**: Sociodemographic data: It contained seven questions about patient's age, sex, marital status, place of residence, level of education, occupation and economic status.
- **Part 2**: Medical data: It contained ten questions about patient's past and present medical history such as current diagnosis, duration of the disease, disease stage, presence of chronic disease, history of surgery, current treatment, family history with lung cancer, history of exposure to radiation therapy, history of smoking, and history of exposure to carcinogenic factors.
- **Part 3**: patient's knowledge: It included questions to assess patients' knowledge related to lung cancer. These items are definition, causes, types, stages, symptoms related to lung cancer, methods of diagnosis, treatment, selected nursing interventions, exercises that reduce the severity of these symptoms, and the importance of these exercises & its duration.

Scoring System:

Answers ranged from zero to 2, in which zero denotes incorrect answer or don't know, one denotes incomplete correct answer, and two for complete correct answer, then all scores were summed up and converted into percent.

Patients who obtained a score less than 50% (from zero to less than 10 marks) was considered poor knowledge. While patients who obtained a score from 50% to less than 75% (from 10 to less than 15 marks) was considered fair knowledge, and patients who obtained a score from 75% to 100% (from 15 to 20 marks) was considered good knowledge. The higher score represents the higher patient's knowledge level & vice versa. The structured interview questionnaire had a good internal consistency (Cronbach's α coefficient for all items α=0.86).

Instrument two: Observational checklist:

It was developed by the researcher based on the literature review (Hong ye & Chao Hong 2020) and was used to assess patient's performance of pursed lip breathing, diaphragmatic breathing and stretching exercises of upper body, it included two parts as follow:

- **Part 1**: pursed lip breathing and diaphragmatic breathing exercises, it was used to assess patient's performance of pursed lip breathing and diaphragmatic (belly) breathing exercises.
- **Part 2**: Stretching exercises of upper body, it was used to assess patient's performance of stretching exercises of upper body.

Scoring system:

Patient's performance was clarified on a 3-point scale, two marks for correctly complete done, one mark for correctly incomplete done and zero mark for incorrectly done or not done. The total score is summed from 25 items ranging from Zero to fifty. Then all marks for each item were summed and converted into percent. Patients who obtained a score less than 50% (from zero to less than 25 marks) denoted poor performance. While patients who obtained a score from 50% to less than 75% (from 25 to less than 37 marks) denoted fair performance, and patients who obtained a score from 75% to 100% (from 37 to 50 marks) denoted good performance. The higher score represents the higher patient's performance level & vice versa.

The observational checklist had a good internal consistency (Cronbach's α coefficient for all items α=0.91)

Instrument three: Fatigue Assessment Scale (FAS):

It was developed by Hendriks et al., (2018) to assess fatigue. It includes ten questions; five questions reflect physical fatigue while the other five questions reflect mental fatigue which is measured by questions (3, 6, 7, 8, 9).

Scoring system:

Each item of the FAS is answered using a five-point, likert-type scale ranging from 1 (“never”) to 5 (“always”). Items 4 and 10 are reverse scored. Total scores can range from 10 to 50. Then total score was categorized as follow

- FAS scores 10 - 21: no fatigue (normal).
- FAS scores 22 -50: substantial fatigue, which subdivided into subscale as the following: -

-FAS scores 22 -34: mild to moderate fatigue

-FAS scores ≥ 35: sever fatigue.

The fatigue assessment scale (FAS) had good internal consistency (Cronbach's α coefficient for all 10 items α=0.90) (Hendriks et al., 2018).

Instrument four: Dyspnea Numeric Rating Scale (DNRS):

It was developed by Nicholas et al., (2015) to assess breathlessness (dyspnea) level, it was typically anchored with 0: (Not breathlessness at all) and 10: (breathlessness as bad as you can imagine).

Scoring system:

The scale ranged from zero to ten, it was categorized as follows: -

- Zero to one mean no breathlessness.
- A score from 2 to 4 indicated mild breathlessness (dyspnea).
- A score from 5 to 7 indicated moderate breathlessness (dyspnea).
- A score from 8 to 10 indicated worst (sever) breathlessness (dyspnea).
- The DNRS is a validated and highly recommended scale for breathlessness. Spearman correlation coefficient was strong at 0.78 (Nicholas et al., 2015)

Instrument five: Insomnia Severity Index Likert Scale (ISI):

It was developed by Kay-Stacey, (2017) to assess insomnia (sleep disorder). It includes seven items. Each item has five-points (0- 4). It was used for scoring the items according to the perceived degree of severity. The total score ranges from zero to 28. The highest score indicates greatest severity of insomnia.

Scoring system:

The total score is the sum the scores of the seven items. It ranges from zero to 28. Then total score was categorized as follow:

Interpretation of total scoring system:

Score	Degree of insomnia severity
0–7	No clinically significant insomnia
8–14	Subthreshold insomnia
15–21	Moderate insomnia
22–28	Sever insomnia

Consistency was assessed by Cronbach's alpha (α) and item-total correlations. Both reliability measures were considered acceptable at a level of of >0.70 (Riemann & Zangger, 2017).

Instrument six: Functional Assessment of Cancer Therapy - General (FACT – G) Scale:

It was developed by Cella (2016) It is a 5-point Likert ranging from 0 (not at all) to 4 (very much). Questions are phrased so that highest number indicates the best health status or functional status.

FACT-G Scoring Guidelines:

The FACT-G total score is computed as the sum of the scores of four subscales. It ranges; of 0-108 points. Negatively worded items are reverse scored prior to summing so that higher scores indicate a better health state and vice versa. The total score of FACT-G was categorized into: -

- A score less than 50% (from zero to less than 54 marks) denoted poor health status or functional status.

- A score from 50% to less than 75% (from 54 to less than 81 marks) denoted fair health status or functional status.
- A score from 75% to 100% (from 81 to 108 marks) denoted good health status or functional status.

Validity of the instruments: -

All instruments were tested for its content validity by 5 experts in the field of nursing and medical specialists to ascertain relevance, completeness, and clarity. Modifications were done accordingly to ascertain relevance and completeness.

Reliability of the instruments: -

All instruments were tested using a test- retest method and a pearson correlation coefficient formula to ascertain the reliability of instruments; the period between each test was 2 weeks. Internal consistency was evaluated using Cronbach's alpha for all instruments. It was 0.86 for instrument one, 0.91 for instrument two, 0.90for instrument three, 0.78 for instrument four, 0.70for instrument five and 0.90-94 for instrument six.

Pilot study

A pilot study was conducted prior to data collection on 10% of the study sample (6 patients) to test the feasibility, clarity and applicability of the instruments. Then, necessary modifications were done so these patients were excluded from the study sample.

Ethical Considerations:

An approval from the Ethical and Research Committee of the Faculty of Nursing, Menoufia University was obtained. A written consent was obtained from all who met the inclusion criteria and agree on participation in the study after explanation of the purpose of the study. Each patient was reassured that any obtained information would be confidential and would only be used for the study purpose.

The researcher emphasized that participation in the study was entirely voluntary and anonymity of the patients were assured through coding data. They were also informed that they can withdraw from the study at any time without penalty and refusal to participation wouldn't affect their care. Moreover, they were assured that the nature of the questionnaire didn't cause any physical or emotional harm to them.

Procedure:

An official was submitted from the dean of the Faculty of Nursing, Menoufia University to the director of oncology department including purpose of the study and methods of data collection

- Data collection was extended over a period of 10 months from the first of February to the end of November 2023.
- Patients who agreed to participate in the study and fulfilled the inclusion criteria were assigned randomly and were divided alternatively into two equal groups; study group (I) and control group (II) (30 subjects for each group).
- The researcher dealt with the control group firstly then the study group to

avoid the contamination of results. The purpose of the study was explained to each subject of both study and control group.

- Each patient in the two groups was interviewed individually at Oncology department and assessed for socio-demographic data, medical data and knowledge by using instrument one (structured interview questionnaire). All patients in the two groups were assessed also for their performance of breathing & stretching exercises using instrument II (observational checklist). As well, they were assessed for lung cancer symptoms (fatigue, dyspnea, insomnia & functional status) using instrument III, IV, V &VI respectively.
- Based on the base line data that was collected from all patients and review of related literature (Yorke et al., 2023; Nguyen et al., 2023), a colored booklet supported with illustrative pictures was prepared by the researcher

-The researcher conducted three teaching sessions weekly for each patient in the study group. Every session took about 45-60 minutes.

- Each subject of study group took a copy of the designed booklet at the beginning of the first session.
- **At the first session**, the researcher gave each subject of study group information about:

-lung cancer (definition, risk factors, types, stages, symptoms, diagnostic procedures and treatment)

-Nursing interventions that improve symptoms and functional status.

- At the end of this session the researcher allowed each study subject to ask questions and provided them with question's answers.
- **At the second session**, the researcher individually interviewed each on the second day in a row of the first session, it took about 45-60 minutes.
- The researcher started firstly by refreshing the previous learnt knowledge. After that the researcher started to teach each study subject how to perform breathing exercises.
- The researcher emphasized on the frequency of breathing exercises (pursed lip breathing & diaphragmatic breathing exercise) two to three times per day as a part of daily routine, five days per week for 6 weeks.
- **At the third session**, the researcher individually interviewed each study patient on the fifth day in the first session; it took about 45-60 minutes. The researcher started with refreshing the previous learnt exercises. After that the researcher started to teach each study subject how to perform stretching exercises.
- The researcher emphasized on the frequency of stretching exercises of upper body 3-4 times per week for 6 weeks
- At the end of third session, the researcher allowed all patients in the study group to re demonstrate the learnt exercises and ask questions. Then, they provided patients related question's.
- Follow-up 1 was conducted one week after the third session. All instruments used in the pretest were reused.

- Second follow up was conducted 6 weeks later using the same data collection instruments.

Results:

Table 1 reveals that, more than one third of both study and control group (40%, 43.3%. respectively) were 45 to < 55 years. The majority of study and control group (80, 83.3% respectively) were males. More than three quarters of them (80%) were married. As regards to level of education 46.7% of study group as compared to 60% of control group were illiterate/read and write. As regards to occupation, more than half of study group (56.7%) and nearly half of control group (46.6%) were craft professions. In relation to residence, more than half of both studied groups (56.7%) were living in rural areas. All studied groups (100%)) had inadequate economic status. There were no statistically significant differences between both groups related to all sociodemographic data.

Table 2 shows that about, two thirds of both study and control group (60% & 63.3% respectively) had severe fatigue pre intervention. While a highly statistically improvement at follow up 1 (100%) of study group had mild to moderate fatigue also, there was statistically significant improvement at follow up 2 (60%, 40%) had mild to moderate fatigue and normal (no fatigue) respectively. The mean fatigue level pre intervention for study group was (36.9±5.6) which showed highly significantly decreased to (26.9±2.7, 22.3±2.1) at follow up 1 and follow up 2 respectively versus control group (36.7±6.0), and the difference was highly statistically significant (P<0.0001).

Table 3 shows that, half of study group (50%) and nearly half (43.3%) of control group had severe dyspnea pre intervention. While study group at follow up 1 and follow up 2 period showed statistically significant improvement (83.3%) had moderate dyspnea and almost 90% had mild dyspnea respectively versus control group (56.7%) at follow up 1 and 2. The mean dyspnea level pre intervention for study group was 7.3±0.9which decreased to 5.3 ± 0.7, 3.7 ± 0.6 at follow up 1, and follow up 2 respectively compared to control group (7.2 ± 0.8) pre intervention, follow 1, and follow up 2, and the difference was very highly statistically significant (P<0.0001).

Table 4 illustrates that about two thirds (63.4%) and the majority (93.3%) of study group had moderate insomnia pre intervention, and follow up 1 respectively. A highly statistically significance improvement76.7% had sub threshold insomnia at follow up 2 versus control group who shows 30% sever insomnia throughout study period. Also, the mean insomnia level pre intervention for study group was (19.9±2.8) that improved significantly to (16.8±1.5, 13.6±1.2) at follow up 1 and follow up 2 respectively versus control group (19.9±2.8), and the difference was highly statistically significant (P<0.0001).

Table 5 This table shows that, the majority (83.3%) of study group and more than two thirds (76.7%) of control group had poor functional status pre intervention while study

group showed highly statistically significant improvement (100%) had fair functional status at follow up 1 and (20%, 80%) of study group also had good and fair functional status respectively at follow up 2 compared to control group. Also, the mean functional status pre intervention for study group (43.2±10.3) showed statistically significant improvement (65.4 ±6.2, 68.2 ±5.7) at follow up 1 and follow up 2 versus control group (42.3 ± 9.9) throughout study period.

Figure 1 shows that, there was highly statistically significant positive correlation between breathing & stretching exercises performance and functional status at follow up 2 among studied groups.

Table (1): Distribution of the studied groups according to their sociodemographic data (n = 60)

sociodemographic data	Study group (n=30)		Control group (n=30)		Total		Tests of significance	
	No.	%	No.	%	No.	%	χ^2	P-value
Age (Years)								
▪ 35 - < 45 Y	11	36.7	8	26.7	19	31.7	0.76	0.68 NS
▪ 45 - < 55 Y	12	40	13	43.3	25	41.7		
▪ 55 – 60 years	7	23.3	9	30	16	26.6		
▪ Mean ± SD	47.4±1.3 years		49.9±2.7 Years		48.5±2.2 Years		t test = 0.95, p = 0.21 NS	
Sex								
▪ Male	24	80	25	83.3	49	81.7	0.11	0.73 NS
▪ Female	6	20	5	16.7	11	18.3		
Marital status								
▪ Married	24	80	24	80	48	80	LR=5.2	<0.07 NS
▪ Widower	3	10	6	20	9	15		
▪ Divorced	3	10	0	0	3	5		
Level of education								
▪ Illiterate/ read& write	14	46.7	18	60	32	53.3	LR=6.0	0.10 NS
▪ Basic education	12	40	12	40	24	40		
▪ 2ry education	2	6.7	0	0	2	3.3		
▪ University education	2	6.7	0	0	2	3.3		
Occupation								
▪ Workers	4	13.3	5	16.7	9	15	LR=9.15	0.12 NS
▪ Employees	6	20	5	16.7	11	18.3		
▪ House wives	3	10	6	20	9	15		
▪ Craft professions	17	56.7	14	46.6	31	51.7		
Residence								
▪ Rural	17	56.7	17	56.7	34	56.7	0.0	P=1.0 NS
▪ Urban	13	43.3	13	43.3	26	43.3		
Adequacy of economic status								
▪ Yes	0	0	0	0	0	0	NA	NA
▪ No	30	100	30	100	60	100		

NA=Not Applicable NS=Not significant LR= Likelihood ratio Craft professions= Carpenter, welder, fruit seller, cooker, and driver.

Table (2): Distribution of studied groups according to their fatigue score throughout study period (n=60).

Fatigue score	Pre Intervention		Follow up 1 (after 3 weeks)		Follow up2 (after 6 weeks)		P1	P2	P3
	Study group (n=30) %	Control group (n=30) %	Study group (n=30) %	Control group (n=30) %	Study group (n=30) %	Control group (n=30) %			
Normal (no fatigue)	0	0	0	0	40	0	$\chi2$=0.07, P=0.79 NS	LR=27.8, P<0.0001 HS	$\chi2$=32.7 P<0.0001 HS
Mild to moderate fatigue	40	36.7	100	36.7	60	36.7			
Sever fatigue	60	63.3	0	63.3	0	63.3			
X± SD (study group)	36.9±5.6 Range=27- 44		26.9±2.7 Range=22- 32		22.3±2.1 Range=19 – 27		F test= 113.2, P<0.0001 HS		
X± SD (control group)	36.7 ± 6.0 Range=27-46		36.7 ± 6.0 Range=27-46		36.7 ± 6.0 Range=27-46		F test= 0.0, P= 1.0 NS		
t test & p value	t=0.17, PS=0.86, NS		t=8.1, PS<0.0001		t=7. 37, pf<0.0001				

Table (3): Distribution of studied groups according to their dyspnea level throughout study period (n=60).

Dyspnea level	Pre Intervention		Follow up 1 (after3 weeks)		Follow up2 (after6 weeks)		P1	P2	P3
	Study group (n=30) %	Control group (n=30) %	Study group (n=30) %	Control group (n=30) %	Study group (n=30) %	Control group (n=30) %			
Normal or no breathlessness (dyspnea)	**0**	**0**	**0**	**0**	**0**	**0**	**$\chi2$=0.27 P=0.61 NS**	**LR=26.5, P<0.0001 HS**	**$\chi2$=49.8, P<0.0001 HS**
Mild breathlessness (dyspnea)	**0**	**0**	**16.7**	**0**	**90**	**0**			
Moderate breathlessness (dyspnea)	**50**	**56.7**	**83.3**	**56.7**	**10**	**56.7**			
Sever breathlessness (dyspnea)	**50**	**43.3**	**0**	**43.3**	**0**	**43.3**			
X± SD (study group)	**7.3 ± 0.9 Range = 5–9**		**5.3 ±0.7 Range = 4–7**		**3.7 ±0.6 Range = 3–5**		**F1 test= 113.2, P<0.0001 HS**		
X± SD (control group)	**7.2 ± 0.8 Range = 6–9**		**7.2 ± 0.8 Range = 6–9**		**7.2 ± 0.8 Range = 6–9**		**F2 test= 0.0, P= 1.0 NS**		
t test & p value	**t=0.2, p=0.77, NS**		**t=9.3, p<0.0001 HS**		**t=18.0, p<0.0001 HS**				

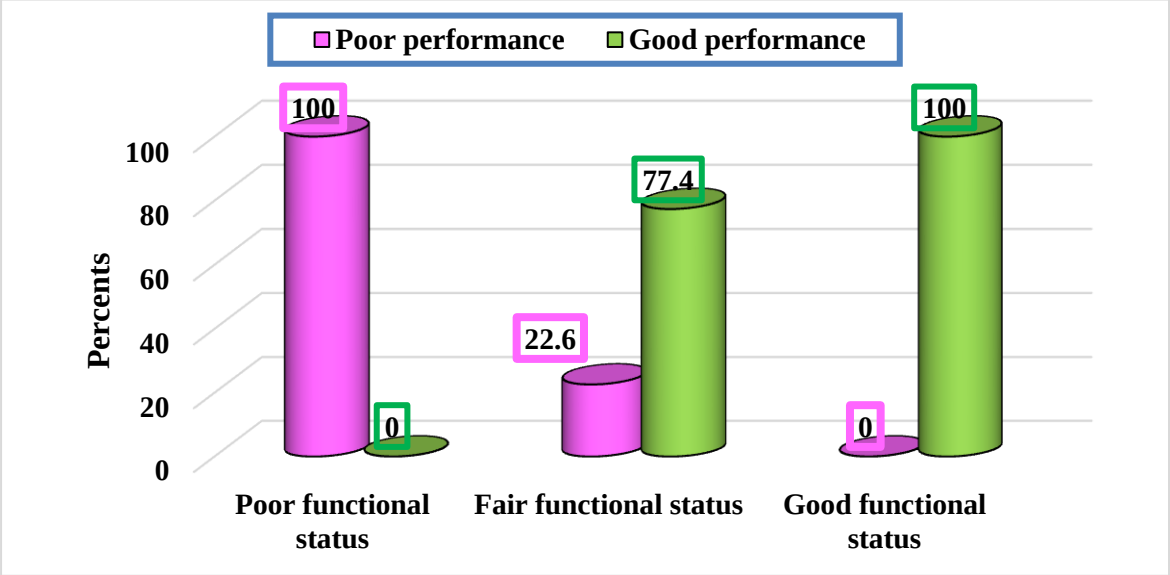
Table (4): Distribution of studied groups according to their insomnia severity level throughout study period (n=60).

Insomnia severity Level	Pre Intervention		Follow up 1 (after 3 weeks)		Follow up2 (after 6 weeks)		P1	P2	P3
	Study group (n=30) %	Control group (n=30) %	Study group (n=30) %	Control group (n=30) %	Study group (n=30) %	Control group (n=30) %			
No clinically significant insomnia (score 0-7)	0	0	0	0	0	0	LR= 1.5, P= 0.46 NS	LR=16.3, P<0.0001 HS	LR=51.7, P<0.0001 HS
Subthreshold insomnia (score 8-14)	3.3	0	6.7	0	76.7	0			
Moderate insomnia (score 15-21)	63.4	70	93.3	70	23.3	70			
Sever insomnia (score 22-28)	33.3	30	0	30	0	30			
X± SD (study group)	19.9 ± 2.8 Range = 14–26		16.8 ±1.5 Range = 14–20		13.6 ±1.2 Range = 12–16		F1 test= 72.9, P<0.0001 HS		
X± SD (control group)	19.9 ± 2.8 Range = 15–25		19.9 ± 2.8 Range = 15–25		19.9 ± 2.8 Range = 15–25		F2 test= 0.02, P= 0.97 NS		
t test & p value	t=0.2, p=0.77, NS		t=5.3, p<0.0001 HS		t=11.9, p<0.0001 HS				

Table (5): Distribution of studied groups according to their total score of functional assessment of cancer therapy-general scale throughout study period (n=60).

Total score of functional assessment of cancer therapy	Pre Intervention				Follow up 1 (after 3 weeks)				Follow up2 (after 6 weeks)				P1	P2	P3
	Study group (n=30) %		Control group (n=30) %		Study group (n=30) %		Control group (n=30) %		Study group (n=30) %		Control gr %				
	N	%	N	%	N	%	N	%	N	%	N	%			
Poor functional status (score less than 50%)	25	83.3	23	76.7	0	0	23	76.7	0	0	23	76.7	χ^2= 0.62, P=0.47 NS	χ^2=37.5,P< 0.0001 HS	χ^2=38.3, P<0.0001 HS
Fair functional status (score from 50% to less than 75%)	5	16.7	7	23.3	30	100	7	23.3	24	80	7	23.3			
Good functional status (score from 75% to 100%)	0	0	0	0	0	0	0	0	6	20	0	0			
X± SD (study group)	43.2±10.3 Range = 14–53				65.4 ±6.2 Range = 14 -75				68.2 ±5.7 Range = 16 - 91				F1 test= 32.6, P<0.0001 HS		
X± SD (control group)	42.3± 9.9 Range = 3–52				42.3 ± 9.9 Range = 3–52				42.3 ± 9.9 Range = 3 - 52				F2 test= 0.06, P= 0.99 NS		
t test & p value	t=1.05, p=0.17, NS				t=10.8, p<0.0001 HS				t=13.5, p<0.0001 HS						

Figure (1): Correlation between total performance of breathing & stretching exercises and total functional assessment levels among studied groups after follow up 2 interventions.



Discussion

Lung cancer remains the leading cause of cancer mortality in men and women worldwide. Both lung cancer and its treatment specially chemotherapy cause a range of debilitating side effects that affect on patient's functional status and overall health related quality of life (Kero et al., 2024). So, the purpose of this study is to evaluate the effect of selected nursing interventions on improving symptoms and functional status among patients with lung cancer.

Concerning symptoms (fatigue, dyspnea &insomnia):

The findings of the present study revealed that patients who received selected nursing interventions showed better fatigue score as indicated by FAS scores. This finding was in the same line with Yang et al., (2020) who conducted a study "Effects of home-based exercise on exercise capacity, symptoms, and quality of life in patients with lung cancer" and reported that cancer related fatigue had improved post intervention and follow up period in study group than control. As well, this finding was consistent with the study done by Codima et al., (2021) who mentioned that the intervention caused higher scores of both physical and mental fatigue. Moreover, this finding was matched with Ma et al., (2021) who done the study "Systematic review and meta - analysis of non-pharmacological interventions for lung cancer fatigue" and reported that there was statistically significant improvement of fatigue score among study group after intervention than control. From the researcher's point of view this is due to positive effective nursing interventions for improving fatigue among patients with lung cancer.

Concerning symptoms (fatigue, dyspnea & insomnia) among studied subjects

As regard to dyspnea level:

The findings of the present study showed that majority of study group had mild breathlessness score in follow up period post intervention than control group. This finding was consistent with the study done by Özbudak & Yıldırım (2023) who conducted a study "Nonpharmacological Methods Used for Dyspnea Management by Individuals with Lung Cancer" and reported that most of the study group had an improvement in dyspnea score post intervention.

On the same line, a study conducted by Yorke et al., (2023) who studied "Considerations in developing and delivering a non-pharmacological intervention for symptom management in lung cancer" and reported that, dyspnea score was improved in the majority of study group at post intervention and follow up periods than control group. As well, these findings are supported by Kero et al., (2024) who conducted the study "Nursing interventions for dyspnea management among inpatients with cancer in palliative care" and mentioned that nursing intervention for dyspnea were effective in reducing dyspnea among study group.

Moreover, the results of the present study were matched with a study done by Kako et al., (2023) who revealed that, there was highly statistically significant improvement in dyspnea score for study group at post intervention and follow up periods than control group. From the researcher's point of view, this is due to positive effective nursing interventions for improving dyspnea or breathlessness among patients with lung cancer.

Concerning symptoms (fatigue, dyspnea & insomnia) among studied subjects

As regard to insomnia severity

The findings of the present study showed that, more than two thirds of study group had subthreshold insomnia in follow up 2 post intervention than control group. This finding was in the same line with Dean et al., (2020) who conducted the study "Nurse-Delivered Brief Behavioral Treatment for Insomnia in Lung Cancer Survivors" and reported that, majority of study group had improved their insomnia level post intervention than control group.

Also, this result supported by Panattoni et al., (2023) who conducted the study "Improving sleep quality in cancer patients. a literature review on non-pharmacologic interventions" and mentioned that non-pharmacological interventions led to improvement of insomnia level among study group after intervention than control group. As well, the results of the present study were matched with Du (2022) who conducted the study "Effects of the Combination of Continuous Nursing Care and Breathing Exercises on Respiratory Function, Self-Efficacy, and sleep disorders in Patients with Lung Cancer" and reported that

occurrence of sleep disorders reduced after intervention to study group. From the researcher's point of view, this is due to positive effective nursing interventions for improving insomnia among patients with lung cancer.

Regarding functional status among studied subjects:

The finding of the present study revealed that near the majority and less than one third of study of study group had fair, good functional or health status respectively at follow up 2 interventions versus to control group. This finding was in the same line with Singh et al., (2020) who conducted the study "Exercise for Individuals with Lung Cancer: A Systematic Review and Meta-Analysis of Adverse Events, Feasibility, and Effectiveness" and reported that exercise interventions had an effect on improvement of functional status and overall health-related quality of life.

This finding also agreed with Heredia et al., (2023) who studied "Effectiveness of healthy lifestyle–based interventions in lung cancer survivors: a systematic review and meta- analysis" and reported that the majority of the study group had an improvement in emotional wellbeing, functional status and overall health than control group.

As regard to correlation between total performance of breathing and stretching exercises and total functional status levels among studied groups:

The findings of the present study revealed that the difference between total performance of breathing & stretching exercises and functional status levels was highly statistically significant and there was significant positive correlation between performance of breathing & stretching exercises and total functional status levels. This finding was in the same line with Chen et al., (2023) who conducted the study "Effects of exercise interventions on cancer-related fatigue and quality of life among cancer patients" and mentioned that there was significant positive correlation between exercise intervention and total functional status and overall quality of life among cancer patients".

Conclusions

Based on the findings of this study, it can be concluded that:

Nursing interventions has significant effect on improving symptoms and functional status among study group than control group

Recommendations

A. Recommendations for patients:

- Supervised health teaching regarding nursing interventions should be given for lung cancer patients to improve symptoms and functional status among them.
- A colored illustrative booklet should be distributed to all lung cancer patients. It should include knowledge about lung cancer, nursing interventions, and exercises that improve symptoms and functional status.

- Increasing awareness about prevention methods of lung cancer.

B. Recommendations for further research:

- A similar study can be replicated at different settings and on large probability sample to allow for greater generalization of the findings.

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