Application of Foot Massage Therapy with Lavender Oil and Pursed Lip Breathing in Lung Cancer Patients : A Case Report

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Abstract

Lung cancer is one of the leading causes of cancer-related deaths worldwide. In advanced stages, patients often experience pain and shortness of breath, which significantly reduce their quality of life. Non-pharmacological interventions such as foot massage with lavender essential oil and pursed lip breathing (PLB) exercises offer potential supportive therapy, but evidence on their effectiveness remains limited. This case study aimed to describe the application of foot massage and PLB techniques in reducing pain and dyspnea in a 64-year-old male diagnosed with stage IVA squamous cell lung carcinoma. The intervention was conducted over six consecutive days. Foot massage was performed using five standard techniques—effleurage, petrissage, friction, tapotement, and vibration—while PLB was practiced for 10 minutes prior to each session. Pain intensity and oxygen saturation were measured using the Numeric Rating Scale (NRS) and pulse oximetry, respectively. The results showed a decrease in pain score from 7 to 3 and an improvement in oxygen saturation from 92% to 96%. The patient also reported improved comfort and the ability to perform light activities with assistance. These findings suggest that the combination of foot massage and PLB may be effective in managing pain and respiratory symptoms in advanced lung cancer. Further research with larger sample sizes and controlled study designs is recommended to confirm these outcomes and support broader clinical use.

Keywords: Foot Massage Therapy, Lavender Oil , Lung Cancer, Pain, Pursed Lip Breathing, Shortness of Breath.

Introduction

Lung cancer is the abnormal and uncontrolled growth of cells in the lungs. This includes malignancies originating from the lung itself (primary), namely malignant tumors originating from the bronchial epithelium (National Cancer Control Committee 2015) . Lung cancer is a significant health problem, and ranks as the second most commonly diagnosed cancer and the leading cause of cancer-related deaths worldwide with 2.48 million new cases and 1.8 million deaths in 2022 (Guo et al. 2024). Based on the prevalence of non-communicable disease incidence of lung cancer by the World Cancer Research Fund in 2022, there are 2,480,675 new cases of lung cancer in the world. While in Indonesia itself, according to the Global Burden of Cancer (Globocan) data through the International Agency For Research on Cancer, there were 38,904 cases of lung cancer in Indonesia in 2022. Lung cancer in men ranks first at 29,107 cases and in women ranks fifth at 9,797 cases. In research ((Hoang et al. 2024) The increase in the incidence of lung cancer patients is directly proportional to the early death rate in lung cancer patients, this occurs due to delays in diagnosis and treatment of lung cancer itself.

Squamous Cell Carcinoma (SCC) or squamous cell carcinoma is a type of non-small cell lung cancer (Non-Small Cell Lung Cancer) that originates from squamous cells that generally appear in the middle of the lungs or in the main airway, such as the left or right bronchus. Global data show that 85% of lung cancers are NSCLC, with SCC accounting for about 30–35% of these cases (Sabbula, BR., Gasalberti, DP. 2025). The development of SCC is associated with changes in the squamous cells lining the airways and is caused by exposure to tobacco smoke. Clinical symptoms of NSCLC include cough, chest pain, shortness of breath, bloody sputum, wheezing, voice congestion, weight loss, and fatigue (Sabbula, BR., Gasalberti, DP. 2025)

Globally, smoking is a major risk factor for lung cancer incidence. Smoking at a young age and maintaining smoking habits for a long time will significantly increase the risk of lung disease, in addition to smoking, environmental exposures including biomass fuels, radon, arsenic, and air pollution contribute to an increased risk of lung cancer (Bruce et al. 2015) . Lung cancer is part of the ageing disease, which is a disease with the frequency of occurrence increasing with age, lung cancer is included in the ageing disease because one of the risk factors for lung cancer incidence besides smoking is increasing age: more than 40 years of age.

The impact of lung cancer complained of by patients is in the form of coughing, coughing up blood, shortness of breath, nausea, and pain. Pain is the complaint most often complained of by lung cancer patients (Wysham et al. 2015), reinforced by the findings in the study which states that pain is more experienced by lung cancer patients than other chronic lung diseases (62%). Pain suffered by lung cancer patients is heterogeneous and arises from various sources, such as from the tumor itself, metastases, side effects of treatment, and other complications (Adquisiciones et al. 2019). Therefore, pain is a symptom that cannot be tolerated by cancer patients, and can seriously affect the quality of life (Zhang et al. 2023).

Complaints that are felt apart from pain are shortness of breath. Shortness of breath is an experience or condition in which a person has difficulty breathing due to a lack of air supply into the lungs (adar BakhshBaloch 2017) . In research (Damani et al. 2019) states that lung cancer is one of the most common causes of shortness of breath seen in 60% of patients.

The management of pain and shortness of breath due to cancer is not only focused on relieving pain and reducing breathing difficulties, but also on treating the underlying cause of these symptoms. This refers to anti-cancer treatments that target the cause of cancer pain, such as radiotherapy, surgery, chemotherapy and molecular targeted treatments that can relieve cancer pain and shortness of breath to some extent. However, these treatments can also cause pain in patients. Pain complaints are also commonly found in advanced stage lung cancer patients (stage III and IV), these pain complaints can reduce the patient's quality of life. This is evidenced by research (Ananda, Ermayanti, and Abdiana 2018) in stage III (29%) and stage IV (71%) lung cancer patients who have

received chemotherapy therapy for 90 days still feel severe pain, even though analgesics have been given.

Pharmacological treatment given includes non-steroidal anti-inflammatory drugs, opioids, and adjuvant analgesics. Based on this statement, the WHO analgesic ladder provides comprehensive guidelines in the use of pharmacology that recommends, The WHO analgesic ladder begins with no treatment, step 1 (administration of non-opioid analgesics such as paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs), but if the pain still persists, then the pharmacological administration rises to step II mild to moderate pain (administration of opioids for mild pain such as codeine and tramadol) and step III moderate to severe pain with the administration of strong opioids such as morphine, fentanyl, and oxycodone. Pain management in cancer cases can not only be done by providing pharmacological therapy. Based on research by (Asmara et al. 2023) shows that there is dissatisfaction from cancer patients with pain complaints after being given pharmacology, this is because pain management with pharmacology has high side effects such as gastric ulcers, impaired liver and kidney function, nausea, vomiting, lethargy, and respiratory depression and raises the fear of clients being addicted to drugs. Therefore, it is necessary to provide non-pharmacology as an adjuvant therapy in pain management. As an adjunctive therapy that is non-invasive and relatively does not cause side effects that increase the patient's pain, other treatments that can be taken together to reduce and relieve pain such as non-pharmacological therapies are of increasing interest to researchers and clinicians (Guo et al. 2024)

Pain management in cancer patients is an important aspect of oncology care. Research shows that non-pharmacologic methods can help relieve pain in cancer patients and potentially improve overall quality of life (Ye 2024). Non-pharmacologic treatments are treatment therapies without the use of drugs. There are various types of non-pharmacological therapies that can reduce pain in cancer patients, including mind-body therapy (progressive muscle relaxation, foot massage, imagination, meditation, music therapy, and aromatherapy) (Fajri et al. 2022), the use of hot and cold compresses, and therapeutic touch. These therapies can be done at home according to the patient's condition. There are various types of non-pharmacological therapies that can be used to reduce pain, increase physical and emotional comfort of patients. One of them is foot massage therapy using lavender essential oil. In a study conducted, massage with lavender essential oil showed positive results on patients' neuropathic pain (Rivaz et al. 2021). While some studies have shown that lavender oil showed possitive results on patient's neuropathic pain (Rivaz et al. 2021) there is limited evidence on the combined use of foot massage and pursed lip breathing to support both physical and emotional comfort in patients with advanced lung cancer. Therefore, this study aims to evaluate the effectiveness of foot massage with lavender essential oil and pursed lip breathing techniques in reducing pain and enhancing holistic comfort in stage IV lung cancer patients.

Research Method

Study Design

This study uses a case-report by providing foot massage interventions using lavender oil and Pursed Lip Breathing as a non-pharmacological therapy to complement pharmacological therapy given to clients in reducing the pain and tightness experienced by patients. The case raised was a client with a medical diagnosis of lung cancer in one of the hospitals in West Java Province. This research was conducted for 8 days, starting from December 9-16, 2025.

Data Collection

Data collection was carried out by means of observation, interviews, medical records, and validation with the nurse in charge of the patient. The data collected in this study has obtained approval from the client and family through written informed consent that has been signed and has agreed to be published by keeping the identity of the client and family confidential.

Nursing Assessment

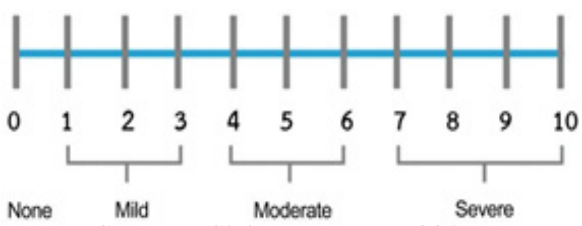
In the initial stage, a nursing assessment was carried out by collecting data from the patient's physical examination and subjective data based on family narrative. In the assessment of the main complaints with the PQRST approach to pain and tightness, the results obtained P (Provoker) which causes tightness in the patient, namely chest pain that appears during rest and activity, Q (Quality) the quality of the pain felt is like being hit by a heavy load, S (Severity) the scale reported by the patient regarding the pain felt is a scale of 7 (0-10) with pain felt throughout the chest area to the whole body, T (Time) the pain felt has been felt since October 2024, but the pain and tightness felt worse in December 2024 early until now.

Intervention Procedure

The use of lavender oil in a meta-analysis conducted by (Lakhan, Sheafer, and Tepper 2016), shows the results that aromatherapy can treat pain when combined with conventional treatments such as topical massage or through inhalation. In line with research by (Novitasari, Ridlo, and Kristina 2017) states that lavender aroma therapy used through massage shows sedative and analgesic properties, because it has the main components of linalool and linalyl acetate, which are compounds that are analgesic (reducing pain) and cause calmness. In patients, foot massage therapy is performed for 15 minutes with a frequency of once a day. In a meta-analysis conducted by (Zhang et al. 2023). obtained the results of foot massage therapy can significantly relieve cancer pain in patients with a massage duration of 10 to 30 minutes for ≥ 1 week, reinforced by research conducted by (Jodie, Anna, and Ursula 2024) obtained the results of massage therapy is beneficial for cancer patients in reducing pain, quality of life, and anxiety.

Handling shortness of breath with the provision of non-pharmacological Pursed Lip Breathing is a breathing technique that is passed with a closed mouth and exhales through slightly pursed lips. This is done to provide back pressure in the airways. Inhaling through the nose and exhaling through the lips can reduce the level of respiratory , increase tidal volume, improve gas exchange and increase inspiratory and expiratory muscle activity. This respiration exercise can reduce shortness of breath and increase respiratory rate. In a study conducted by (adar BakhshBaloch 2017) stated that there was a significant increase in the average score of vital parameters and respiratory parameters, namely pulse rate, systolic pressure, diastolic pressure, respiratory rate, and oxygen saturation in the experimental group given the pursed lip breathing method.

The procedure of giving pursed lip breathing and foot massage therapy using lavender oil was carried out for 15 minutes. In the initial stage, the patient was positioned comfortably, semi-fowler position and legs stretched straight forward. After that, the patient is given a pursed lip breathing exercise by inhaling air slowly through the nose and exhaling through pursed lips. After the intervention was carried out for 10 minutes with a cycle of 6 breathing times. Then the researcher started the foot massage stage by applying lavender oil on the palms of the hands and performing the stages of foot massage movements. Lavender oil is applied at every turn of the movement. Foot massage therapy given to patients uses five movements, namely effluarge technique (light rubbing movement with the thumb above the shin), petrissage (movement of gently squeezing the soles of the feet and instep), friction (movement of rubbing the back and soles of the feet from the inside to the outside of the foot), tapotement (movement of lightly patting the instep and sole of the foot to stimulate muscle tissue), and vibration (movement of giving gentle vibrations to relax the feet and toes). Evaluation is done using the Numeric Rating Scale (NRS) to measure the pain scale and tightness scale in patients. This scale is very effective when assessing pain intensity and tightness before and after therapeutic interventions are given to clients (Yulias 2019)with the following information.



Source: (Sirintawat et al. 2017)

Case Description

A 64-year-old man weighing 50 kg and 160 cm tall was diagnosed with Squamous Cell Carcinoma (SCC) category stage IVA (T4N3M1a), with a past medical history, the client's family said the client had undergone ON OAT treatment for 1 month in October 2024, had complaints of shortness and coughing since 2 months ago (October 2024). The client is a heavy smoker and is in a work environment with a lot of cigarette smoke pollution. The patient smoked 2-3 packs per day before falling ill in October 2024. Previously, the patient had no history of any particular disease.

The main complaint felt by the patient at this time was tightness and pain that continued to worsen in the chest and spread to the upper back. The pain felt like being hit by a heavy object, measuring the pain scale felt by the patient using the Numeric Rating Scale with a patient-reported scale of 7 (0-10) or classified as severe pain. The pain gets worse when the patient coughs. While on the measurement of the shortness of breath scale, the scale reported by the patient is at a score of 7 (0-10) or classified as severe shortness of breath (Abu-Odah et al. 2025). On physical assessment, on inspection, there was retraction of the chest wall and asymmetric movement of the chest on the right side, in addition, enlarged lymph nodes were palpated in the client's left armpit. Currently, the client is under the care of a pulmonary specialist.

Thoracic CT scan with and without contrast, performed on November 29, 2024, showed multiple solid nodules of various sizes in the parenchyma of bilateral lobes of intrapulmonary ec metastasis, atelectasis of the lobe medius of the right lung and a right lung mass that could not be excluded, enlarged lymph nodes (lymphadenopathy) in several areas, including around the trachea and aorta. There was also spondylolysis at T3-T7 vertebrae, as well as an enlarged heart (cardiomegaly) with aortic atherosclerosis. Prostate ultrasound examination was also performed, based on the client's complaints of difficulty urinating and bone pain around the pelvis. The examination was conducted on December 3, 2024, there was an enlarged prostate with a volume of 26.93 cc, suspected early chronic process of bilateral kidneys and intraluminal sludge vesica urinaria or visible sediment / sediment in the client's bladder which is suspected of lung cancer metastasis to the prostate. However, this metastasis could not be proven because there was no follow-up examination related to this issue.

Physical examination was performed on the patient on December 9, 2024, on the physical examination, it was found that the general condition appeared to be seriously ill, with glasgow coma scale (GCS) eye 4 verbal 5 motor response 6 (E4V5M6), the conjunctiva appeared anemic, the sclera was not icteric, the pupils were round isochor. The trachea appears in the middle, the shape of the chest is asymmetrical on the right, the breathing pattern is irregular, when auscultation is obtained wheezing sound in the right lung, the client complains of shortness of breath, there is white sputum discharge and clubbing fingers appear on the right and left upper extremities. The patient's activity ability is limited because the patient feels tight at rest and activity. The patient's Respiratory Rate (RR) when assessed was 28x/minute, saturation was 92% and used a rebreathing mask of 10 liters per minute (LPM).

During treatment, the client received fluid therapy with Ringer Lactate (RL) 1000 cc/24 hours MST (Morphine Sustain Tablets) Continus 10 mg 1 tablet orally 2x daily, N-acetylcysteine 3x200 mg orally, levofloxacin 1x 750 mg, Omeprazole 2x20 mg, Harnal 1x 0.4 mg, combivent 2.5 mL vial + pulmicort 2 mL vial 2x/day inhalation and oxygen therapy Rebreathing Mask 10 liters per minute.

Table 1. Laboratory examination results (December 8, 2024)

Examination	Result	Unit	Reference Value
Hemoglobin	**13.3**	**g/dL**	**14-17.5 g/dL**
Leukocyte	**11.970**	**/mm3**	**4500-10.00/mm3**
Platelets	**391.000**	**/mm3**	**150,000-450,000/mm3**
Hematocrit	**40**	**%**	**40-52%**
Blood Sugar	**102**	**mg/dL**	**100-150 mg/dL**
Creatinin	**0.9**	**mg/dL**	**0.5-11 mg/dL**
Natrium	**143**	**mmol/L**	**135-148 mmol/L**
Kalium	**2.7**	**mmol/L**	**3.5-5.1 mmol/L**
Calcium	**13.6**	**mg/dL**	**8.1-10.4 mg/dL**
Albumin	**2.5**	**g/dL**	**3.4-4.8 g/dL**
SGOT	**89**	**U/L**	**<37 U/L**
SGPT	**203**	**U/L**	**<42 U/L**

Results

During six intervention sessions with a duration of 25 minutes each, foot massage therapy using lavender oil and Pursed Lip Breathing were performed as non-pharmacological nursing actions to complement pharmacological therapy. The evaluation results showed a significant decrease in pain intensity, where the pain scale decreased from 7/10 (severe pain) to 3/10 (mild pain) and there was an increase in oxygen saturation before and after the pursed lip breathing intervention, namely an increase in saturation on the first day 92% to 96% on the sixth day. The client also reported feeling more comfortable after therapy, and demonstrated the ability to perform light activities with assistance, such as sitting up in bed and walking to the bathroom. In addition, vital signs, particularly heart rate, improved and stabilized at around 85-100 beats per minute. The entire development of the pain scale and oxygen saturation during the intervention process was visualized in the form of a figure 1 and 2 to show the effectiveness of the therapy provided.

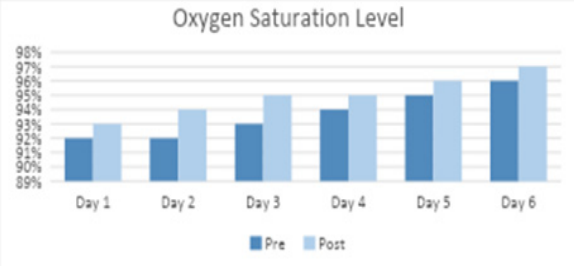


Figure 1. Oxygen Saturation Before and After Pursed Lip Breathing

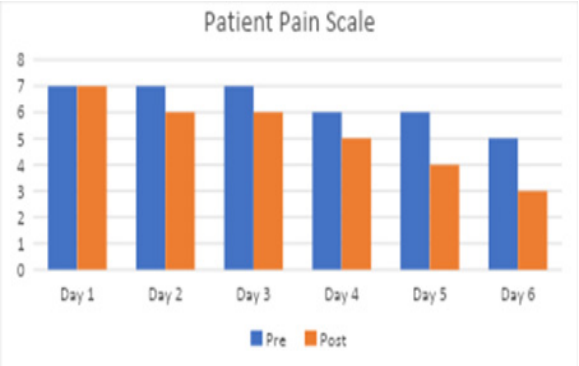


Figure 2. Patient Pain Scale Before and After Foot Massage with Lavender Oil

The bar charts present a gradual improvement in both oxygen saturation and pain intensity over six days of intervention. On the first day, the patient's oxygen saturation was recorded at 92%, indicating mild hypoxemia. With the consistent application of foot massage therapy using lavender oil combined with pursed lip breathing exercises, the oxygen saturation increased progressively—reaching 93% on the second day, 94% on the third and fourth days, 95% on the fifth day, and eventually 96% on the sixth day. This improvement suggests enhanced pulmonary function and more effective gas exchange. At the same time, a significant reduction in the patient's pain level was observed. The initial pain score was 7 out of 10, which is categorized as severe pain. This score gradually decreased

to 6 on the second day, 5 on the third, 4 on the fourth, and finally stabilized at 3 on both the fifth and sixth days. The consistent decrease in pain indicates that the combination of both therapies was effective in providing pain relief and increasing the patient's comfort during the course of treatment.

Discussion

The main symptoms felt by the patient were chronic pain and impaired gas exchange. Chronic pain and impaired gas exchange become nursing diagnoses that are given non-pharmacological therapy in addition to pharmacological therapy to clients based on the most dominant and disturbing clinical manifestations in clients. This condition arises due to abnormal cell growth in the lungs that continues to develop and put pressure on surrounding tissues (Veranita, Widani, and Susilo 2018). Based on information from the patient and his family, it is known that the patient has a history of smoking since the age of 20. This smoking habit is one of the main risk factors in the development of lung cancer. According to (Aktalina 2022) a smoker has a ten times greater risk of suffering from lung cancer compared to non-smokers, long-term exposure to carcinogenic substances through smoking and inhalation of hazardous materials is one of the main causes of increased risk of lung cancer.

Pain is the most common symptom in cancer patients including lung cancer. Pain symptoms that appear can be caused by local effects of the tumor, regional or distant spread that is not associated with metastasis - paraneoplastic syndrome. Pain in patients can affect their quality of life and performance status. Physiological pain arises due to stimulation of sensory receptors located in the tissue when damage occurs. Pain complaints are also commonly found in advanced stage lung cancer patients (stage III and IV), these pain complaints can reduce the patient's quality of life.

Shortness of breath or known as shortness of breath is a symptom feared by cancer patients, shortness of breath contributes significantly to quality of life and is associated with poor prognosis in cancer patients (Abu-Odah et al. 2025). In research states that like pain, shortness of breath is a subjective symptom and can appear at any time, the symptom can correlate with vital sign assessment such as oxygen saturation (TICE 2006).

In shortness of breath management, the treatment given is oxygen therapy. According to the American Thoraric Society, oxygen therapy is a pharmacological treatment given to patients with shortness of breath. However, the administration of oxygen therapy in lung cancer patients does not provide many advantages, but the administration of opioids can better help reduce shortness of breath (Dinaryanti et al. 2015). In addition, giving oxygen therapy for a long time can have a negative impact on patients, giving oxygen therapy can cause side effects such as hypoventilation, atelectasis and pulmonary epithelial damage. Other risks in long-term oxygen administration in patients are physical injury to the oxygen installation area due to the dry nature of oxygen, oxygen poisoning and damage to lung structures such as fibrosis (Dinaryanti et al. 2015).

In pain management in cancer patients, pain management is generally divided into pharmacological therapy and non-pharmacological therapy. Pharmacological treatment of patients with severe pain usually requires analgesic use of strong opioids. Morphine is a first-line strong opioid that is often used to manage cancer pain (Simmons, MacLeod, and Laird 2012). However, in its use, there are patient-related barriers including concerns about dependence and side effects of morphine use (Kim 2011).

In this case, the patient received MST (Morphine Sustain Tablets) Continus 10 mg 1 tablet orally 2x daily, Morphine given to the patient had a positive impact on reducing pain and tightness. However, the presence of additional symptoms due to the mass in the patient's right lung caused the shortness to worsen and made the patient uncomfortable. This is in line with research in (APDANI 2011) which states that shortness of breath can be caused by tumors that compress the respiratory tract. This symptom is also associated with regional spread of cancer through lymph channels or tumor expansion.

Non-pharmacological therapy given to patients as a companion to the pharmacological

administration of morphine gave a positive response to the decrease in the patient's pain scale and shortness of breath. The patient's response to the pain experienced improved after being given foot massage therapy using lavender oil. The mechanism of foot massage in research by (Robby, Agustin, and Azka 2022) mentions foot massage has the effect of increasing circulation, removing metabolic waste, relaxing muscles which can provide a deep relaxing effect, reducing pain, reducing anxiety and physical discomfort, and improving sleep quality. In (Vidya Ananda, Sri Sumaryani, and Eny Hernani 2024) states that foot massage can affect the motor, nervous, and cardiovascular systems thus providing the effects of rest and relaxation of the body, deep breathing, and drowsiness. Pain sensory receptors are mainly located under the skin as well as deep tissues and are concentrated in the hands and feet. Massage can help venous return and lymphatic flow, stimulate skin and subcutaneous sensory receptors and reduce pain. Foot massage can stimulate the A-beta nerve fibers in the foot which contain touch and pressure receptors. These receptors then send nerve impulses to the central nervous system (Vidya Ananda, Sri Sumaryani, and Eny Hernani 2024).

Giving Pursed Lip Breathing is a breathing exercise that is used as a non-pharmacological therapy in reducing shortness of breath in patients. The PLB technique given is by inhaling through the nose and exhaling slowly through a pursed mouth. PLB can provide obstruction to exhalation airflow and increase air resistance, this process helps patients reduce air expenditure so as to control expiration and facilitate maximum emptying of the alveolus (Dinaryanti et al. 2015). This is also evidenced in research which states that pursed lip breathing can increase carbon dioxide release through the lips and increase tidal volume in patients (Nield et al. 2007). This study has several limitations. As a single case report, the findings cannot be generalized to all lung cancer patients. The short duration of observation may not capture long-term effects, and the outcome may be influenced by concurrent treatments such as morphine. Subjective assessments without objective respiratory measurements also limit the accuracy of the results. Future research should involve larger samples and longer follow-up to strengthen the evidence.

Conclusion

Based on the results of the case report, the application of foot massage therapy using lavender essential oil can reduce the intensity of pain experienced by lung cancer patients as indicated by the evaluation results after foot massage therapy for 6 days of administration, a significant decrease in the pain scale was obtained using measurements with the Numeric Rating Scale (NRS) in patients, namely from a score of 7 (0-10) to 3 (0-10). In addition, the application of pursed lip breathing can also help stabilize oxygen saturation in patients, as shown in the evaluation after the PLB intervention was given to patients, there was an increase in oxygen saturation from 92% on the first day and 96% on the sixth day of intervention. An increase in the patient's sense of comfort is also experienced by the patient, as evidenced by the patient and family saying that the patient can rest comfortably after being given therapy, besides that the client can also do minimal activities with assistance such as sitting in bed and going to the bathroom with assistance and reduced breathing difficulties experienced by the patient. The response of the client and family during the intervention and after the intervention is very good, the family can carry out the therapy that has been taught by the therapist and can apply it independently to the patient.

The combination of foot massage using lavender essential oil and pursed lip breathing showed positive effects in reducing pain and improving oxygen saturation in a lung cancer patient. This suggests that non-pharmacological interventions can be valuable in nursing care to enhance patient well-being. Nurses are encouraged to involve families in continuing simple therapies at home. Future studies with larger samples and longer follow-up are needed to confirm these findings and explore broader applications in cancer care.

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