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STEAM INHALATION THERAPY WITH EUCALYPTUS OIL TO CLEAR THE RESPIRATORY TRACT IN CHILDREN WITH PNEUMONIA : CASE STUDY

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ABSTRACT

Pneumonia is a major cause of morbidity and mortality in children in developing countries. Complications include pleural effusion, empyema, lung abscess, and respiratory failure. Therefore, one of the problems that arises is ineffective airway clearance. Non-pharmacological therapies such as water vapor inhalation with eucalyptus oil help thin secretions. Eucalyptus oil contains cineole which has mucolytic and anti-inflammatory properties. Objective: To describe the application of water vapor inhalation therapy with eucalyptus oil to clear the airways in children with pneumonia in the Nakula Sadewa ward of Panembahan Senopati Regional Hospital. Method: Using a descriptive design with a case study approach on one child who experienced pneumonia during hospitalization, where ineffective airway clearance can be directly observed using an observational format. Results: After conducting water vapor inhalation therapy with eucalyptus oil for 4 consecutive days with a duration of 15 minutes once a day, the results obtained were a decrease in respiratory frequency from 38x/minute to 30x/minute, as well as an increase in SpO2 from 97% to 100% and easier excretion of secretions, as well as reduced additional breath sounds. Conclusion: Water vapor inhalation therapy with eucalyptus oil is effective in helping clear the airways in children with pneumonia. Suggestion: the application of water vapor inhalation therapy with eucalyptus oil as a non-pharmacological supporting intervention in pediatric patients with pneumonia.

INTRODUCTION

Pneumonia is an infectious disease that attacks the lower respiratory tract, characterized by inflammation of the alveoli filled with fluid or pus, resulting in symptoms of coughing, fever, shortness of breath, and additional breath sounds such as rhonchi (Abdjul & Herlina, 2020). Pneumonia remains a major cause of child morbidity and mortality in developing countries (Silviani, 2023). WHO data from 2019 stated that 740,180 children under the age of five died from pneumonia, which represents 14% of all deaths in children under five (WHO, 2020). In Indonesia, pneumonia remains the eighth leading cause of death in children under five. In 2021, there were 278,261 cases of pneumonia in children under five, and although this figure decreased in the following year, it remains high (Ministry of Health of the Republic of Indonesia, 2023). According to a report from the Bantul District Health Office, there were 2,838 cases of pneumonia in toddlers between January and November 2023 (Masyrafina Idealisa, 2023). One common problem with pneumonia is ineffective airway clearance, which can lead to complications such as pleural effusion, empyema, lung abscess, and even respiratory failure (Purnamiasih, 2020). Pneumonia also presents with symptoms such as a sudden rise in temperature accompanied by seizures, restlessness, cyanosis, shortness of breath, and a productive cough. Fine, loud, moist rales, and vesicular and diminished rales will be found during a physical examination, which is usually performed. Airway clearance can be managed through pharmacological and non-pharmacological therapies. One easily implemented non-pharmacological therapy is water

vapor inhalation with eucalyptus oil (Oktiawati & Nisa, 2021). Eucalyptus oil contains cineole, a mucolytic, anti-inflammatory, and bronchodilator compound that can help thin secretions, clear the airways, and reduce inflammation (Yustiawan et al., 2023). Furthermore, eucalyptus oil is readily available and accessible to the public. Research (Majid & Windartik, 2023) demonstrated that steam inhalation with eucalyptus oil effectively helps clear the airways in children with pneumonia. This finding is supported by research (Sundara1 & Dewi Umu Kulsum, 2024), which found that administering steam inhalation therapy with eucalyptus oil for 15 minutes once daily for 3 to 4 days can help reduce the respiratory rate from 30 breaths per minute to 25 breaths per minute and reduce phlegmy coughs. These results support the effectiveness of steam inhalation therapy with eucalyptus oil in helping clear the airways and thin phlegm.

RESEARCH METHODS

The method used is a descriptive method to obtain a general overview by observing and analyzing accurate data with a focus on the application of water vapor inhalation therapy with eucalyptus oil in pediatric patients with pneumonia who experience severe cough. This study used one respondent who met the inclusion criteria, namely pediatric patients aged 3-4 years who were treated with full consciousness, cooperative, willing to be respondents, and had no contraindications for allergies to eucalyptus oil. Water vapor inhalation therapy intervention with eucalyptus oil was carried out once a day for 4 consecutive days with a duration of 15 minutes each time, in accordance with standard operational procedures consisting of pre-interaction, orientation, work stages, and evaluation stages. After therapy, the patient was rested for 5 minutes and an evaluation of his clinical condition was carried out through measuring airway clearance parameters, including frequency of breathing, additional breath sounds, oxygen saturation, ability to remove secretions, and reduction in cough symptoms. Data collection was carried out through direct observation using an airway clearance observation sheet and interviews with the patient's parents regarding identity, main complaints, medical history, and other supporting data. The research results are analyzed using the facts obtained, then compared with existing theories and applied to the discussion in the form of narratives, tables, graphs, or charts.

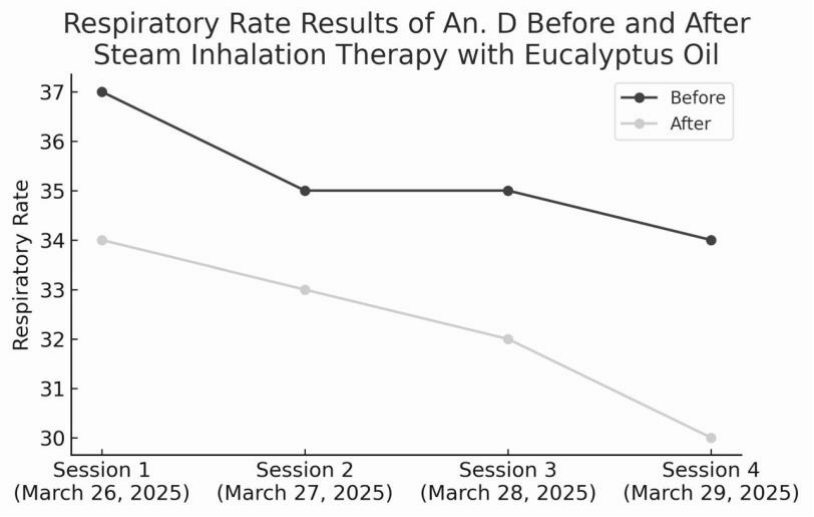
RESULTS AND DISCUSSION

The patient's family said that An D had a cough with a grok grok sound and disturbed sleep and vomited 3 times then had 3 loose stools at home. Then he was taken to the hospital and underwent laboratory and x-ray examinations and was diagnosed with DCA Pneumonia, profuse vomiting with moderate dehydration and the patient had to be hospitalized for drug therapy. Additional data obtained by An D had experienced a mild cough but was not hospitalized. The patient's general condition was compos mentis, the results of the examination of vital signs with the results, RR: 38x / minute, temperature 36.6 ° c, pulse 119x / minute, SpO2 95%, the results of the respiratory system tachypnea breathing pattern, use of accessory muscles 3 lpm, stridor breath sounds, sputum production was present. The radiology results of the clinical results of Pneumonia suspected large cor normal.The location description was conducted in the Nakula Sadewa ward, Panembahan Senopati Bantul Regional General Hospital. The respondent's characteristics were An D, a 4-year-old girl, diagnosed with DCA pneumonia, severe vomiting, and moderate dehydration. After administering water vapor inhalation therapy with eucalyptus oil once daily for 4 consecutive days with a duration of 15 minutes, a decrease in respiratory frequency and an increase in the effectiveness of airway clearance were observed, as indicated by a decrease in additional breath sounds with the following results:

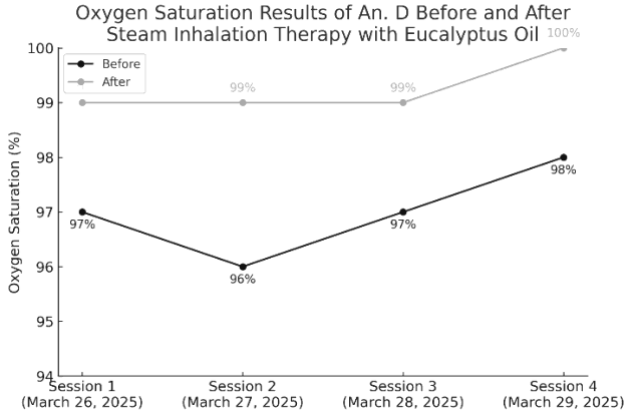
No	Day/ Date	Examination Results	Before and after nebulizer administration		Before and after steam inhalation therapy with eucalyptus oil		Results
			Before	After	Before	After	
1.	Wednesday, 26 March 2025 10.00 WIB	Breath sound	Stridor	Stridor berkurang	Stridor reduced	Stridor reduced	
		Respiratory rate	38 x/menit	37 x/menit	37x/minute	34x/minute	Decreased (3)
		Breathing pattern	Tachypnea	Tachypnea	Tachypnea	Normal	
		SpO2	95 %	97 %	97 %	99 %	Increased (2)

		Sputum production	No sputum	No sputum	No sputum	Slight sputum approximately 2 cc	Slight sputum approximately 2cc
		Oxygen	3 L/min	3 L/min	3 L/min	3 L/min	
		Cough sound	Gurgling	Gurgling	Gurgling	Gurgling sound decreased	Gurgling sound decreased
2	Thursday, 27 March 2025 10.00 WIB	Breath sound	Stridor	Stridor berkurang	Stridor reduced	Stridor reduced	
		Respiratory rate	39 x/menit	35 x/menit	35x/minute	33x/minute	Decreased (2)
		Breathing pattern	Tachypnea	Tachypnea	Tachypnea	Normal	
		SpO2	90 %	96 %	96 %	99 %	Increased (1)
		Sputum production	No sputum	Slight sputum < 2,5 cc	Slight sputum 3 cc	Slight sputum 3,5cc	Slight sputum < 2,5 cc
		Oxygen	3 L/min	3 L/min	2 L/min	2 L/min	
		Cough sound	Gurgling sound decreased	Gurgling sound starting to decrease	Gurgling sound starting to decrease	Gurgling sound starting to decrease	Gurgling sound starting to decrease
3	Friday, 28 March 2025 10.00 WIB	Breath sound	Stridor	Stridor reduced	Stridor reduced	Stridor reduced	
		Respiratory rate	37 x/menit	35 x/menit	35x/minute	32x/minute	Decreased (3)
		Breathing pattern	Tachypnea	Tachypnea	Tachypnea	Normal	
		SpO2	94 %	96 %	97 %	99 %	Increased (1)
		Sputum production	Slight sputum < 2,5 cc	Slight sputum < 2,5 cc	Slight sputum < 2,5 cc	Slight sputum 3 cc	Slight sputum < 3 cc
		Oxygen	3 L/min	3 L/min	2 L/min	2 L/min	
		Cough sound	Gurgling sound starting to decrease	Gurgling sound starting to decrease	Cough sound grok grok is starting to decrease	Cough sound grok grok is starting to decrease	Cough sound grok grok is starting to decrease
4	Saturday, 29 March 2025 06.00 WIB	Breath sound	Stridor reduced	Stridor absent	Stridor absent	Stridor absent	
		Respiratory rate	37 x/menit	34 x/menit	34x/minute	30x/minute	Decreased (4)
		Breathing pattern	Tachypnea	Normal	Normal	Normal	
		SpO2	97 %	98 %	98 %	100 %	Increased (2)
		Sputum production	Slight sputum 3 cc	Slight sputum 3 cc	Slight sputum < 3,2 cc	Slight sputum < 3,5cc	Slight sputum < 3,5 cc
		Oxygen	Not applied	Not applied	Not applied	Not applied	
		Cough sound	Decreased	reduce	Decreased	None	Decreased

Table 1 Before And After Being Given A Nebulizer And Steam Inhalation Therapy With Eucalyptus Oil



Graph 1 Results Of Respiratory Frequency Of Water Steam Inhalation Therapy With Wood Oil



Graph 2 Results Of Oxygen Saturation Of Water Vapor Inhalation Therapy With Eucalyptus Oil

On the first day, an assessment was conducted through interviews and examinations, and by observing the patient's response, then measuring ineffective airway clearance, the results showed reduced stridor breath sounds, a frequency of 37 x / minute, a tachypnea breathing pattern, SpO2 97%, no sputum was produced and using 3 lpm oxygenation, given water vapor inhalation therapy with eucalyptus oil for 15 minutes. After implementation, the ineffective airway clearance was measured again and the results showed reduced stridor breath sounds, a respiratory frequency of 34 x / minute, a normal breathing pattern, SpO2 99%, a small amount of sputum production of approximately 2 cc and oxygen was installed at 3 lpm.

On the second day before being given a 2 ml Ventolin nebulizer at 10.00 WIB, the patient's respiratory rate was 39x/minute, tachypnea breathing pattern, SpO_2 90%, stridor breath sounds, sputum had not come out, a grok-grok cough sound was still present, and oxygen was connected to 3 lpm. After being given a nebulizer, the respiratory rate decreased to 35x/minute, stridor sounds decreased, the breathing pattern remained tachypnea, SpO_2 increased to 98%, sputum came out a little (<2.5 cc), and the grok-grok cough sound began to decrease. After a 4-hour rest, water vapor inhalation therapy with eucalyptus oil was carried out for 15 minutes at 14.00 WIB. The evaluation results showed a decrease in respiratory rate to 33 breaths/minute, reduced stridor, normal breathing pattern, SpO_2 of 99%, a small amount of 3.5 cc of sputum production, reduced rales, and a decrease in wheezing. The patient felt more comfortable, cooperative, and followed instructions.

On the third day, before being given a 2 ml Ventolin nebulizer at 10:00 a.m. WIB, the assessment showed stridor, a respiratory rate of 37 breaths/minute, a tachypneic breathing pattern, SpO_2 of 97%, sputum <2.5 cc, oxygen at 2 lpm, and a persistent cough. After the nebulizer, the stridor

decreased, the respiratory rate decreased to 35 breaths/minute, the breathing pattern remained tachypneic, the SpO_2 increased to 98%, and the sputum remained <2.5 cc. After a 4-hour rest, steam inhalation therapy with eucalyptus oil was performed for 15 minutes. A reassessment of the ineffective airway clearance measurement revealed a decrease in stridor, a respiratory rate of 32 breaths/minute, a normal breathing pattern, SpO2 of 99%, a small amount of 3 cc of sputum production, and oxygen at 2 LPM. The wheezing sounds had begun to decrease.

On the fourth day, before administering the 2 ml Ventolin nebulizer at 6:00 AM WIB, the assessment showed a decrease in stridor, a respiratory rate of 37 breaths/minute, a tachypneic breathing pattern, SpO_2 of 97%, a small amount of 3 cc of sputum production, and oxygen at 2 LPM. The wheezing cough was still audible after the nebulizer was administered. After the nebulizer, the stridor was eliminated, the respiratory rate decreased to 34 breaths/minute, the breathing pattern improved to normal, the SpO_2 increased to 98%, and the sputum remained at 3 cc, and oxygen at 2 LPM. After a 4-hour rest, steam inhalation therapy with eucalyptus oil was performed for 15 minutes. Reassessment of airway clearance measurements showed no stridor breath sounds, respiratory rate decreased to 30x/minute, breathing pattern remained normal, SpO_2 increased from 98% to 100%, sputum increased slightly to <3.5 cc, and An. D appeared to no longer be using oxygen.

Pneumonia remains a leading cause of morbidity and mortality in children, particularly in developing countries like Indonesia (Kemenkes RI, 2023). One of the main problems in children with pneumonia is ineffective airway clearance due to the accumulation of secretions in the respiratory tract (Hidayatin, 2020). Efforts to help clear the airway, in addition to pharmacological therapy, include the application of non-pharmacological therapies such as water vapor inhalation with eucalyptus oil.

The recommended therapy for clearing the airway in pneumonia patients with phlegm is the non-pharmacological method of water vapor inhalation with eucalyptus oil. Water vapor inhalation with eucalyptus oil is a non-pharmacological therapy method used to help clear the airway. This therapy works by using inhaled hot steam to help thin mucus (secretions) in the airways, making them easier to cough out. The added eucalyptus oil contains compounds such as cineole (eucalyptol), which has antiseptic, anti-inflammatory, and expectorant properties, which can help reduce inflammation, relieve nasal congestion, and provide a warm and comforting effect on the respiratory tract. This therapy is often used as a supportive treatment for conditions such as coughs, colds, bronchitis, and mild to moderate pneumonia, especially in outpatient settings or supportive care in hospitals (Anjani & Wahyuningsih, 2022). Eucalyptus oil contains cineole, or eucalyptol, which has a mucolytic effect, helping to thin mucus in the respiratory tract. Cineole's anti-inflammatory properties also help reduce inflammation and ease breathing. In this way, combined steam therapy is used for patients experiencing respiratory disorders such as pneumonia (Yuliana Hutasoit & Argarini, 2023).

After receiving steam inhalation therapy with eucalyptus oil, An. D's airway clearance improved within 15 minutes for four consecutive days, once daily. Prior to the steam inhalation therapy with eucalyptus oil, the patient had a productive cough with phlegm, a gurgling breath sound, a rapid respiratory rate of 38 breaths per minute, and difficulty expelling secretions. His oxygen saturation was 95%. He was placed on 3 lpm oxygen. The patient appeared restless due to shortness of breath and persistent coughing. After administering steam inhalation therapy with eucalyptus oil, the respiratory rate decreased to 30 breaths per minute, wheezing sounds decreased, secretions were more easily expelled, and oxygen saturation increased to 100%. The patient was no longer using oxygen support.

This aligns with research conducted by Majid & Windartik (2023), which showed that steam inhalation therapy with eucalyptus oil can significantly improve airway clearance in pneumonia patients. These results are also supported by research by Oktiawati & Nisa (2021), which demonstrated that steam inhalation therapy with eucalyptus oil in toddlers can help thin phlegm and improve airway clearance effectiveness with an optimal duration of 10–15 minutes.

Therefore, the findings of this article support the idea that steam inhalation therapy with eucalyptus oil can be implemented as an effective non-pharmacological intervention to help improve airway clearance in children with pneumonia. Nurses are expected to utilize this therapy as an alternative independent intervention in nursing practice, especially for patients with ineffective airway clearance.

CONCLUSION

It was concluded that there was an increase in airway clearance in pediatric pneumonia patients after water vapor inhalation therapy with eucalyptus oil was administered for 4 consecutive days with a frequency of 1 time per day and a duration of 15 minutes. The results obtained showed a decrease in respiratory frequency from 38x/minute to 30x/minute, sputum began to come out gradually, the use of oxygen aids from 3 lpm until the patient was not attached to oxygen, the sound of grok-grok breathing decreased until it disappeared. Water vapor inhalation therapy with eucalyptus oil is a non-pharmacological therapy that is easy to do, helps thin phlegm, relieves the respiratory tract. After being given therapy, patients felt more comfortable, had more relief when breathing, coughing decreased, and the airway became clearer.

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