Application of Hand Held Fan Therapy and Orthopneic Position to Reduce Dyspnea in Congestive Heart Failure (CHF) Patients: Case Report

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Abstract

Introduction: Congestive Heart Failure (CHF) is a condition in which the heart is unable to pump blood effectively to meet the body's needs, resulting in decreased cardiac output. This leads to fluid accumulation in the lungs due to increased pulmonary venous pressure, which subsequently triggers pulmonary edema. Pulmonary edema causes impaired oxygen diffusion in the alveoli, resulting in dyspnea as the primary complaint in CHF patients. The main nursing problem that arises is impaired gas exchange, indicated by an increased respiratory rate, decreased oxygen saturation, and the use of accessory respiratory muscles. To help address impaired gas exchange in CHF patients, non-pharmacological therapies such as the use of a hand-held fan and the implementation of an upright sitting position (orthopnea position) can be utilized. Purpose: To evaluate the effectiveness of the hand-held fan and orthopneic position interventions in CHF patients experiencing shortness of breath. Methods: This study employed a case study approach based on observation, interviews, and medical record reviews. The interventions hand-held fan and orthopneic position were administered over three days, with each session lasting 5 minutes. Results: Following the interventions, respiratory rate decreased from 30 breaths per minute to 25 breaths per minute, and oxygen saturation increased from 95% to 98%. The patient reported feeling more relieved, comfortable during breathing, and able to sleep more easily, although occasional shortness of breath persisted. Discussion: The interventions are physiologically beneficial: the orthopneic position helps reduce venous return to the heart, thereby lowering pulmonary pressure, while hand-held fan therapy alleviates the perception of breathlessness through sensory stimulation of the face, which activates the V2 branch of the trigeminal nerve. Conclusion: The combination of hand-held fan therapy and the orthopneic position is effective in relieving dyspnea, reducing respiratory rate, and improving oxygen saturation in patients with congestive heart failure.

Keywords: Congestive Heart Failure (CHF), Dyspnea, Hand Held Fan, Orthopneic Position

Introduction

Congestive Heart Failure (CHF) is a condition in which the heart is unable to pump blood effectively throughout the body, resulting in inadequate blood and oxygen supply to the organs and tissues necessary to perform their functions properly. This condition may occur due to damage or weakening of the heart muscle, leading to a loss of strength in pumping an adequate amount of blood (Milwati et al., 2024). Heart failure is one of the leading causes of death worldwide, claiming an estimated 17.3 million lives each year. This number is projected to rise to 23.6 million by 2030, in line with the aging population and the increasing prevalence of the disease (PERKI, 2022).

According to Riskesdas (2018), the prevalence of diagnosed CHF in Indonesia is 1.5%, equivalent to approximately 1,017,290 individuals. When viewed by age group, the highest prevalence is found in the elderly aged over 75 years, at 4.7%, while the lowest is in infants under one year of age, at only 0.1%.

CHF is characterized by a decline in the left ventricle's ability to pump blood, which leads to increased pressure in the left atrium and pulmonary veins. This pressure pushes fluid into the lung tissue, particularly the alveoli, resulting in pulmonary edema. Fluid accumulation in the alveoli disrupts oxygen diffusion, reduces blood oxygen levels, and triggers acute dyspnea. Dyspnea is the dominant symptom that limits daily activities and affects psychological well-being, often increasing anxiety in patients. Therefore, it is essential to address this symptom promptly to improve the patient's quality of life and clinical stability (Purba et al., 2016). Other clinical symptoms of CHF include fatigue, peripheral edema, chest pain, coughing, and rapid heartbeat (tachycardia) (Milwati et al., 2024).

According to the American Family Physician, dyspnea is a subjective sensation commonly caused by disorders in the lungs, heart, or both (cardiopulmonary). Pulmonary-related dyspnea typically results from disorders affecting lung function, such as asthma. In contrast, cardiac-related dyspnea arises from impaired heart function, as seen in heart failure. When both the lungs and heart are involved such as in chronic obstructive pulmonary disease (COPD) with accompanying pulmonary hypertension and cor pulmonale it is referred to as cardiopulmonary dyspnea (Budhwar & Syed, 2020).

Proper management plays a crucial role in determining the disease's progression. Therapeutic approaches may include pharmacological and non-pharmacological treatments. Although non-pharmacological therapy does not replace medications, it is effective and can be provided as a complementary therapy due to its lower risk of side effects. Dyspnea symptoms can be alleviated through non-pharmacological interventions such as positioning, sensory stimulation, relaxation, and breathing exercises. For patients with CHF, a safe, economical, easily self-administered, and effective non-pharmacological approach to reducing dyspnea is body positioning and sensory stimulation, such as the use of the orthopneic position and hand-held fan therapy. These interventions offer both physiological and psychological benefits, promoting greater respiratory comfort (Kusuma et al., 2021).

The orthopneic position involves sitting upright in bed with the body leaning slightly forward at a 30º angle, usually supported by two pillows placed in front. In this position, the workload of the inspiratory muscles is reduced, allowing air to enter the lungs more easily. This results in a decrease in residual lung volume after exhalation and improves the efficiency of gas exchange. As gas exchange becomes more optimal, oxygen flow to the pulmonary capillaries increases, enhancing oxygen binding to hemoglobin and decreasing respiratory rate (Siregar et al., 2021). The orthopneic position has advantages over the semi-Fowler's position because it improves Peak Expiratory Flow (PEF). The light pressure from a pillow under the chest also assists in exhalation, optimizing lung ventilation and reducing the fatigue caused by rapid breathing (Ritianingsih et al., 2015). Compared to the semi-Fowler's position, orthopneic positioning is more recommended due to its superior effectiveness in lowering respiratory rate (Santoso et al., 2020).

In addition to the orthopneic position,

hand-held fan therapy can also be used to relieve dyspnea by helping patients find their most comfortable position. The patient is then asked to turn on the fan and close their eyes. Next, they are instructed to direct the airflow from the fan toward the face while taking slow, deep breaths. This therapy is performed for approximately five minutes and can be repeated whenever the patient experiences dyspnea. Research by Yusrina Ammazida (2023) shows that hand-held fan therapy is effective in reducing the level of dyspnea in CHF patients. The airflow stimulates the nasal mucosa, activating cold receptors in the maxillary branch (V2) of the trigeminal nerve (cranial nerve V), which produces a cooling sensation on the face and plays a role in modulating the respiratory system by influencing the perception of dyspnea. As a result, the neural drive to breathe is reduced, alleviating the sensation of breathlessness (Swan et al., 2019). The use of fans to relieve dyspnea is also recommended by the Oncology Nursing Society, as patients with dyspnea often feel more comfortable near airflow sources, such as fans or open windows (Puspawati et al., 2017).

In this case, the patient diagnosed with congestive heart failure (CHF) experienced acute dyspnea but was not administered pharmacological therapy such as inotropics, receiving only diuretic therapy. This untreated dyspnea could potentially affect the patient's quality of life and psychological well-being. Nurses play a vital role in providing care and education to patients and their families in order to reduce symptoms such as dyspnea, which can significantly impact the patient's overall quality of life. The combination of the orthopneic position and hand-held fan therapy works synergistically through different but complementary mechanisms. Orthopneic positioning improves pulmonary ventilation by facilitating diaphragmatic movement, while the hand-held fan provides facial sensory stimulation that reduces dyspnea perception through effects on the nervous system.

Although several studies have evaluated the effectiveness of each intervention separately, research examining the combination of orthopneic positioning and hand-held fan therapy especially in CHF patients is still limited. Therefore, the aim of this study is to evaluate the effectiveness of combining orthopneic position and hand-held fan therapy in reducing dyspnea levels in patients with congestive heart failure.

Research Methods

The research design employed in this study is a case study based on observation, interviews, and medical record reviews, with direct nursing interventions provided to the client. The nursing care was carried out comprehensively, starting from the informed consent process, anamnesis, assessment, data analysis, nursing diagnosis formulation, intervention planning, implementation according to the care plan, and evaluation based on the predetermined nursing goals. This case study was conducted over a period of three days, from December 17 to 19, 2024, at a hospital in Indonesia.

The intervention consisted of applying the orthopneic position and hand-held fan therapy for a client presenting with dyspnea and a nursing diagnosis of impaired gas exchange caused by Congestive Heart Failure (CHF). Both interventions were administered three times per day, each session lasting five minutes. The indications for hand-held fan therapy include clients experiencing dyspnea and reduced respiratory function due to certain medical conditions. Meanwhile, contraindications include clients with a fever above 38°C within the past 48 hours, those with trigeminal nerve disorders, or those unable to recognize the sensation of breathlessness (Indra, 2017).

The tools used in this intervention included two to three pillows (Ritianingsih et al., 2015). The intervention began by explaining the positioning procedure to the client to help facilitate chest expansion, thereby enhancing inspiratory effectiveness. The nurse assessed whether the client could sit independently or needed assistance. The head of the bed was then elevated to a 90-degree angle. A pillow was placed between the client's back and the bedhead for comfort, followed by positioning pillows on the client's thighs to the knees. The client was then assisted to lean forward at approximately a 30-degree angle (Mesquita Montes et al., 2018; Morrow et al., 2016).

After the client was properly positioned, hand-held fan therapy was administered as a complementary intervention. A small fan was placed approximately 15 cm in front of the client's face, with an airflow speed of around 4 km/h (equivalent to the fan's maximum speed). The therapy was carried out for five minutes, accompanied by oxygen support. The intervention and demonstration were performed once daily for both the client and their family, after which the client independently continued the intervention. This therapy was conducted three times daily (morning, afternoon, and evening) for 14 consecutive days (Kocatepe et al., 2021; Swan et al., 2019). The expected outcomes of the combination of orthopneic positioning and hand-held fan therapy included reduced respiratory rate, increased oxygen saturation, decreased dyspnea complaints, and improved breathing comfort.

Evaluation of the intervention included pre- and post-assessments of body temperature, oxygen saturation, respiratory rate, and dyspnea scale using the Borg Scale. Pre-intervention measurements were conducted one minute before starting the intervention, while the client was in a relaxed and comfortable state. Body temperature was measured using a digital thermometer, oxygen saturation using a pulse oximeter, respiratory rate was counted over one minute, and dyspnea was rated using the Borg Scale based on the patient's subjective perception. Subsequently, the client received the orthopneic position and hand-held fan therapy for five minutes. Post-intervention measurements were taken immediately afterward using the same instruments and consistent methods.

Case Description

Mrs. I (78 years old) was brought to the hospital with complaints of dyspnea that began two days prior to admission, palpitations, and bilateral leg edema. The patient had a history of heart disease since 2019 with a medical diagnosis of Acute Decompensated Heart Failure (ADHF) and is currently diagnosed with Congestive Heart Failure (CHF). The patient routinely took medication prescribed by a clinic, including Amlodipine 10 mg once daily and Warfarin 2 mg once daily. The patient's younger sibling also has a history of heart disease and stroke. The dyspnea worsened, prompting hospital admission on December 14, 2024.

Vital signs and anthropometric measurements taken during assessment on December 16, 2024, showed the following results: GCS E4V5M6 (Compos Mentis), Blood Pressure: 117/48 mmHg, Heart Rate: 48 bpm, Respiratory Rate: 23 breaths/minute, Oxygen Saturation: 96% with nasal cannula at 2 lpm, Body Temperature: 36.1°C, Body Weight: 38 kg, Height: 150 cm, Mid-Upper Arm Circumference: 19.5 cm, Body Mass Index (BMI): 16.8 (Underweight).

Focused cardiopulmonary physical examination revealed that the patient appeared weak, had a moon face, and used accessory respiratory muscles. On palpation, there was decreased tactile fremitus, and the Point of Maximal Impulse (PMI) was shifted laterally from the 5th intercostal space (ICS) to the 6th ICS. The skin appeared dry with reduced skin turgor. On percussion, cardiac dullness extended laterally to the 6th ICS, while the lung fields were resonant. Auscultation revealed additional breath sounds, including rhonchi in the tracheobronchial area, as well as wheezing and crackles in the lung fields.

Laboratory results on December 14, 2024, were as follows Hemoglobin: 10.3 g/dL, Leukocytes: 7,340 /µL, Platelets: 180,000 /µL, Hematocrit: 31%, Random Blood Glucose (RBG): 96 mg/dL, Creatinine: 1.4 mg/dL, Urea: 74 mg/dL, Albumin: 4.3 g/dL, Sodium: 129 mEq/L, Calcium: 7.9 mg/dL, Potassium: 3.7 mEq/L.

Chest X-ray performed on the same day showed signs of cardiomegaly, pulmonary edema, and aortic atherosclerosis. Electrocardiogram (ECG) on December 14, 2024, indicated an anterior myocardial infarction and right ventricular hypertrophy. During hospitalization, the patient received Lansoprazole 30 mg once daily, Furosemide drip at 10 mg/hour, and Warfarin 2 mg once daily.

Results

Based on the nursing assessment conducted for Mrs. I, several nursing problems were

identified, including decreased cardiac output, ineffective breathing pattern, activity intolerance, self-care deficit, and risk of falls. The primary complaint reported by the patient was shortness of breath, which had persisted for two days prior to admission and progressively worsened. To help alleviate this complaint, non-pharmacological interventions were provided in the form of orthopneic positioning and hand-held fan therapy, aimed at enhancing comfort and improving the patient's breathing pattern.

From December 16 to December 19, 2024, the patient received the intervention. During the intervention period, measurements were taken before and after each session, including dyspnea score using the Borg Scale, body temperature, respiratory rate, oxygen saturation, heart rate, and blood pressure.

Table 1. Vital Signs Before and After the Intervention

Day	Hour	Vital Sign	Before	After
1	07.13	Temp	36,5	36,4
		RR	30	28
		SpO2	96	98
		Scale	6	6
2	13.16	Temp	36,3	36,3
		RR	29	27
		SpO2	95	97
		Scale	5	5
3	08.05	Temp	36,2	36,2
		RR	26	25
		SpO2	96	97
			4	4

Over a three-day intervention from December 16 to 19, 2024, involving the use of orthopneic positioning and handheld fan therapy, the patient's dyspnea symptoms showed gradual and significant improvement. On the first day, the patient reported more comfortable breathing with a decrease in respiratory rate from 30 to 28 breaths per minute and an increase in oxygen saturation from 96% to 98% (with supplemental oxygen), although the Borg Scale remained at 6. By the second day, the patient experienced easier breathing and better sleep, with a respiratory rate of 27 breaths per minute, oxygen saturation of 97%, and Borg Scale at 5. On the third day, the patient noted reduced dyspnea and improved appetite, with respiratory rate decreasing to 25 breaths per minute, oxygen saturation maintained at 97%, and Borg Scale dropping to 4. Initially appearing tachypneic and using accessory muscles, the patient ultimately showed a marked reduction in dyspnea and improved respiratory comfort, despite occasionally experiencing mild shortness of breath.

Discussion

Patients with congestive heart failure (CHF) commonly experience fatigue and dyspnea, even during light activities or while at rest. This leads to reduced tissue oxygenation and decreased energy production, ultimately limiting the patient's ability to perform daily activities and lowering their quality of life (Sepdianto, 2020). In this case, the primary complaint was dyspnea, which is associated with the nursing problem of impaired gas exchange. Impaired gas exchange is defined as a condition in which the process of inspiration and/or expiration fails to achieve adequate ventilation, resulting in suboptimal gas exchange in the lungs and causing discomfort during breathing (Tim Pokja SDKI DPP PPNI, 2017).

In this patient, dyspnea was caused by pulmonary edema resulting from increased pulmonary venous pressure due to left ventricular dysfunction, indicating Congestive Heart Failure (CHF). Fluid accumulation in the alveoli impairs oxygen diffusion

and further worsens tissue oxygenation. This condition highlights the complexity of respiratory problems in CHF patients, influenced not only by cardiovascular factors but also by fluid overload.

Treatment provided to this CHF patient included positioning techniques (orthopneic position) and sensory stimulation techniques (handheld fan therapy). The fan therapy works by stimulating cold receptors on the V2 branch of the trigeminal nerve, helping reduce the sensation of dyspnea. Meanwhile, positioning, such as the orthopneic position, plays an important role in reducing circulatory congestion and improving lung ventilation, thereby enhancing respiratory comfort (Khasanah et al., 2015).

An increase in oxygen saturation from 95% to 98% and a decrease in respiratory rate from 30 to 25 breaths per minute following the intervention occurred because the orthopneic position physiologically reduces venous return to the heart. With less blood returning to the right atrium and ventricle, the volume of blood pumped into the lungs also decreases. This helps lower pulmonary circulation pressure and gradually reduce pulmonary edema, making breathing easier and more efficient (Guyton & Hall, 2014). The outcomes of this therapy are also supported by findings from a study titled "The Effects of High Fowler and Orthopneic Position in Lung Ventilation", which showed that the orthopneic position is effective in reducing respiratory rate and increasing maximal expiration time (Agussalim, 2014).

Additionally, this intervention was supported by handheld fan therapy, which physiologically decreases the perception of dyspnea through sensory stimulation of the facial area, activating the V2 branch of the trigeminal nerve. Patients reported feeling refreshed and relieved when given fan therapy, which helped reduce dyspnea. These findings are consistent with the study "Application of Hand-Held Fan on Dyspnea in Heart Failure Patients" which demonstrated a decrease in dyspnea levels after directing the fan to the patient's face for five minutes, proving the effectiveness of handheld fan therapy in relieving dyspnea in heart failure patients (Ratna Sari et al., 2023). This is further supported by Mesquita Montes (2018), who found that the sensation of wind on the face provides a relaxing effect and reduces cortical activity associated with breathlessness. An additional study by Apriani (2023) also found that handheld fan use can increase respiratory comfort and reduce anxiety, which contributes to the sensation of dyspnea in CHF patients.

Based on these findings, the combination of handheld fan therapy and orthopneic positioning has been proven to offer significant benefits, such as reduced respiratory rate and increased oxygen saturation. Moreover, these interventions are non-invasive and practical, making them suitable for self-administration by patients and families at home to help relieve dyspnea symptoms. However, both handheld fan and orthopneic position therapies are temporary and symptomatic measures that rely on compensatory mechanisms, and do not address the underlying cause of dyspnea in CHF patients (Mesquita Montes et al., 2018; Swan et al., 2019). Although non-pharmacological therapies have fewer side effects than pharmacological approaches and are effective in symptom relief, they should be seen as supportive actions prior to main interventions, such as pharmacological treatment with diuretics. Diuretics are used to remove excess fluid from the body, thereby reducing pulmonary edema and allowing more effective gas exchange in the alveoli.

Nurses play a key role in providing nursing care to help alleviate dyspnea in patients with respiratory disorders, especially in conditions like CHF. Nursing actions include monitoring respiratory rate, oxygen saturation, detecting adventitious breath sounds such as rales or wheezing, and evaluating the depth of breathing. Additionally, nurses may recommend bed rest or activity limitation to reduce cardiac workload, administer oxygen therapy as needed, guide patients in breathing exercises, and help position patients for more effective respiration, such as by using the orthopneic position (Syapitri et al., 2023).
However, this study had limitations in the frequency of intervention delivery. Although literature recommends that therapy be performed three times a day, the intervention in this case was only administered once daily, with one demonstration provided to the patient followed by independent practice. This limited the intensity and repetition of

the therapy. To address this, instructions were given to the patient's family to continue the therapy independently, ensuring more optimal care and achieving the intended outcomes. The nursing implications of this study highlight the importance of family empowerment in performing simple non-pharmacological interventions and providing continuous education on symptom management techniques to support sustained home-based care. Furthermore, the results of this study can serve as a foundation for nurses in developing non-pharmacological intervention protocols as part of the standard of nursing practice for CHF patients.

Conclusion

Hand-held fan therapy is a non-pharmacological intervention that, in this study, was combined with the orthopneic position in patients. The results of this research indicate that the combination of hand-held fan therapy and orthopneic positioning is effective in reducing dyspnea symptoms in clients with congestive heart failure (CHF). Although dyspnea was still experienced, the therapy successfully reduced respiratory rate, improved oxygen saturation, and enhanced client comfort.

This intervention can be performed independently three times a day or whenever dyspnea occurs, using 2–3 pillows for positioning and a handheld fan as a supportive tool to aid oxygenation. This therapy can serve as an easy and repeatable alternative that can be independently applied at home to help alleviate dyspnea symptoms. Future research is recommended to involve a larger sample size, consistent intervention frequency, and different study designs to increase the validity of the results. Additionally, studies may explore the role of family members in continuing the therapy independently at home.

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