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A Case Study: Application of Music Therapy in Chronic Obstructive Pulmonary Disease (COPD) Patients at RSUD Tarakan Jakarta

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Abstract

Background: Anxiety is a typical complaint experienced by COPD patients. Pharmacological therapy is one of the primary interventions used to reduce anxiety. However, this therapy is not optimal and ultimately reduces anxiety. Therefore, additional treatment is needed. **Objective**: This study aims to measure the effect of music therapy in reducing anxiety in COPD patients. **Method**: A case study was applied among 15 COPD patients. HADS was used to assess anxiety. Paired t-test was used as a statistical test. **Result**: This case study resulted that nursing care being prepared based on Indonesian nursing standards consisting of the SDKI, the SIKI, and the SLKI. Then the application of music therapy effectively reduced anxiety with a p-value of 0.000 ($p < 0.05$). **Conclusion**: It can be concluded that music therapy could reduce anxiety in these fifteen patients. **Recommendation** for the clinical practice: it is recommended that nurses can apply this intervention to improve the quality of nursing care plans.

Keywords: COPD; Anxiety; Music Therapy

INTRODUCTION

Lung disease is a significant contributor to morbidity and mortality. Every year, it is estimated that 65 million people die from lung and respiratory diseases, mainly due to COPD (1). More than 65 million people worldwide suffer from COPD, and as many as 3 million die yearly. This places COPD as the 3rd cause of death worldwide. In 2012 the prevalence of COPD in Asia was 6.2%, and around 19.1% were patients with severe COPD. In Indonesia, a prevalence rate of approximately 4.5% (2).

The impact on patients with COPD can be categorized into two: the direct effect is due to COPD disease, and the indirect impact is due to the influence of the care services needed by COPD patients. Both direct and indirect impact the patient's psychological problems. Ibrahim (2012) said that anxiety is the psychological problem that most often occurs and negatively impacts heart and lung health (3, 4). Anxiety in COPD patients is caused by many factors, including being away from family, feelings of isolation, invasive procedures, pain, privacy, immobility, health conditions, confusion, sleep disturbances, and a new care team (4-6).

Anxiety and awareness about the illness's condition, chronic or acute, are stressors that cause stress to the patient (4). Stress that is felt continuously by the patient can hinder healing. Prolonged stress can decrease the patient's immune system and be fatal, namely an increased risk of death. This is because stress interferes with all hormone levels, including an increase in the hormone cortisol, thyroid hormone, and sympathetic nerve work, which ultimately increases the body's metabolism. The body's metabolism is very useful in the patient's healing process, but increasing the body's metabolism is not useful because anxiety will hamper the patient's recovery (7, 8). Other studies have also shown that patients with constant anxiety may have more complications than those without anxiety (9). If the client cannot immediately accept the condition of his illness, it will be difficult for the client to get healing. Even complications can be experienced by the patient and worsen the situation (10).

Anxiety in COPD patients can be reduced or eliminated with pharmacological interventions. However, pharmacological intervention does not optimally eliminate stress, and continuous use of pharmacology cannot be separated from the emergence of side effects. Therefore, additional therapy is needed to reduce or even eliminate anxiety, namely non-pharmacological treatment (11). Non-pharmacological intervention can be combined to optimize outcomes and minimize side effects. Non-pharmacological therapies to deal with anxiety can include relaxation, hypnotherapy, massage, and music therapy (12, 13). Non-pharmacological interventions that can be done to install a positive perception and calm is music therapy. Music therapy seeks to assist patients in reducing muscle tension, reducing anxiety, increasing self-esteem, improving interpersonal relationships, increasing motivation, and successful and safe emotional release (14, 15).

This concept is supported by environmental theory from Florence Nightingale, which says that the nurse's role is to create an environment that allows healing. Florence Nightingale emphasized holism in nursing, that is, caring for the person. This healing environment must enable critically ill patients to meet their physical, psychological, and spiritual needs. Environmental manipulation can include adequate sleep and rest, giving pain medication, playing music, teaching breathing exercises, and applying patient and family-centered care (4).

OBJECTIVE

The study aimed to determine the effect of music therapy on reducing anxiety in COPD patients.

METHODS

This research used a case study design. Fifteen patients in this study had similar characteristics: Tarakan Hospital patients aged >40 years, diagnosed with COPD, compos mentis awareness, patients tolerant to activity, and experienced mild and moderate anxiety. The researcher explained the implementation procedure and obtained informed consent. Anonymity and confidentiality were guaranteed throughout this research. Data collection techniques used were observation and interviews. In this study, the researchers arranged a nursing care plan for fifteen patients

based on the Indonesian Nursing Diagnosis Standard (IDHS), the Indonesian Nursing Intervention Standard (SIKI), and the Indonesian Nursing Outcome Standard (SLKI). The researchers included music therapy with a tempo of 2/4 daily for three days to reduce anxiety. The level of anxiety was assessed on the first day (pre-test) and the third day (post-test) using the Hospital Anxiety and Depression Scale (HADS). Univariate analysis used mean and SD for numerical data and frequency distribution for categorical data. The normality test using Shapiro Wilk. Then ended with a bivariate analysis using paired t-test.

RESULTS

Characteristics of 15 Patients

Table 1 Patients Characteristics (N=15)

Patients Characteristics	Frequency	%
Gender		
Man	10	66.7
Women	5	33.3
Age		
36-45 (Late Adult)	2	13.3
46-55 (Early Elderly)	8	53.3
56-65 (Late Elderly)	5	33.3
Education		
Basic Education	7	46.7
High School	4	26.7
University level	4	26.7
Occupation		
Housewife	5	33.3
Employees	6	40
Entrepreneur	4	26.7

Table 1 shows that most patients were male (66.7%). More than half of the patients were aged 46-55 (53.3%). Nearly half of patient education was primary education (46.7%). Only 40% have been working as employees (40%).

Medical Diagnosis of 15 Patients

Table 2 Patients Medical Diagnosis (N=15)

Medical Diagnosis	Frequency	%
Chronic Bronchitis	9	60
Emphysema	3	20
Chronic Bronchitis + Emphysema	3	20

Table 2 shows that the most medical diagnoses for COPD cases were bronchitis in nine patients (60%), followed by emphysema cases in as many as three (20%). Thus, there were three patients diagnosed with bronchitis and emphysema.

Assessment of 15 Patients Based on Medical Diagnosis

Table 3 Assessment of 15 Patients Based on Medical Diagnosis (N=15)

Assessment	Medical Diagnosis		
	Emphysema (n=3)	Chronic bronchitis (n=9)	Chronic Bronchitis + Emphysema (n=3)
Increase sputum production	0 (0%)	9 (100%)	3 (100%)
Loss of Ventilation and perfusion area	(100%)	0 (0%)	0 (0%)
Airway obstruction	0 (0%)	9 (100%)	3 (100%)
Mismatching of ventilation & perfusion	0 (0%)	9 (100%)	3 (100%)
Hypoxemia	0 (0%)	9 (100%)	3 (100%)
Cyanosis	0 (0%)	9 (100%)	3 (100%)
Dyspnea	3 (100%)	0 (0%)	3 (100%)
Increase work of breathing	3 (100%)	0 (0%)	3 (100%)
Use of accessories muscle	3 (100%)	0 (0%)	3 (100%)
Tripod position	3 (100%)	0 (0%)	3 (100%)
Barrel chest	3 (100%)	0 (0%)	0 (0%)
Pursed lips breathing	3 (100%)	0 (0%)	3 (100%)
Loss of weight	3 (100%)	0 (0%)	3 (100%)
Shortness of breathing	0 (0%)	9 (100%)	3 (100%)
Wheezing expiration	0 (0%)	5 (55%)	3 (100%)
Crackles expiration	0 (0%)	4 (44%)	0 (0%)
Hypercapnia	0 (0%)	9 (100%)	0 (0%)
Increase RBC Production	0 (0%)	9 (100%)	3 (100%)
Cough	0 (0%)	3 (33%)	3 (100%)
Chest pain	0 (0%)	0 (0%)	2 (67%)
Weakness	0 (0%)	0 (0%)	2 (67%)

Table 3 shows that all patients (100%) diagnosed with emphysema experienced loss of ventilation and perfusion area, shortness of breath, increased effort of breathing, use of accessory muscles to breathe, Tripod position, barrel chest, pursed lips breathing, and weight loss. Table 3 shows that all patients (100%) were diagnosed with Chronic Bronchitis. They had airway obstruction, mismatching ventilation &

perfusion, hypoxemia, cyanosis, shortness of breath, hypercapnia, and increased red blood cell production. In addition to the above complaints, 5 of 9 patients experienced wheezing, 4 of 9 had crackles, and 3 of 9 had additional cough symptoms. Table 3 also shows that all patients (100%) diagnosed with emphysema and bronchitis experienced increased sputum production, airway obstruction, mismatching ventilation & perfusion, hypoxemia, cyanosis, and shortness of breath, the effort of breathing, use of accessory muscles, tripod position, pursed lip Breathing, weight loss, shortness of breath, wheezing, increased red blood cells production, cough, and chest pain.

Nursing Diagnosis of 15 Patients Based on Medical Diagnosis

Table 4 Patients Nursing Diagnosis Based on Medical Diagnosis (N=15)

Nursing Diagnosis	Medical Diagnosis (N=15)		
	Emphysema (n=3)	Chronic bronchitis (n=9)	Chronic Bronchitis + Emphysema (n=3)
Ineffective airway clearance	3 (100%)	9 (100%)	3 (100%)
Impaired gas exchange	3 (100%)	0 (0%)	3 (100%)
Anxiety	3 (100%)	9 (100%)	3 (100%)
Acute pain	0 (0%)	0 (0%)	2 (67%)
Ineffective breathing pattern	3 (100%)	9 (100%)	3 (100%)
Activity intolerance	0 (0%)	0 (0%)	2 (67%)

Table 4 shows that all patients diagnosed with COPD have a nursing diagnosis of ineffective airway clearance, inefficient breathing patterns, and anxiety. However, the diagnosis of gas exchange disorders was only experienced by patients with diagnosed emphysema (100%) and emphysema + chronic bronchitis (100%). Meanwhile, acute pain and activity intolerance was only experienced by patients diagnosed with emphysema + chronic bronchitis, as many as two (67%).

Nursing Intervention of 15 Patients based on Nursing Diagnosis

Table 5 Patients Nursing Intervention based on Nursing Diagnosis (N=15)

Nursing Intervention	Nursing Diagnosis					
	Infective airway clearance (n=15)	Impaired gas exchange (n=6)	Anxiety (n=15)	Acute pain (n=2)	Ineffective breathing pattern (n=15)	Activity intolerance (n=2)
Respiratory management	5 (100%)	6 (100%)	0 (0%)	0 (0%)	5 (100%)	0 (0%)
Pain management	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	0 (0%)
Emotional Support	0 (0%)	0 (0%)	5 (100%)	0 (0%)	0 (0%)	0 (0%)
Energy management	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)

Table 5 shows that the respiratory management intervention was given to all patients (100%) with a nursing diagnosis of ineffective airway clearance and breathing patterns. Emotional support nursing interventions were given to all patients (100%) with nursing diagnoses of anxiety. Pain management nursing interventions were given to all patients (100%) with a nursing diagnosis of chest pain. And pain management nursing interventions were given to all patients (100%) with a nursing diagnosis of activity intolerance.

Nursing Evaluation of 15 Patients based on Nursing Diagnosis

Table 6 patients Nursing Evaluation based on Nursing Diagnosis (N=15)

Nursing Diagnosis	Nursing Evaluation	
	Goal has achieved	The goal has not been achieved
Ineffective airway clearance (n=15)	12 (80%)	3 (20%)
Impaired gas exchange (n=6)	3 (50%)	3 (50%)
Anxiety (n=15)	15 (100%)	0 (0%)
Acute pain (n=2)	0 (0%)	2 (100%)
Infective breathing pattern (n=15)	12 (80%)	3 (20%)
Activity intolerance (n=2)	0 (0%)	2 (100%)

Table 6 shows that 12 out of 15 patients achieved their nursing goals on the nursing diagnosis of ineffective airway clearance. 3 out of 6 patients achieved their nursing goals on the nursing diagnosis of gas exchange disorders. 12 out of 15 patients achieved their nursing goals on the nursing diagnosis of ineffective breathing patterns. At the same time, all patients (100%) with a nursing diagnosis of anxiety achieved their nursing goals. Then all patients (100%) with a nursing diagnosis of acute pain and activity intolerance have not attained their nursing goals.

Descriptive Results of Anxiety Scores During Pretest-Posttest, Normality Test, and Paired T-Test

Table 7 Descriptive Results of Anxiety Score During Pretest-Posttest

Anxiety	Mean	Anxiety Level	SD	Shapiro-Wilk	p-value
Pre-test (day 1)	12.13	Moderate	1.8	0.008	0.000
Post-test (day 3)	7.33	Mild	1.8	0.232	

Table 7 shows that the average anxiety score at pre-test was 12.13 (moderate anxiety) and at post-test was 7.33 (mild anxiety). The normality test with Shapiro-Wilk showed a value of 0.008 at the pre-test and 0.232 at the post-test. This showed that the data were normally distributed. Statistical test with paired t-test showed a value of 0.000 ($p<0.05$). Therefore, there was a statistically significant difference in anxiety scores between the pre-test and post-test, where the post-test anxiety score was smaller than the pre-test.

DISCUSSION

The result of table 1 was in line with the research conducted by Singh VP et al. (2009), which reported that the respondents who participated in his study were male, with as many as 45 respondents (70.3%) with an average age of 63 years. In Singh VP's study, respondents' characteristics in terms of occupation, education, sports status, and health history were not reported (16). Different results were reported by Brooks et al. (2003) that the participating respondents had a balanced frequency between men and women (50%), with the most age being >50 years. In Brooks's study, it was also reported that 73% of respondents had comorbid but not reported characteristics of respondents in terms of occupation, education, and sports status (17).

COPD symptoms are more common in people over 50 years of age. At the age of over 60 years, symptoms appear more often. This is because the function of the body's organs will decrease (18). More men than women are associated with more smoking found in men than women. The risk of COPD caused by smoking is four times greater than non-smokers (7). According to (WHO 2012) Global Adult Tobacco Survey: Indonesia Report 2011, smokers' current prevalence rate was 34.8%. This is exceptionally high for men at 67%, 30 times the female prevalence rate of 2.7% (1, 7, 8, 18).

The results of table 2 align with Gerungan et al. (2020) and Palinoan et al. (2015) that chronic bronchitis suffered more than emphysema, especially related to age level. Bronchitis occurs under 50 years, while emphysema usually occurs at the age above 50 years (18, 19). Anatomically, the bronchi are located earlier than the alveoli, so cigarette exposure is first and in large quantities (7).

The result of table 3 aligns with the theory. The mnemonics "pink puffer" and "blue bloater" have been used to differentiate the clinical manifestations of emphysema and chronic obstructive bronchitis. In practice, differentiation between the two types is not as vivid as presented here. This is because persons with COPD often have some degree of both emphysema and chronic bronchitis. The respiratory responsiveness to the hypoxic stimuli is a significant difference between the pink puffers and the blue bloaters. With pulmonary emphysema, there is a proportionate loss of ventilation and perfusion area in the lung. These persons are pink puffers, or fighters, who can over ventilate and thus maintain relatively normal blood gas levels until late in the disease. Chronic obstructive bronchitis is characterized by excessive bronchial secretions and airway obstruction that causes mismatching of ventilation and perfusion. Thus, persons with chronic bronchitis cannot compensate by increasing ventilation; hypoxemia and cyanosis develop. These are the blue bloaters or nonfighters. Persons with emphysema have marked dyspnea and struggle to maintain normal blood gas levels with increased breathing effort, including prominent use of the accessory muscles.

The seated position, which stabilizes chest structures and allows for maximum chest expansion and use of accessory muscles, is preferred. With the loss of lung elasticity and hyperinflation, the airways often collapse during expiration because the pressure in surrounding lung tissues exceeds airway pressure. Air becomes trapped in the lungs, producing an increase in the anteroposterior dimensions of the chest, the so-called barrel chest typical of persons with emphysema.

Expiration often is accomplished through pursed lips. Pursed lip breathing increases the resistance to air outflow and helps prevent airway collapse by increasing airway pressure. The work of breathing is significantly increased in persons with emphysema, and eating often is difficult. As a result, there often is considerable weight loss. Chronic obstructive bronchitis is characterized by shortness of breath and a progressive exercise tolerance decrease. As the disease progresses, breathing becomes increasingly more labored, even at rest. The expiratory phase of respiration is prolonged, and expiratory wheezes and crackles can be heard during auscultation.

In contrast to persons with emphysema, those with chronic obstructive bronchitis cannot maintain normal blood gases by increasing their breathing effort. As a result, hypoxemia, hypercapnia, and cyanosis develop, reflecting an imbalance between ventilation and perfusion. Hypoxemia with arterial PO2 levels falls below 55 mm Hg, causes reflex vasoconstriction of the pulmonary vessels and other impaired lung gas exchange. Hypoxemia also stimulates red blood cell production, causing polycythemia. As a result, persons with chronic obstructive bronchitis develop pulmonary hypertension and, eventually, right-sided heart failure with peripheral edema (*i.e.*, cor pulmonale). Persons with combined forms of COPD (*i.e.*, some degree of both emphysema and chronic bronchitis) characteristically seek medical attention in the fifth or sixth decade of life, complaining of cough, sputum production, and shortness of breath. The symptoms typically have existed to some extent for ten years or longer. The productive cough usually occurs in the morning.

Dyspnea becomes more severe as the disease progresses. Frequent exacerbations of infection and respiratory insufficiency are common, causing absence from work and eventual disability. The late stages of COPD are characterized by pulmonary hypertension, cor pulmonale, recurrent respiratory infections, and chronic respiratory failure. Death usually occurs during an exacerbation of illness associated with infection and respiratory failure.

The results of table 4 showed that there was a problem with respiration. According to Black (2014), Chronic irritation caused by cigarette smoke and pollution triggers chronic bronchitis. Cigarette smoke is a mixture of particles and gases. There are free radicals in every puff of cigarette smoke, namely hydroxide radicals (OH-). Most of these free radicals will reach the alveolus when smoking cigarettes. These particles are oxidants that can damage the lungs. Particulates of cigarette smoke and polluted air settle in the mucus layer that lines the bronchial mucosa, inhibiting ciliary activity. The movement of the fluid that coats the mucosa is reduced so that irritation of the mucosal cells increases. This will stimulate the mucous glands. This situation, coupled with impaired ciliary activity, causes chronic cough and expectoration symptoms. This process increases sputum production and prevents air from entering the lungs, resulting in airway clearance problems (7).

Black (2014) said that continuous exposure to cigarette smoke and free radicals would reach the alveoli in large numbers. This is the cause of emphysema. Emphysema is a condition with permanent abnormal enlargement of the alveoli with the destruction of the alveolar walls. This situation causes reduced elastic recoil of the lungs, resulting in airway obstruction. This process causes the diffusion of O2 and CO2 to be disrupted, which raises the problem of impaired gas exchange (7).

COPD develops slowly, and this disease's symptoms will usually become more evident after the patient is 40 or 50 years old (1). Patients aged 40-60 years, according to Santrock (2002), were at the stage of middle adulthood development. At this stage of development, individuals begin to experience a decline in body functions, including a decrease in lung function, and health problems will become a significant concern for individuals. In addition, patients suffering from COPD will experience lifestyle and activity limitations changes that cause psychological stress. Furthermore, the stress of severe medical treatment can cause anxiety (1, 7, 8). Patients who are hospitalized are patients who have just recovered from experiencing a severe exacerbation. These patients were reported to have higher anxiety levels than COPD patients who underwent outpatient treatment. This is due to the patient's

traumatic experience, like; as shortness of breath and chronic cough that had just been experienced by the patient, which caused fear and concern in the patient about his disease condition (7).

The result of table 5 aligns with the Indonesian Nursing Intervention Standards (SIKI), where patients diagnosed with ineffective airway clearance, impaired gas exchange, and ineffective breathing patterns can receive respiratory management interventions. Then patients with anxiety were given emotional support interventions, patients with pain were delivered pain management interventions, and patients with activity intolerance were given pain management interventions (20).

Finally, the Statistic test showed a statistically significant difference in anxiety scores between the pre-test and post-test, where the post-test anxiety score was smaller than the pre-test. These results were in line with research conducted by Brooks et al. (2003), Rechley et al. (2015), Singh et al. (2009), and McBride et al. (2015), where music therapy could reduce anxiety scores in COPD patients. The difference in results lies in each study's statistical and clinical significance. This difference was due to differences in implementation, the number of samples, anxiety measurement instruments, and duration of therapy (16, 17).

Physiologically, hearing is how the ear receives sound waves, distinguishes frequencies, and sends information to the central nervous system. The ear will receive every sound produced by a sound source or air vibration. These vibrations are converted into mechanical impulses in the middle ear and electrical impulses in the inner ear. It was transmitted through the auditory nerve to the auditory cortex in the brain, besides receiving signals from the thalamus (one part of the brain that receives messages from the senses and is forwarded to other parts of the brain). The amygdala also receives signals from all parts of the limbic cortex (emotions/behaviors). It also receives the signal on the neocortex temporal lobe (cortex or brain layer that is only present in humans), parietal (part of the midbrain), and occipital (hindbrain), especially in the auditory association area and visual association area. From these physiological processes, music is believed to be used to relax, relieve stress, and reduce anxiety because music is an organized auditory stimulus consisting of melody, rhythm, harmony, form, and style. Therefore, this music therapy can be carried out in a medical-surgical service setting, especially with COPD patients (21, 22).

CONCLUSION AND RECOMMENDATION

To summarize, it can be concluded that music therapy could give health benefits to these fifteen patients. Firstly, it could reduce anxiety. Secondly, it leads to maintaining the health emotional of COPD patients.

In terms of the research area, it is recommended to do this research with a more significant sample to generalize the result to a bigger population. In the nursing practice, it is recommended to involve family members in this research so that the effect of this music therapy could last longer.

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