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THE EFFECT OF BALLOON BLOWING THERAPY IN PATIENTS WITH PPOK IN IMPROVING OXYGEN SATURATION

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ABSTRACT

COPD is a disease of the respiratory system characterized by progressive and irreversible airway obstruction, accompanied by inflammation and systemic effects leading to airway narrowing and increased sputum production. This results in difficulty breathing and shortness of breath, which can be seen through increasingly strong contractions of the respiratory muscles. Prevention can be done through respiratory rehabilitation, such as blowing balloon exercise, which aims to better improve oxygen saturation. One way to measure this is by monitoring oxygen saturation. This study aims to determine the effect of balloon blowing on improving oxygen saturation in COPD patients. The research design used a one group pre-post design. The population of this study were patients with COPD, 30 samples were selected purposive sampling technique and data analysis using Wilcoxon test. The results showed that there was an effect of balloon blowing therapy on increasing oxygen saturation in COPD patients at UNS Hospital (p value 0.000). Researchers recommend that blowing balloon exercise be done regularly and consistently, with three blows every morning for three consecutive days, so that COPD patients can achieve more optimal oxygen saturation and reduce the risk of exacerbations.

Keywords

COPD, Oxygen Saturation, Balloon Blowing Therapy

INTRODUCTION

COPD (chronic obstructive pulmonary disease), also known as CPOD (Chronic Obstructive Pulmonary Disease), is a broadly classified disease that includes chronic bronchitis, bronchiectasis, emphysema and asthma. COPD is characterized by flow limitation in the lungs that is not fully reversible. Flow limitation is usually progressive and is associated with an abnormal pulmonary inflammatory response to harmful particles or gases leading to airway narrowing, mucus hypersecretion and changes in the pulmonary vascular system. COPD is one of the diseases that cause death worldwide (Khoiriyah et al., 2022). COPD disease is the third largest contributor to death in the world, with around 3.23 million deaths occurring in 2019. Deaths from COPD are about 90% aged > 70 years dominant in low and middle income countries (Sa'diyah & Suandika, 2023).

The prevalence of COPD is predicted to increase from 11% in 2016 to more than 15% in 2030. This happens

because of air pollution and smoking habits of the people (Yawn et al., 2021). In Indonesia, COPD cases continue to increase, around 9.2 million Indonesians experience COPD (Badan Penelitian Dan Pengembangan Kesehatan Republik Indonesia, 2018). COPD cases in Central Java according to Riskesdas, (2018) reached 359 cases. In UNS Hospital, COPD is the number one inpatient disease with data entered in the last 1 year reaching ± 600 cases.

COPD is a leading cause of chronic morbidity and mortality worldwide. Many people suffer from this disease for years and die prematurely due to complications. Patients with COPD will usually experience difficulty in exhaling due to resistance in the respiratory tract, or hypoventilation (Singh et al., 2022). These changes in the lungs can cause a decrease in blood oxygen levels (SpO2 < 85%) because oxygen flow to the lungs is reduced due to disruption of the oxygen and carbon dioxide exchange process. Normal oxygen saturation values are between 95% - 100% using fingertip pulse oximetry (Sulistiowati et al., 2021).

Seeing the impact of COPD, it requires serious medical treatment both pharmacologically and non-pharmacologically with the aim of preventing progressive disease, reducing symptoms, improving health status, and improving exercise tolerance in COPD patients (Paramitha, 2022). Handling COPD patients in addition to pharmacological therapy can also use non-pharmacological therapy with the Ballow Blowing technique (Khoiriyah et al., 2022). Balloon blowing breathing technique is a breathing relaxation exercise by inhaling air through the nose and expelling air through the mouth into a balloon. Such a technique helps prevent the respiratory muscles from becoming fatigued and increases lung development. This process helps individuals suffering from COPD to achieve more controlled and efficient ventilation, thereby reducing the workload of the lungs and increasing the supply of oxygen and removal of carbon dioxide trapped in the respiratory system (Setiawan et al., 2021).

The results of a study conducted by Astriani et al., (2020) stated that there was an effect of respiratory relaxation with balloon blowing technique on increasing oxygen saturation in COPD patients at Buleleng Regency Hospital. Balloon blowing exercise is also effective for training the ability of the lungs to take in and pump air, but does not affect the size or number of alveoli in the lungs. In addition, this exercise can also increase intra-abdominal pressure during expiration so as to increase bronchial diameter and inspiratory and expiratory flow which can increase oxygen saturation (Khoiriyah et al., 2022). Based on the above, considering that COPD cases continue to increase, and COPD research that has been done before is only limited to the deep breath method and oxygen therapy, the researcher considers it very necessary to examine the effect of Ballow Blowing Therapy on COPD patients in increasing oxygen saturation.

METHOD

The research design used a one group pre-post test design. Data collection with a sample of COPD patients at UNS Hospital as many as 30 patients with inclusion criteria: Patients with COPD with oxygen saturation below 95%, respondents aged > 18 years-70 years. Exclusion Criteria: Uncooperative patients, patients who have heart disease, patients who have decreased consciousness. Sampling using purposive sampling technique. Data was taken by conducting a pre-test to determine the value of oxygen saturation using pulse oxymetry in COPD patients and post-test after ballow ballowing technique. The ballow ballowing technique intervention was given 3 times a meeting in 3 days with an intervention duration of 15 minutes at each meeting, after the results of the data collected were measured using the Wilcoxon test to determine the effect of the balloon blowing technique to improve oxygen saturation in COPD patients. The measuring instrument in this study is to use SOP (Standard Operating Procedure) Ballow blowing breathing technique that has been standardized so that validity and reliability tests are not carried out and pulse oxymetry

equipment for measuring oxygen saturation. This study obtained a research ethics permit from UNS Hospital with EC number 224/UN27.06.11/KEP/EC/2024.

Characteristics	Frequency	Percentage (%)
SD	1	3.3
HIGH SCHOOL	14	46.7
D3	4	13.3
S1	10	33.3
S2	1	3.3
Total	30	100

RESULTS

Univariate Results

1. Distribution of respondent characteristics by age.

   An overview of the characteristics of respondents based on age in the pulmonary inpatient room. At UNS Hospital is presented in table 1.

   Table 1. Distribution of respondent characteristics based on age

	N	Mean	Min	Max	Sd
Age	30	44.7	23	73	12.967

Primary data source, (2024)

Variables	Number (n)	Mean	P. Value
Pre-test	30	76.8	0.00
Post-test	30	81,74	

Based on table 1 above, it can be seen that the average age of respondents is 44.7 with an age range between 23-73 years. Respondents who have the oldest age are 73 years old and the youngest age is 23 years old out of 30 respondents.

2. Characteristics of respondents based on gender.

   An overview of the characteristics of respondents based on gender in the pulmonary inpatient room. Table 2. Distribution of respondent characteristics based on gender

Gender	Frequency	Percentage (%)
Male	13	43.3
Female	17	56.7
Total	30	100

Primary data source, (2024)

Based on table 2 above that of the 30 respondents, the frequency distribution of respondents was mostly female and a small proportion of men.

3. Characteristics of respondents based on education

   An overview of the characteristics of respondents based on education in the pulmonary inpatient room. At UNS Hospital is presented in table 3.

   Table 3. Distribution of respondent characteristics based on education

Primary data source, (2024)

Based on table 3 above that of the 30 respondents, the frequency distribution of respondents most of the respondents had a high school education level as many as 14 respondents (46.7%).

Bivariate Results

In this study, the data obtained can be analyzed with bivariate analysis, namely to determine the effect of *Ballow Blowing* Therapy on COPD patients in increasing oxygen saturation at UNS Hospital, it can be seen in the Wilcoxon test results table below.

Table 4. Distribution of Wilcoxon test

Primary data source, (2024)

Based on table 4 that balloon blowing therapy is very influential in increasing oxygen saturation in COPD patients. Before applying balloon blowing therapy, the average oxygen saturation of COPD patients was 76.43%, while after applying balloon blowing therapy, the average oxygen saturation of COPD patients was 81.74%. Based on the table above, it is known that the majority of COPD patients experience an increase in oxygen saturation. The results of data analysis using the Wilcoxon test obtained a calculated p value of 0.00 <0.05, which means it shows p-value 0.000 it can be concluded that the p value is smaller than 0.05 (p <0.05) which means there is the effect of balloon blowing technique therapy in improving oxygen saturation of COPD patients in the pulmonary inpatient room of UNS Hospital.

DISCUSSION

Respondent characteristics

Based on the results of the study, it shows that of the 30 respondents, the majority of COPD respondents based on age were all over 20 years old. This is in line with research from Yuningsih, (2017) that the average person who experiences COPD is middle adulthood where as age increases, the risk of developing COPD increases. In patients diagnosed with COPD before the age of 40, there is most likely a genetic disorder in the form of α1 antitrypsin deficiency. COPD can affect the decline in lung function as well as physiological changes associated with the aging process, eventually leading to airway obstruction. This affects oxygen supply, lung elasticity, and impaired lung ventilation (Astriani et al., 2020).

In line with research conducted by (Tarigan & Juliandi, 2018) the majority of respondents in this study were aged between 60 to 70 years. This suggests that as age increases, the risk of experiencing respiratory distress also increases, where in advanced age there are changes in the shape of the thorax and breathing patterns.

Based on the gender characteristics of respondents who experienced COPD in this study, many cases occurred in women even though the number of cases in men only differed slightly for respondents suffering from COPD obtained in this study. This is in line with research Priastuti et al., (2020) that cases increase women affected by COPD because based on the results of the analysis, it was found that the number of women exposed to cigarette smoke from family or the environment is a significant risk factor for the incidence of COPD. Respondents who are exposed to cigarette smoke have a 4.31 times higher risk of suffering from COPD compared to respondents who are not exposed to cigarette smoke.

This finding is in line with epidemiological research conducted by Oemiati et al., (2020) which states that almost all COPD cases are caused by smoking. Other studies related to cigarette smoke also show that the proportion of COPD history is higher in the passive smoking population, both men and women. Smoking behavior is a very detrimental habit, both for oneself and those around them. Exposure to cigarette smoke is not only harmful to active smokers, but also to other people who accidentally inhale the smoke produced. Therefore, smoking behavior should be avoided for mutual safety (Hartina et al., 2021). This can occur due to increased production of secretions by goblet cells, where the cells produce excessive fluid that can enter the respiratory tract (Hartina et al., 2021).

Based on educational characteristics, it shows that of the 30 respondents, the majority of COPD respondents graduated from high school. In this case, the level of education also greatly affects the severity of the disease condition and the receipt of information received, including those related to self-care. Lower education is associated with higher disease severity. This is in line with research findings showing that individuals with lower education levels tend to experience greater disease severity, worse lung function decline, and more significant physical function limitations. In addition, they are also at higher risk of acute exacerbations in COPD patients (Adiana & Maha Putra, 2023). Patients with low education levels require more specific information to be able to actively participate in their self-care.

Meanwhile, for respondents who have higher education, information can be obtained from various sources. This is in accordance with research by Clari et al., (2017) which states that when individuals feel that information from medical personnel is not enough, they tend to look for alternative sources of information, one of which is from the internet. Thus, respondents who have a low level of education need support related to information about the self-care behavior of COPD patients, which can be obtained from various sources, one of which is the family, who is the closest person to the patient. Hopefully, with this additional information, the patient's knowledge about self-care will increase, so that the patient's self-care behavior can be better (Park, 2017).

Effect of balloon blowing technique therapy in improving oxygen saturation of COPD patients

Based on the results of the data analysis test using the Wilxocon test, it shows that there is an effect of balloon blowing therapy on increasing oxygen saturation in COPD patients at UNS Hospital. This is in line with research conducted by the results of a study conducted by Astriani et al., (2020) which states that there is an effect of respiratory relaxation with balloon blowing techniques on increasing oxygen saturation in COPD patients at Buleleng Regency Hospital. Balloon blowing exercises are also effective for training the lungs' ability to take in and pump air, but do not affect the size or number of alveoli in the lungs. In addition, this exercise can also increase intra-abdominal pressure during expiration so as to increase bronchial diameter and inspiratory and expiratory flow which can increase oxygen saturation (Khoiriyah et al., 2022).

In line with research conducted Hidayat et al., (2024) shows the results that there is an effect of blowing balloon exercise pressure on oxygen saturation in COPD patients with a value (p value 0.000) with training for three days and every day three training sessions. Blowing balloon exercise has a significant impact on increasing oxygen saturation since the first session. However, based on the analysis of the average change in oxygen saturation at each measurement time, it can be seen that after the third exercise, the improvement effect is greater than the first and second exercises (Hidayat et al., 2024).

Blowing balloon exercise is a breathing exercise performed by blowing a balloon using the mouth and inhaling air through the nose. This exercise can help relax the respiratory tract, improve the exhalation process, and support optimal lung development (Tunik et al., 2020). This exercise also plays a role in improving oxygen transportation and can help prolong the respiratory phase (Tunik et al., 2020).

Blowing balloon exercise is an exercise designed to train breathing by exhaling slowly, which can increase the strength of pulmonary pressure and respiratory muscles if done correctly and regularly (Hidayat et al., 2024). Blowing balloon exercise done properly and regularly can also enlarge the chest cavity, which can be seen from the increase in chest circumference after several training sessions. This is in accordance with research conducted by Tarigan & Juliandi, (2018), with an increase in chest circumference size, lung volume and pressure in the chest cavity also increase because the respiratory muscles become stronger, which has the potential to improve respiratory function.

Patients with COPD are strongly advised to perform breathing exercises, such as blowing balloon exercise, with the aim of improving ventilation and synchronizing the work of the abdominal and chest muscles. This breathing exercise is generally done in either three training sessions, by inhaling maximally through the nose (3-4 seconds), holding for 2-3 seconds then blowing into the balloon maximally for 5-8 seconds until the balloon expands. This technique is expected to create pressure during expiration, so that the air flow slows down and increases the pressure in the abdominal cavity which is passed on to the bronchioli, preventing respiratory tract collapse on expiration. Balloon blowing therapy can improve gas exchange, as seen by an increase in arterial oxygen saturation. In

addition, this technique also helps to improve breathing patterns and increase tidal volume. Balloon blowing provides subjective benefits, such as reducing shortness of breath, anxiety, and tension caused by tightness (Tarigan & Juliandi, 2018).

CONCLUSIONS

The characteristics of respondents based on gender show that the majority of respondents are female, with the youngest age being 23 years old and the oldest age being 73 years old. In the characteristics of education, it was found that the majority of respondents had a high school education. Measurement of oxygen saturation in COPD patients after being given the intervention shows an increase in oxygen saturation, which indicates a positive effect of using the balloon blowing technique on oxygen saturation in COPD patients with a p-value of 0.000. Balloon blowing technique is proven to be effective in helping lung expansion, so as to increase oxygen supply and remove carbon dioxide trapped in the lungs in patients with impaired respiratory function. Balloon blowing exercise can be an effective nursing intervention to improve oxygen saturation in patients with COPD. Based on the results of this study, it is hoped that nurses can improve their knowledge and skills regarding pulmonary rehabilitation, especially in learning and applying the blowing balloon exercise technique more deeply and thoroughly. In its implementation, the researcher recommends that blowing balloon exercises be carried out on patients whose conditions are already stable.

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