



Balloon Therapy to Reduce Shortness of Breath in Chronic Obstructive Lung Disease Patients

Khoiriyah¹, Farida Adi Rahayu², Tri Nur Hidayati³, Arief Shofyan Baidhowy⁴

^{1,3,4} Nursing Program Universitas Muhammadiyah Semarang

² Muhammadiyah Temanggung Hospital

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ABSTRACT

Blow the Balloon make lung expansion improve intercostal muscles. This process help patient COPD remove trapped carbon dioxide in the lungs. Management of COPD requires comprehensive treatment, both pharmacologically and non-pharmacologically. Balloon therapy is a non-pharmacological therapy to reduce shortness of breath. The purpose of this study is to analyze the effect of balloon therapy on reducing shortness of breath in COPD patients at PKU Muhammadiyah Temanggung Hospital. The design was used Quasi-experiment research type one group pre-test post-test without control group with 36 respondents used a simple random sampling technique. Measurement of the degree of shortness of breath using the Modified Medical Research Council Scale questionnaire. Balloon therapy intervention was carried out using breathing exercises by blowing a balloon until the balloon inflated with a diameter of 7 inches about 5 times per day for 14 days. The statistical test used the Wilcoxon signed-rank test. The results showed there was a decrease in shortness of breath in COPD patients before and after being given balloon therapy intervention. The average measurement result of the degree of shortness of breath on the first day was around 2.50, while on the 7th day it was 1.89, and on the 14th day of measurement, the average degree of shortness of breath was 1.06. There is an effect of balloon therapy in reducing shortness of breath in COPD patients in the pulmonary poly ward of PKU Muhammadiyah Temanggung Hospital with a p-value of 0.000 ($p < 0.005$). Nurses are expected to provide education about balloon therapy to reduce the degree of COPD shortness of breath. The results of this study show that balloon therapy is effective in reducing shortness of breath in COPD patients

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Kata kunci:

Terapi balon
Sesak Nafas
PPOK

**) corresponding author*

Khoiriyah

Basic Nursing Department, Faculty of
Nursing Science and health, Universitas
Muhammadiyah Semarang

Email: khoiriyah@unimus.ac.id

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ABSTRAK

Meniup Balon membuat ekspansi paru-paru meningkatkan otot interkostal. Proses ini membantu pasien PPOK mengeluarkan karbon dioksida yang terperangkap di paru-paru. Penatalaksanaan PPOK memerlukan penanganan yang komprehensif, baik secara farmakologis maupun nonfarmakologis. Terapi balon merupakan terapi nonfarmakologis untuk mengurangi sesak napas. Tujuan penelitian ini adalah menganalisis pengaruh terapi balon terhadap penurunan sesak napas pada pasien PPOK di RS PKU Muhammadiyah Temanggung. Rancangan penelitian yang digunakan adalah *Quasi-experiment one group pre-test post-test* tanpa kelompok kontrol dengan 36 responden menggunakan teknik simple random sampling. Pengukuran derajat sesak napas menggunakan kuesioner *Modified Medical Research Council Scale*. Intervensi terapi balon dilakukan dengan menggunakan latihan pernapasan dengan cara meniup balon hingga balon yang berdiameter 7 inci sebanyak 5 kali per hari selama 14 hari. Uji statistik menggunakan uji Wilcoxon. Hasil penelitian menunjukkan

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terdapat penurunan sesak napas pada pasien PPOK sebelum dan sesudah diberikan intervensi terapi balon. Hasil pengukuran rata-rata derajat sesak nafas pada hari pertama adalah sekitar 2,50 pada hari ke-7 sebesar 1,89 dan pada pengukuran hari ke-14 didapatkan rata-rata derajat sesak nafas sebesar 1,06. Ada pengaruh terapi balon dalam menurunkan sesak napas pada pasien PPOK di poli paru RS PKU Muhammadiyah Temanggung dengan p-value 0,000 ($p < 0,005$). Perawat diharapkan memberikan edukasi tentang terapi balon untuk menurunkan derajat sesak nafas PPOK. Hasil penelitian ini menunjukkan bahwa terapi balon efektif dalam mengurangi sesak napas pada pasien PPOK



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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a disease with airway limitation that is not fully reversible. The airway limitation is very progressive which is closely related to the inflammatory response due to noxious substances or gases. Characteristics of airflow limitation in COPD are caused by a combination of small airways (obstructive bronchiolitis) and parenchymal damage (emphysema) that varies in individuals (GOLD, 2016). The most common symptom in COPD is a chronic cough, accompanied by sputum production and shortness of breath (Vogelmeier et al., 2017)

The impact of COPD on each individual varies depending on the degree of shortness of breath, decreased exercise capacity, systemic effects, and other comorbid symptoms. This is influenced by the degree of airflow limitation as well. Airflow limitation results in decreased physical activity in daily life due to airway obstruction conditions continuously. This can cause reduced muscle function, causing shortness of breath (Francisco, 2013) These pathologies can lead to severe hypoxemia with near-normal arterial carbon dioxide levels due to ventilation/perfusion (V/Q) mismatch and unventilated pulmonary units. Inability to exchange gas often mimics classic ARDS as the disease progresses.

The prevalence of COPD in Indonesia is estimated to increase, one of which is caused by a large number of smokers in Indonesia (Kusumawardani et al., 2017). According to the data of Basic Health Research Data (RISKESDAS) in 2017 that the incidence of COPD in Indonesia shows the figure of 3.72%. Based on data from the health profile of the province of Central Java with COPD in 2015 as many as 12,115 people, in 2016 there were 15,250 people, in 2017 15,455 people (Ministry of Health RI Agency for Research and Development, 2018). Data on the prevalence of COPD patients in Temanggung district currently occupying the highest score is in Parakan sub-district with 90 people out of the total number of COPD sufferers in Temanggung district (Temanggung District Health Office).

The management of COPD requires significant medical treatment, both pharmacologically and non-pharmacologically. Pharmacological management uses several drugs such as bronchodilators, anti-inflammatory drugs, antibiotics, mucolytics, and antitussives. Bronchodilators aid the airways open and can reduce secretions and have a rapid effect but if used over a long period caused harmful effects for the patient (Angeline A, 2017). Non-pharmacological management of COPD is with simple inhalation, effective coughing, chest physiotherapy,

diaphragmatic breathing, and balloon therapy (Vogelmeier et al., 2017)

COPD recurrence complaints of such as shortness of breath need an innovative intervention. Balloon therapy is a non-pharmacological therapy performed on COPD patients. Balloon therapy is an exercise technique to reduce and control shortness of breath. Balloon therapy is a therapy with a balloon blowing technique to help the intercostal muscles using balloon therapy is very effective because of the economic cost it can improve the patient's respiratory status and can reduce drug use or reduce dosage (Angeline A, 2017) This allows it to absorb oxygen, convert gases that are still in the lungs and expel carbon dioxide in the lungs. Blowing balloons is very effective in helping the expansion of the lungs so that they can supply oxygen and remove carbon dioxide trapped in the lungs in COPD patients (Goleman, daniel; boyatzis, Richard; Mckee, 2019) Specifically, this technique can improve lung development more optimally and prevent respiratory muscle fatigue, so that COPD sufferers can achieve more controlled, efficient ventilation and reduce workload (S. Smeltzer, Bare, Hinkle, & Cheever, 2015).

A study conducted by Renuka, et al (2015) of 20 respondents as a control group who were given a balloon blowing intervention for 14 days showed normal dyspnea scores and normal lung capacity. There was a significant increase in respiratory rate ($p < 0.001$), dyspnea score ($p < 0.001$), and lung capacity ($p < 0.00$) (Angeline A, 2017) While research conducted by Tunik, et al (2017) concluded that after the breathing relaxation intervention with the balloon blowing technique there was an increase in pulse frequency and respiratory frequency. (Goleman, daniel; boyatzis, Richard; Mckee, 2019) A study conducted by Kim Jin Seop et al (2012) of 15 respondents as a control group who was given an intervention by blowing a balloon for 8 weeks can increase Vital Capacity (VC), Expiratory Residual Volume (ERV), Inspiratory Residual Volume (Irv), Forced Vital Capacity (FVC), Force Expiration Volume (FEV1) and Peak Expiratory Flow (PEF) were significantly compared with the control group. This study concluded that blowing a balloon is an effective ability for the lungs to take in and exhale air in the lungs. During exercise, the alveoli will release CO₂ trapped in the lungs during exhalation and enter O₂ in the blood during inhalation (Kim & Lee, 2012) This is in line with Raju's theory (2015) that balloon blowing exercises can prevent shortness of breath and muscle weakness due to the presence of oxygen entering the body to provide energy to cells and muscles when removing carbon dioxide (Junaidin et al., 2019)

A preliminary study was conducted at PKU Muhammadiyah Temanggung Hospital from the last 3 months of data based on the number of reports in 2019, from July to October 2019 the number of outpatient COPD patients at PKU Muhammadiyah Temanggung Hospital was 40 cases. Several non-pharmacological treatments for COPD patients have been given deep breathing exercises, chest and back physiotherapy, appointment techniques, and postural drainage, while balloon therapy has not been optimal. In Patients with COPD".

METHOD

The type of research was Quasi-experimental one-group pre-test post-test without a control group. The population in this study were all Obstructive Pulmonary Disease Patients at PKU Muhammadiyah Hospital Temanggung. The sample of the study was 36 respondents using a simple random sampling technique. PKU Muhammadiyah Temanggung Hospital. Measurement of the degree of shortness of breath using the Modified Medical Research Council Scale (MMRC)

questionnaire. It contains of five parameter from easy to breath to difficult to breath Balloon therapy intervention was carried out using breathing exercises by blowing a balloon until the balloon inflated with a diameter of 7 inches about 5 times per day for 14 days. Inhale maximally through the nose (3-4 seconds), hold for 2-3 seconds then blow into the balloon maximally for 5-8 seconds (balloon inflates). The respondent gave 2 balloons. Measurements were made on day one, day 7, and day 14 during treatment. The research process took place from 12 February 2020-29 March 2020. The data were analyzed using the Wilcoxon signed-rank test

RESULTS AND DISCUSSION

Characteristics of respondents in the age distribution of respondents, the average age is 58.89 years. Most of them are male with a history of elementary school education, type of work as farmers, active smokers, and classified as moderate COPD. The average respondent suffers from COPD for 4.5 years.

Table 1. Distribution of respondent characteristics based on gender, education, occupation, smoking status and type of COPD at PKU Muhammadiyah Temanggung Hospital February 2020 (n=36)

Characteristics	Frequency (f)	Presentation (%)
Gender		
1) Male	27	75
2) Woman	9	25
Education		
1) Didn't finish school	4	11.1
2) Elementary school	14	38.9
3) Junior high school	7	19.4
4) Senior high school	4	11.1
5) College	7	19.4
Smoker status		
1) Active smoker	22	61.1
2) Passive smoker	2	5.6
3) Not a smoker	9	25
4) Ever smoked	3	8.3

Based on the data from table 2, it is known that the degree of shortness of breath before being given balloon therapy on average respondents on a scale of 2.50 based on the MMRC scale or the degree of moderate shortness of breath. The degree of shortness of breath after the intervention of balloon therapy on the 7th day, the average data on the respondent's shortness of breath scale was 1.89 and decreased in the measurement of the degree of

shortness of breath on the 14th day with an average of 1.06, the lowest shortness of breath scale was 0 or concluded not shortness of breath and the scale The highest after the intervention was worth 2 or the degree of shortness of breath was moderate.

Table 2. Distribution of the degree of shortness of breath before and after administration balloon therapy intervention at PKU Muhammadiyah Temanggung Hospital February 2020 (n=36)

Indicator	Mean	SD	minimum	maximum
MMRC scale 1st day (pre test)	2.50	.655	1	4
MMRC scale 7th day	1.89	.708	1	3
MMRC scale 14th day (post test)	1.06	.715	0	2

Based on table 3, it is known that there is an effect of balloon therapy to reduce the degree of shortness of breath in COPD patients between before the intervention and after the intervention. The analysis obtained from the data above is that 30 respondents experienced a decrease in shortness of breath after balloon therapy intervention, 6 respondents remained breathless after balloon therapy intervention.

Wilcoxon statistical test obtained a significance value of 0.000 ($p < 0.05$), then H_a was accepted, meaning that there was a significant effect of balloon therapy on reducing shortness of breath in COPD patients in the Pulmonary Poly ward of PKU Muhammadiyah Temanggung Hospital.

Table 3. Effect of balloon therapy to reduce shortness of breath in COPD patients at PKU Muhammadiyah Temanggung Hospital February 2020 (n=36)

Indicator	Mean	SD	P Value*
MMRC scale 1st day (pre test)	2.50	.655	0.000
MMRC scale 7th day	1.89	.708	

*P value<0.05 based on Wilcoxon Signed Rank Test

DISCUSSION

Chronic Obstructive Pulmonary Disease (COPD) is a disease characterized by a slowing of airflow that is irreversible and partially reversible, this airflow limitation is progressive that caused by the inflammatory response of the lungs (PDPI, 2016) The more severe the respondent suffers from COPD, the greater possibility of lung damage, and more subjective complaints are felt like shortness of breath. After balloon therapy, there was a significant improvement in respiratory status measured using the shortness of breath scale with the MMRC scale.

Balloon therapy is done to reduce respiratory rate, shortness of breath, increase the tidal volume and oxygen saturation during the rest. Balloon therapy improves expiration by increasing the expiratory phase and preventing airway prolapse (Angeline A, 2017) The improvement in the patient's respiratory function, it is expected that shortness of breath in the patient will be reduced. This simple and cost-effective intervention will be considered as an alternative measure as well to improve lung function among patients with respiratory distress.

Based on GOLD 2016 the parameters used for shortness of breath are from the Modified Medical Research Council For Dyspnea (MMRC) because it can estimate the likelihood of survival among COPD patients. Shortness of breath based on scores from the Modified Medical Research Council for Dyspnea (MMRC) scale was carried out by interviewing and filling out a questionnaire. Blowing balloons is very effective in helping the expansion of the lungs so that they can supply oxygen and remove CO trapped in the lungs in COPD patients. Specifically, this technique can improve lung development more optimally and prevent respiratory muscle fatigue, so that COPD sufferers can achieve more controlled, efficient ventilation and reduce workload (Angeline A, 2017).

Based on this study, the data showed there was an effect of decreasing shortness of breath in COPD patients after being given a balloon intervention with a significance value of 0.000 ($p < 0.05$). Balloon therapy is a therapy with a balloon blowing technique to help the intercostal muscles elevate the diaphragm and costa muscles. According to the research results, the technique of using balloon therapy is very effective because it can improve the patient's respiratory status and can reduce the use of drugs or reduce doses through a very economical cost. It is Possible to absorb oxygen, convert gases that are still in the lungs and expel carbon dioxide in the lungs.

The results of this study are the same as the previous study conducted by Kim Jin (2012), the results of his research showed that the lung function of the balloon-blowing training group increased significantly compared to the non-training group, indicating that balloon-blowing training had a positive effect on improving function. lungs of smokers (Kim & Lee, 2012). Therapeutic exercise in the form of balloon therapy can improve optimal posture (position of the diaphragm and lumbar spine) and neuromuscular control of the inner abdomen, diaphragm, and pelvic floor (lumbar-pelvic stabilization). Balloon therapy is designed to improve

breathing and improve posture and stabilization to improve function to reduce pain (Cecily et al., 2015)

CONCLUSION

Nurses have an important role in patients who experience shortness of breath, one of the interventions to reduce it is the use of balloon therapy. There is an effect of decreasing shortness of breath before and after giving balloon therapy intervention in COPD patients. that balloon therapy is very effective in reducing shortness of breath in COPD patients

SUGGESTION

Further research is expected to improve the application of balloon therapy to reduce shortness of breath in COPD patients and also it can combine balloon therapy with other intervention breathing therapy to access the effectiveness of therapy.

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