

Literature Review: Benefits of Balloon Blowing Breathing Exercises on Lung function in Asthma Patients

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ABSTRACT

Chronic inflammation that occurs in asthmatic patients results in recurrent episodic symptoms such as shortness of breath, chest tightness, coughing, and wheezing breath sounds. This indicates that there is impaired lung function which can be seen from the results of the Peak Expiratory Flow (APE) examination. The purpose of compiling a literature review is to analyze the benefits of breathing exercise therapy using the balloon blowing technique on lung function in asthma patients. The method used in this literature study is the PICOS framework. Article searches were carried out using the science database from Science Direct, Pub Med and Google Scholar. The keywords used are breathing exercises, Balloon Blowing and asthma or asthma. Results have been literature found 7 articles analyzed. A total of 5 articles discussed the effect of breathing exercises using the balloon blowing technique on lung function, namely in terms of Peak Expiratory Flow (APE) values and 2 journals discussed the effect of balloon blowing on improving clinical symptoms, namely shortness of breath and increased oxygen saturation. Based on the results of the literature review, it can be concluded that the Balloon Blowing breathing exercise can be applied to asthma patients. This exercise, when performed according to correct and regular procedures, can improve lung function which can be seen from several indicators, namely increasing Peak Expiratory Flow (APE), oxygen saturation and decreasing complaints of shortness of breath.

Keywords: Breathing exercises, balloon blowing and asthma

INTRODUCTION

Bronchial asthma is a chronic inflammatory condition that occurs in the respiratory tract, causing hyperresponsiveness. This condition results in recurrent episodic symptoms with clinical symptoms such as shortness of breath, chest tightness, coughing, and wheezing or wheezing which mainly appears at night. Shortness of breath or dyspnea is a condition where it is difficult to breathe with complaints of shortness of breath or the patient feels suffocated (Laksana & Berawi, 2015).

One way to identify the severity of an asthma disorder is to perform a lung function test by examining the Forced Peak Expiratory Flow (APE). The APE value can be obtained by checking techniques using a Peak Expiratory Flow Meter (PEF meter). Measurement of the first second forced expiratory volume (VEP1) and forced vital capacity (FVC) was performed by forced expiratory maneuvers through standard operating procedures. Pulmonary function test results in asthmatic patients can detect airway obstruction if the value of the VEP1 ratio (first second forced expiratory volume or forced vital capacity (FVC) is $<75\%$ or $VEP1 <80\%$ predicted value) (Akbar Nur et al., 2019).

The prevalence of asthma tends to increase every year. In 2020, it is known that 40.7% of adult patients aged 18 years and older have had more than one asthma attack in the last year. According to CDC data, there has been a significant increase in asthma cases starting from 2001-2020. In America it is known that on average there are 10 asthma patients who die every day. In 2021 in America it is also known that there were 3,517 asthma patients who died (Asthma and Allergy Foundation of America, 2022). The prevalence of asthma according to the 2018 RISKESDAS shows that the highest prevalence of asthma is in the Yogyakarta Special Region of 4.5% with the average majority of asthma sufferers living in urban areas of 2.6%. Asthma recurrence occurred in Indonesia, mostly in Aceh Province, which was 68.9%. (Balitbangkes RI, 2018).

Asthma is often not detected properly, so it can disrupt the patient's daily activities in living his life. Asthma patients who are not well controlled can cause sleep disturbances, difficulty concentrating and fatigue in carrying out their activities. In a state of exacerbation and not getting fast and proper treatment, asthma patients can experience death. Various symptoms that appear in asthmatic patients occur due to the pathophysiological mechanism of asthma, namely the mechanism of chronic inflammation.

Chronic inflammatory disorders that occur in the respiratory tract of asthmatic patients can result in the induction of several inflammatory cells such as mast cells, eosinophils, T lymphocyte cells, macrophages, neutrophils and epithelial cells. This condition results in bronchoconstriction, microvascular leakage, edema, mucus hypersecretion and reflex stimulation of nerves. Asthma trigger factors cause the sensitization phase, Ig E antibodies increase. So that the allergen binds to Ig E antibodies by attaching itself to mast cells. The content of neutral trypase in mast cells results in proteolytic activity, namely by activating complement, forming kinins and breaking down fibrinogen resulting in the release of various mediators. Some of the mediators released are histamine, leukotriene, eosinophil chemotactic factor and bradykinin which cause bronchoconstriction. This situation results in a local edematous effect on the bronchiolar walls, as well as bronchiolar smooth muscle spasm (Rizki et al., 2015). This mechanism results in clinical symptoms such as shortness of breath, heavy chest, wheezing and coughing. The severity of the asthma disorder can also be determined by assessing the peak forced expiratory flow (APE). Assessment of the first second forced expiratory volume

(VEP1) and forced vital capacity (FVC) can also be taken into consideration in providing and evaluating the management of asthmatic patients.

Long term in the management of asthma patients is case management to improve and maintain quality of life so that asthma patients can carry out their daily activities normally. There are several things that can be done by health workers in helping patients control asthma, namely: Education, asthma medication and maintaining fitness (Kemenkes RI, 2018). In maintaining the fitness of asthma patients, light exercise and breathing control exercises are needed which can be done regularly. One of the breathing techniques that can be done by asthma patients is balloon blowing breathing exercises. Balloon blowing breathing exercise is a breathing relaxation technique by blowing a balloon. This breathing technique can help the intercostal muscles to elevate the diaphragm and rib muscles. So that the patient is able to increase the amount of oxygen that enters and excretes carbon dioxide more optimally. Blowing balloons is very effective in helping lung expiration so that it can supply oxygen and remove carbon dioxide trapped in the lungs in patients with impaired respiratory function. (Astriani et al., 2020).

Effective breathing exercises are expected to increase the fitness of asthma patients so that they can carry out normal life activities. The purpose of compiling a literature review study is to analyze the benefits of breathing exercise therapy using the balloon blowing technique on lung function in asthma patients.

METHOD

The method used in this literature study is the PICOS framework approach. A scientific review of the literature is carried out by analyzing, finding results by synthesizing research findings, and theory and practical application in the health care setting. Article searches were carried out using the science database from Science Direct, Pub Med and Google Scholar. The keywords used are breathing exercises, Balloon Blowing and asthma or asthma. Article inclusion criteria are articles with full text in English or Indonesian published in 2010-2023. The total number of articles obtained was screened according to the inclusion criteria as many as 7 articles, then further review was carried out.

Criteria	Inclusion	Exclusion
<i>Population</i>	Asthma patient	In asthma with complications of other diseases.
<i>Intervention</i>	Studies that examine balloon blowing breathing exercise interventions alone or with combination interventions	
<i>Comparison</i>	The control group is used as a comparison group from the intervention therapy that is carried out or the group that is only observed without being given intervention.	Has no exclusion criteria
<i>Outcomes</i>	Studies explaining the effect of the Balloon Blowing Breathing Technique on lung function.	The literature that discusses respiratory therapy is not the technique of balloon blowing.
<i>Study Design and Publication Type</i>	Case studies, Quasy-experimental studies, Pre-experimental studies and randomized control and trials	<i>Qualitative research, literature review, systematic review, dan cross sectional study.</i>
<i>Publication Years</i>	2010 and after	Before 2023
<i>Language</i>	English and Indonesian	Languages other than English and Indonesian

Table 1: PICOS Frame Work Literature Review: Benefits of Balloon Blowing Breathing Exercises on Lung function in Astma Patients

FINDING AND DISCUSSION

The results of the literature study obtained 7 articles discussing the effect of balloon blowing breathing techniques on asthma patients.

No.	Author	Title	Aim	Method	Results
1.	(Suwaryo et al., 2016)	Case Study: Balloon Blowing Therapy to reduce shortness of breath in asthma patients	To determine the effectiveness of giving balloon blowing therapy to asthma patients diagnosed with ineffective breathing patterns	descriptive observation with a case study approach. Subjects in this study were 3 patients with asthma aged 13-50 years, had asthma for more than 3 months, recurrence frequency ≤ 2 times/week and were willing to be respondents	The results of the case study found that the three patients gave a positive response and experienced decreased respiration. The average respiratory frequency of patients is 21-23x/minute with reduced shortness of breath. Conclusion: balloon blowing therapy is effective in stabilizing the respiratory frequency of asthmatic patients.
2.	(Sandi et al., 2022)	The Effectiveness of viewing balloon blowing in increasing the peak expiratory flow among asthma patients at the Makassar Lung Health Center	Analyzing the effectiveness of Balloon Blowing video on Peak Expiratory Flow (PEF)	quasi-experimental with pre and post-test design. There were 22 patients included as the study sample.	The results showed that there were differences in Peak Expiratory Flow (PEF) values before and after being given the Ballon Blowing video. In the statistical test, it is known that the p value is 0.001 so that it can be concluded that balloon blowing therapy or balloon blowing therapy increases the Peak Expiratory Flow (PEF) value.
3.	(Irfan et al., 2019)	Comparison of Buteyco breathing exercises and Blowing Balloons exercises on changes in peak expiration in	Comparing Buteyko breathing exercises with Blowing Balloons exercises on changes in peak expiratory flow in	quasi experimental method with pretest and posttest two groups. The research sample consisted of 70 respondent groups consisting of 2 groups, namely 35 respondents in the Buteyko breathing exercise group and 35 respondents in	there was no difference in the mean rank score of the asthma control test. on the Buteyko breathing exercise and the Blowing Balloons exercise $p = 0.21$. From the results of measuring the peak expiratory flow value, there is a significant difference with the value of $p = 0.00$ in the Buteyko breathing exercise and the Blowing Balloons exercise.

		asthmatic patients.	asthmatic patients	the Blowing Balloons exercise group using simple random sampling technique.	
4.	(Ihwan et al., 2022)	Balloons Blowing And Buteyko Exercises Against Peak Current Expiration Of Asthma Patients	Comparing Buteyko breathing exercises with Blowing Balloons exercises on changes in peak expiratory flow in asthmatic patients	quasi-experimental with pretest and post-test approach. The number of samples was 20 respondents who were divided into 2 groups. Buteyco and balloon blowing exercises were carried out 2 times per day for 2 weeks.	Statistical test results show that there is no significant difference between buteyco exercise and balloon blowing on the peak expiratory flow of asthma patients. However, it is known that there is a difference in the value of the peak expiratory flow in the pre posttest with nilap $p = 0.00$. This shows that the same exercise buteyco and balloon blowing can increase the peak expiratory flow in asthma patients.
5.	(Sumartini et al., 2020)	The Effect of Playing Blowing Balloon Therapy to Changes in Lung Function in Preschool Children (3–5 Years Old) with Asthma	Knowing the effectiveness of playing balloon blowing therapy on changes in lung function in preschool asthma patients 3-5 years.	<i>Quasy Experiment with pretest-posttest approach. The number of samples is 38 respondents.</i>	The results showed that playing therapy with balloon blowing was able to improve lung function, which could be seen by increasing the Peak Expiratory Flow (APE) value.
6.	(Pangesti & Dwi Kurniawan, 2022)	Effect of Balloon Blowing on oxygen saturation in children with bronchial asthma	Effect of Balloon Blowing on Oxygenation Status in Children with Bronchial Asthma	The research method used was a case study with a sample of 2 participants aged 9 and 5 years.	Based on the case study, it was shown that after balloon blowing therapy was carried out in children with bronchial asthma it was effective in reducing shortness of breath, reducing respiratory frequency to normal, overcoming wheezing and increasing oxygen saturation. There is an effect of balloon blowing technique therapy in pediatric patients with bronchial asthma on oxygenation status.

7.	(Royani, 2017)	Effect of playing therapy blowing balloons on changes in lung function in children with asthma at Siti Khodijah Islamic Hospital Palembang	Knowing the effect of playing activity therapy blowing balloons on changes in lung function in children with asthma at Siti Khodijah Islamic Hospital	The research design was pre-experimental with a one group pre-test and post-test research design. the number of samples is 30 respondents obtained by accidental sampling.	After balloon blowing therapy, the frequency distribution of respondents with good lung function was 18 respondents (60%) and 12 respondents (40%) with poor lung function. There is a difference between changes in lung function in children with asthma before balloon blowing therapy and after balloon blowing therapy at Siti Khodijah Islamic Hospital Palembang in 2015 with a p value = 0.000 <0.05.
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Table 2: Tabulated results of analysis of research articles Breathing technique with balloon blowing

1. Improved Peak Expiratory Flow (APE)

Breathing exercises with the balloon blowing technique which are carried out regularly can increase the efficiency of the respiratory system both diffusion, perfusion and ventilation. Lung capacity in someone who often does balloon blowing exercises will be greater when compared to people who don't do exercise. This is due to the effectiveness of the capillary bed in the lung parenchyma so that the area for diffusion becomes wider. Some of the benefits of blowing up balloons include improving lung function, relaxing the neuromuscular system so that it has an impact on increasing peak expiratory current (APE) and oxygen saturation. (Suwaryo et al., 2016). This is in accordance with the review of the article, based on the table of literature review results, it is known that there are 5 research results which prove that Balloon Blowing breathing exercises are able to improve respiratory function, which is seen in the results of Peak Expiratory Flow (APE) which tends to increase after being given exercise. The results of research conducted by Sandi, et al in 2022 found out that the results of the study showed differences in Peak Expiratory Flow (PEF) values before and after being given the Ballon Blowing video. In the statistical test, it is known that the p value is 0.001 so that it can be concluded that balloon blowing therapy or balloon blowing therapy increases the Peak Expiratory Flow (PEF) value. (Sandi et al., 2022).

The results of a study conducted by Ihwan, Anhar et al in 2022 found that balloon blowing breathing exercises were statistically and clinically proven to increase peak expiratory currents in asthmatic patients with a value of $p = 0.00$ ($p < 0.05$). Balloon blowing breathing exercise that is done regularly can improve lung capacity. Balloon blowing exercises help to maximize the intercostal muscles and diaphragm when carrying out the inspiratory and expiratory phases of breathing because oxygen can be absorbed maximally and chemicals and carbon dioxide are also maximally released. Balloon blowing exercise is a very effective exercise in developing the lungs. During the process of inspiration, the alveoli are able to function properly because there is a large supply of oxygen. And during the expiration process the intercostal muscles and diaphragm work very optimally so that a lot of carbon dioxide is released (Ihwan et al., 2022).

2. Shortness of breath symptom improvement

The results of research conducted by Suwaryo et al, in 2016 found that balloon blowing breathing exercises were able to improve clinical symptoms in asthma patients in the form of shortness of breath and increased respiratory frequency. Balloon blowing breathing technique can reduce clinical symptoms and improve the severity of asthma. This technique is useful for minimizing the use of pharmacological therapy and improving lung function so that it can help asthma patients control their breathing by increasing the strength of the respiratory muscles and the flexibility of the chest cavity so that lung function improves. This will have an impact on reducing symptoms of shortness of breath in asthma patients (Suwaryo et al., 2016).

Balloon Blowing breathing exercises are performed to reduce breathing rate, symptoms of shortness of breath and increase tidal volume and oxygen saturation. This therapy is very good during the expiratory phase because it can improve the expiratory phase and prevent airway prolapse. With the improvement of respiratory function, it is expected that complaints of shortness of breath in patients will be reduced. Balloon blowing breathing intervention can be used as an alternative measure to improve lung function in patients with respiratory disorders (Khoiriyah et al., 2022).

CONCLUSION

Balloon blowing breathing exercise is a breathing control technique that can be applied to patients with respiratory problems, one of which is asthma. This exercise, when performed according to correct and regular procedures, can improve lung function which can be seen from several indicators, namely increasing Peak Expiratory Flow (APE), oxygen saturation and decreasing complaints of shortness of breath.

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