

THE EFFECTIVENESS OF VIEWING A BALLOON-BLOWING VIDEO IN INCREASING THE PEAK EXPIRATORY FLOW AMONG ASTHMA PATIENTS AT THE MAKASSAR LUNG HEALTH CENTER

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ABSTRACT

Asthma is one of the deadliest diseases in Indonesia of its prevalence continues to increase and influence the country's economic burden. Appropriate intervention is needed to prevent a recurrence. This study aims to analyse the effectiveness of Balloon Blowing video (BB) on the Peak Expiratory Flow (PEF) of asthmatic patients at the Makassar Lung Health Centre. This research was done quantitatively using quasi-experimental design approach, as well as gone pre and post-test group, namely the Balloon Blowing Group. The sampling technique was Consecutive Sampling with a total of 22 samples that met the inclusion criteria. Before conducting Balloon Blowing exercise, the researchers measured Peak Expiratory Flow value using a Peak Flow Meter (PFM). Balloon Blowing intervention was then given five times a week for two weeks according to the video guidelines. Data analysis using the Wilcoxon test showed that there was a significant difference in the Peak Expiratory Flow value before and after the Balloon Blowing intervention ($p = 0.001$, $p < 0.05$). Thus, Balloon Blowing exercise is effective in increasing the Peak Expiratory Flow value in asthmatic patients.

Keywords: *Asthma, Blowing Balloon, Peak Expiratory Flow*

INTRODUCTION

Asthma is a non-communicable disease (NCD). The prevalence of NCD increased from 2013-2018 by 34% and asthma became the most prevalent NCD in Indonesia. Data shows that 4.5% of the population suffers from asthma with a cumulative number of cases of 11,179,032 patients (Kompas, 2019). The number of these cases could be greater considering that asthma is an underdiagnosed disease. Research by the National Health Interview Survey found that untreated asthma causes death. In Indonesia, asthma is the eighth leading cause of death and the prevalence of symptoms jumped from 4.2% to 5.4%

(Hardina & Wulandari, 2019). A survey by the Health Research and Development Agency shows that the increase in the number of asthmatics contributes to the economic burden of the Health Social Security Administration budget. This triggers the BPJS health deficit of Rp 28.5 trillion at the end of 2019, hence it becomes an economic burden and a serious problem (Kompas, 2019). To avoid an increase in morbidity or mortality, many intervention programs aiming to improve airway function in asthmatic patients were carried out. To be more specific, the recurrence was prevented with pharmacological and non-pharmacological therapies. One of the non-pharmacological therapies is breathing exercises.

There are many relaxation breathing techniques to help the intercostal muscles and diaphragm muscles absorb oxygen into the lungs and expel carbon dioxide. One of the breathing relaxation techniques is Blowing Balloon which is considered effective in helping lung expansion increasing oxygen and removing carbon dioxide trapped in the lungs (Josphine, 2018; Kizilcik et al., 2021; Sreedevi, 2016). Balloon-Blowing exercise is done by exhaling air into the balloon. Therefore, the elasticity strength of the rubber increases, resulting in more resistance in the abdominal muscles such as the rectus abdominal and transverse muscles. Expiratory muscles and abdominal muscles become more active as the volume of the balloon increases. Thus, it can give the lungs an effective ability to take O₂ and exhale CO₂ from the lungs.

Effective Balloon-Blowing exercises was given once a day, five times a week, for two weeks, with the duration of 15 for each exercise. This technique is very simple, easy to do, and low-cost. The tools are easy to obtain but proven effective in increasing lung volume capacity, not only in asthma but also in chronic lung disease (Josphine, 2018).

Blowing Balloon can increase the value of the patient's Peak Expiratory Flow (PEF), due to an increase in PEF to deficit or airway obstruction improvement. The exercises are packaged in the form of interesting videos so that patients can independently access it anytime and anywhere via mobile phones and become a solution for patients to improve their ability to prevent recurrences independently at home. The current digital and technological era also certainly supports public's knowledge and skills development on the use of technology to increase their comprehension about asthma non-pharmacology management. Despite the effectiveness of balloon-blowing videos in improving the patient's respiratory function, outpatients at the Makassar Lung Health Centre have not been taught about it yet.

It is hence expected that the results of this study could be a therapeutic intervention for nurses, in line with the standards of Indonesian nursing interventions to manage nursing care in asthma patients. To sum up, the purpose of the study was to analyse the effectiveness of Balloon-blowing video on the Peak Expiratory Flow of asthma patients at Makassar Lung Health Centre.

METHOD

1) Setting and Respondents

Data from Makassar Lung Health Centre shows that the number of visits of asthma patients in outpatient department has increased. in 2021. Thus, the study was conducted at Makassar Lung Health Centre, one of the large lung health service facilities in Makassar. The population in this study was asthma patients at Makassar Lung Health Centre, with a total of 22 respondents, taken using consecutive sampling from February 25 to March 25, 2022. The respondents have met the inclusion criteria, namely: a) diagnosed with asthma by a doctor, b) had uncontrolled asthma, c) had not received Balloon-blowing intervention yet, d) were over 17 years old, e) felt disposed and be cooperative, e) had an android phone. Exclusion criteria were participants who did not attend the first intervention and had chronic diseases.

This research was done quantitatively using a quasi-experimental design approach, with one pre and post-test group, namely the Balloon-Blowing Group. Before the exercise was given, the Peak expiratory Flow measurement was first carried out using the Peak Flow

Meter. After that, respondents did the Balloon- Blowing exercise according to the guidelines in the video on Android phone. The 15-minute exercises were performed for ten days, with a frequency once a day. The tool utilized were latex balloon, The exercise began by inhale with nose for 3-4 seconds, hold for 2-3 seconds, exhale by blowing the balloon and close it with finger. If respondents got dizzy, then intervention stopped.

2) Variables

The dependent variable is the Peak Expiratory Flow (PEF). The PEF value can give an idea of airway obstruction as in asthma disease (Anisa & Mak'ruf, 2020; Olla & Azhar, 2021). To measure PEF, Peak Flow Meter or PFM (Olla & Azhar, 2021) is suitable. This PFM has been shown to be effectively used to objectively detect asthma and even chronic obstructive pulmonary disease (Thorat et al., 2017). The results of the PEF measurement are interpreted with a traffic light zone system. It is green zone if the PEF value is 80% - 100% (good lung function). It is yellow zone if the value reaches 50 - 80% (airway narrowing) and it is red zone if the value is $\leq 50\%$ fibrous and there is an expansion of airway narrowing (Arnold

et al., 2020). To get the percentage of the PEF value measured divided by the predicted PEF value multiplied by 100.

The independent variable is Balloon-blowing. Blowing Balloon is a technique that can help the intercostal muscles relax the diaphragm muscles and costa until the lungs can supply oxygen normally and remove carbon dioxide trapped in the patient's lungs. It uses simple balloons that are commonly found in the community (Suharno et al., 2020; Suwaryo et al., 2021). Balloon-blowing exercises are delivered using videos containing systematic procedures in blowing balloons.

3) Data Analysis

Demographic characteristics are described as absolute values and percentages (n, %). Univariate analysis to identify PEF values of pre-Blowing Balloon and post Blowing Balloon depicted in absolute values and percentages (n, %). Bivariate analysis is used to animate the effectiveness of Blowing Balloon against PEF using the Wilcoxon Test. The results of the study were analysed using SPSS statistical software version 24. The Wilcoxon Test with a significance level of 95% (=

0.05) was used to assess the effectiveness of video-based Blowing Balloon against PEF.

This research was conducted after receiving a statement of Ethical Feasibility from the Health Research Ethics Committee of Manado Health Polytechnic Ministry of Health with the number KEPK.01/02/006/2022. During this study, researchers continued to pay attention to legal ethical principles such as autonomy, beneficence, justice, non-maleficence, and confidentiality.

RESULTS

Table 1. Demographic characteristics (n=22)

Characteristics	Blowing Balloon	
	n	%
Gender		
Male	6	27.3
Female	16	72.7
Age		
17 – 25	6	27.3
26 – 35	5	22.7
36 – 45	7	31.8
46 – 55	4	18.2
Body Mass Index (Kg/m ²)		
Underweight (<18.5 kg/m ²)	0	0
Normal (18 – 22.9 kg/m ²)	2	9.1
Overweight (23 – 24.9 kg/m ²)	15	68.2
Obesities (25.1 – 29.9 kg/m ²)	3	13.6
Obesities II (≥ 30 kg/m ²)	2	9.1
Employment		
Housewives	10	45.5
Self employed	4	18.2
Civil servants	1	4.5
Private employees	3	13.6
Labourer	4	18.2

According to Table 1, most of the respondents were women, with a total of 16 respondents (72.7%). Viewed from the age category, 7 respondents (31.8%) were around 36-45 years old.

As many as 15 respondents (68.2%) were considered overweight under BMI category, and 10 respondents (45,5%) were housewives.

Table 2. The Analysis of Peak Expiratory Flow in pre and post Balloon Blowing Intervention (n=22)

Traffic Light Zone	Blowing Balloons				p
	Pre		Post		
	n	%	n	%	
Red Zone	12	54.5	0	0.0	0.001
Yellow zone	10	45.5	13	59.1	
Green zone	0	0.0	9	40.9	

Table 2 shows the majority of respondents' PEF values before the Balloon-blowing intervention were in the red zone category; 12 respondents (54.5 %). and none of the respondents had PEF values in the green zone. However, after the intervention, respondents whose PEF value in the yellow zone were 13 (59.1%), and there were no more respondents with a PEF value in the red zone. The table also demonstrates a significant difference on respondents' PEF value before and after receiving Balloon-blowing intervention ($p = 0.001$) because the p -value was <0.05 .

DISCUSSION

The results showed that the intervention of balloon-blowing video was effective in increasing respondents' Peak Expiratory Flow value. This is also supported by the results that most of the respondents' PEF values were in yellow and green zone after obtaining the intervention. The PEF value in the yellow zone category means that airway narrowing has occurred, while the PEF value in the green zone category shows improved lung function.

These results are in line with the previous studies which also found that Balloon-Blowing intervention was very effective in controlling the recurrence of asthma patients, marked by an increase in PEF values (Kim, 2015). Balloon-Blowing intervention is said to be able to maintain the amount of air in the alveoli, so it can prevent collapse in the airway. This is because during the intervention, there will be excitation of the brain centre where the vasomotor centre in the brainstem will experience an increase in arterial pressure and an increase in pulmonary ventilation. This can increase the flexibility of the chest cavity, diaphragm, and train the expiratory muscles to extend exhalation and increase pressure airway during expiration there by

reducing the amount of air resistance in the lungs so that the PEF value can increase (Permana et al., 2021). Asthmatic patients are known to have difficulty in expelling air and have the CO² trapped in the lungs due to obstruction in the airway.

In addition, blowing air into the balloon increases the elastic strength of the rubber, resulting in more resistance in the abdominal muscles such as the rectus abdominis and transverse muscles. Expiratory muscles and abdominal muscles will become more active as the volume of the balloon increases. Therefore, the lungs can provide an effective ability to take in and exhale air from the lungs, and the alveoli will expel CO² trapped in the lungs during expiration and enter O² into the blood during inhalation (Kim, 2015). The intervention of Blowing Balloon was not only effective for asthmatic patients but also in those with COPD or Chronic Obstructive Pulmonary Disease (Jun et al., 2015). As it is known, COPD is a chronic lung disease that generally consists of a combination of two respiratory diseases, namely chronic bronchitis, and emphysema and this is certainly different from asthma.

Natural breathing exercises such as Blowing Balloon are intended to reduce clinical symptoms and asthma severity. In addition,

Blowing Balloon can help minimizing patients' dependence on drugs or other medical procedures, as well as improving asthma patients' quality of life. This exercise technique requires determination in training to get maximum results that can increase the efficiency of the respiratory system, both ventilation, diffusion and perfusion. The benefits of Blowing Balloon as an asthma intervention are increasing Peak Expiratory Flow values for the sufferers. The increase in Peak Expiratory Flow values, indicates that the lungs' ventilation and oxygenation are in good condition. Increased ventilation increases blood flow and interalveolar pressure, making gas exchange and diffusion processes more efficient.

This study only used one group with pre- and post-test research designs, and a small number of samples in order for further researchers to develop research designs and sample sizes.

CONCLUSION

Balloon- Blowing intervention was effective in increasing Peak Expiratory Flow or PEF among asthma patients at the Makassar Lung Health Centre, hence it can be a therapeutic intervention in nursing care for asthma patients.

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