



**APPLICATION OF EFFECTIVE CLAPPING AND COUGHING TECHNIQUES
POST NEBULIZATION TO OVERCOME AIRWAYS CLEARANCE IN ASTHMA
PATIENTS**

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ABSTRACT

Asthma is one of the main diseases that cause patients to require hospitalization. WHO records 235 million cases of asthma worldwide each year. In Indonesia, the number of asthma sufferers is 4.5% of the total population or 12 million. At Grha Permata Ibu Hospital, there are 113 asthma sufferers out of a total of 9,654 patients. Asthma causes the airways to narrow because they are blocked by mucus/phlegm. Therefore, appropriate treatment such as pharmacological management with nebulization therapy & non-pharmacological chest physiotherapy and effective coughing techniques are needed to clear the respiratory tract of obstructing phlegm. Objectives to determine the application of effective post-nebulization clapping & coughing techniques to overcome airway clearance in asthma sufferers. The type of research is quantitative descriptive. The methods used by the author are interviews, physical examinations, & observations. The instruments used are informed consent sheets, assessments, observations & questionnaires. Before the intervention, all respondents experienced problems with airway clearance with clinical shortness of breath, coughing and difficulty expelling phlegm. After the intervention, the results showed that the clapping technique & effective coughing post nebulization were able to reduce shortness of breath, as many as 66.6% of respondents said that shortness of breath was reduced, 33.3% of respondents said they were not short of breath and 73.3% of respondents were able to expel phlegm. Implementation of clapping and coughing techniques effectively after nebulization to overcome airway clearance in asthma sufferers.

Keywords: asthma; clapping technique; effective cough; nebulization

How to cite (in APA style)

Hendrawati, H., Wulandari, W., & Lestari, F. (2025). Application of Effective Clapping and Coughing Techniques Post Nebulization to Overcome Airways Clearance in Asthma Patients. *Indonesian Journal of Global Health Research*, 6(6), 4395-4402. <https://doi.org/10.37287/ijghr.v6i6.5835>.

INTRODUCTION

Asthma is a chronic disease that causes inflammation and narrowing of the airways (Rahmah & Pratiwi, 2020). Asthma can be suffered by all ages. Asthma symptoms that appear such as shortness of breath, Coughing, Wheezing, Chest pain due to excess mucus production (Rosfadilla & Tarigan, 2022). The incidence of asthma worldwide reached 262 million people in 2019. In various countries, the incidence of asthma ranges from 1-18%. In resource-rich countries, asthma is the most common chronic disease in children, affecting about 6.5% of children under 18 years of age (Muslina et al., 2022).

Asthma can occur due to the presence of allergens, such as dust, pollen, animal dander, or food (Dandan et al., 2022). Asthma can also occur due to exposure to air pollution, cigarette smoke, or chemicals, viral infections, such as respiratory tract infections (URTIs), cold weather, heavy physical activity, mental stress, undisciplined drug consumption, genetic factors, such as a tendency to develop allergies, asthma management avoids exposure to triggers, regular flu and pneumonia vaccinations, managing asthma with the right medication (Bronte Morenoa et al., 2023).

There are several types of asthma, including allergic asthma, non-allergic asthma, nocturnal asthma, eosinophilic asthma, and occupational asthma. The occurrence of allergic asthma can be caused by allergens such as pollen, dust mites, or pet dander. The second type of asthma is non-allergic asthma which can occur due to air pollution, humidity, mold, colds, flu, and chest infections. The third type of asthma is nocturnal asthma which occurs at night, and can be triggered by irritants in the air such as dust in the bedroom or pet dander. The fourth type of asthma is eosinophilic asthma which is asthma caused by too many eosinophil white blood cells gathering in the airways of the lungs. There is also occupational asthma which results in asthma relapses while working, and can be triggered by air pollution in the work environment. Other types of asthma are Asthma caused by aspirin, Cough variant asthma, Exercise-induced asthma, Steroid-resistant asthma (Suhartono et al., 2013).

Asthma problems occur in chronic conditions that affect the respiratory tract (Kustiono & M, 2019). Asthma causes the walls of the bronchial tubes to become swollen and inflamed. Although chronic asthma is also included in the category of acute asthma. If the condition is acute asthma, then it is mandatory to undergo serious medical treatment so that the treatment is appropriate (Yudhawati & Krisdanti, 2017). Asthma cannot be cured completely, but it can be controlled with proper treatment (Sutrisna & Rahmadani, 2022). Although asthma cannot be cured completely, people with asthma can live active and healthy lives. Uncontrolled asthma can cause complications that can lead to death (Mohammad & Brough, 2019). Asthma treatment can be done with asthma medication usually done with inhalers, nebulizers, or oral anti-inflammatory drugs, respiratory therapy can help improve lung function and prevent asthma attacks, doing yoga training can help relieve asthma symptoms and increase lung capacity and having a healthy lifestyle can help control asthma symptoms (Koesnoe, 2020).

If someone has asthma, they are usually advised to take medication from a doctor. Asthma medications include albuterol or salbutamol, which are effective asthma medications to treat acute asthma attacks, bronchodilators or short-acting beta agonists (SABAs) which function to relieve asthma symptoms quickly when they recur, and inhaled corticosteroids work as anti-inflammatories that provide protection against narrowing of the respiratory tract (Johnson et al., 2022). Asthma occurs due to the shrinking of the airways, swelling of the mucous membranes of the airways, and excessive mucus discharge. Nebulizer therapy is a therapy that uses a device to convert liquid medicine into inhaled vapor. The benefits of using a nebulizer in asthma patients are to relieve shortness of breath, thin phlegm, reduce inflammation in the respiratory tract, help treat respiratory infections, relieve asthma symptoms, such as coughing and wheezing. Although asthma sufferers have received nebulizer therapy, not all mucus will come out easily (Aslinda et al., 2023).

Several techniques have also been widely used to overcome mucus discharge such as drinking lots of water, drinking ginger and lemon water, drinking honey water, taking a warm bath, gargling with salt water, using essential oils, consuming mucus-thinning drugs and there are chest physiotherapy techniques (Hilton, 2004). Chest physiotherapy techniques include percussion, vibration, postural drainage, and effective coughing. These techniques help remove phlegm and mucus from the lungs. Clapping and effective coughing are part of the chest physiotherapy technique which is done by clapping hands and expelling phlegm to clear the airways (Nurhayati, 2022). Given the existing background, the purpose of this study is to analyze the application of post-nebulization clapping and effective coughing techniques to overcome airway clearance in asthma patients in the Emergency Room of Grha Permata Ibu Hospital, Depok.

METHOD

This research design is quantitative with a case study approach. A case study is a series of scientific activities that will be carried out intensively and in depth regarding a program, event and activity, both at the individual level, a group of people, an institution or an organization to gain in-depth knowledge about the event. Inclusion Criteria: Asthma patients with phlegm cough, Asthma patients with wheezing or rongki breath sounds, Asthma patients aged 15-80 years, Asthma patients with good SPO2 >90%, Patients who are willing to be respondents, All female and male patients. Exclusion Criteria: Asthma patients without cough, Asthma patients aged less than 15 years and over 80 years, Asthma patients without breathing sound problems, Patients with SPO2 <90%, Asthma patients with decreased consciousness, Patients who are not willing to be respondents. The population in this study was the entire number of patients who came to the Emergency Room of Graha Permata Ibu Hospital, Depok during the data collection phase totaling 117 people with various diseases, while the sample taken was the total sampling during the data collection phase of 15 people with Asthma.

The research instruments used are: Patient Assessment Sheet with interviews and physical examinations, Observation sheets, Questionnaire sheets, Informed Consent sheets. Data collection methods in this study include: Interviews, Observations, Physical Examination. This study uses descriptive analysis, which is a basic analysis that can help researchers summarize data sets and find patterns from certain data samples. Descriptive analysis describes the frequency of respondent characteristics grouped by age, gender and occupation. After the data is analyzed and the research results are obtained, for data calculation the author uses the univariate analysis formula: $P = F / N \times 100\%$ in percentage form. Data processing stages include: Editing, Coding, Data entry, namely Processing is an activity to create narratives or texts and Cleaning data, which is an activity to re-check what has been entered whether it is correct or there is an error when entering data.

RESULT

Tabel 1.

Respiratory data assessment table before and after intervention

Respiration Data	Frequency Before intervention		Frequency After intervention	
Respiration				
Shortness of breath	15	100	0	0
Shortness of breath reduced	0	0	10	66,6
No shortness of breath	0	0	5	33,3
Sputum Exposure				
Can	0	0	11	73,3
Cannot	15	100	4	26,6
Cough	15	100	15	100

Based on the table above before the action was taken, 100% of respondents said they were short of breath, coughing and could not expel sputum independently. After the clapping technique and effective coughing post-nebulization, there was an improvement in breathing patterns, with the results of respondents who said they were short of breath decreasing by 10 (66.6%) respondents and respondents who said they were not short of breath 5 (33.3%) respondents. Sputum output increased, respondents who could expel sputum were 11 people (73.3%) and there were 4 people (26.6%) who could not expel sputum. Coughing is still an unresolved health problem.

Table 2.

The data of respiratory frequency of asthma respondents in the Emergency Room

Respiration/minute	Frequency Before intervention	%	Frequency After intervention	%
20 – 25 times	4	26,6	13	86,7
26 – 30 times	10	66,7	2	13,3
31 – 35 times	1	6,7	0	0

Based on the table above, the data on respiratory frequency before the action was 31-35 times/minute, namely 1 person (6.7%), respiratory frequency 26-30 times/minute as many as 10 (66.7%) and respiratory frequency 20-25 times/minute as many as 4 people (26.6%). After the clapping technique and effective coughing post-nebulization were carried out, the results of respiration 20-25 times/minute increased to 13 people (86.7%) and the respiratory frequency 26-30 times/minute became 2 people (13.3%) while the respiratory frequency 31 - 35x/minute was no longer there.

Table 3.

of Breath Sound Data before and after intervention

Breath Sound	Before intervention	%	After intervention	%	Information
Wheezing + Ronchi	5	33,3	1	6,6	Wheezing breath sound + decreased ronchi
Wheezing	8	53,3	12	80	Vesicular breath sounds - decreased wheezing
Ronchi	2	13,3	2	13,3	Decreased rhonchi breath sounds

Based on the table above, the data before the intervention, the respondents' breath sounds that sounded wheezing + rhonchi were 5 people (33.3%). Respondents with wheezing breath sounds were 8 people (53.3%) and with rhonchi breath sounds were 2 people (13.3%). After the clapping technique and effective coughing post-nebulization, the results obtained were respondents with wheezing + rhonchi breath sounds became 1 person (6.6%), wheezing breath sounds increased by 12 people (80%) this happened because there was an improvement in the respondents' breathing pattern from wheezing + rhonchi breath sounds to wheezing only, and there was no change in breath sounds in respondents with rhonchi breath sounds, namely 2 people 13.3%.

DISCUSSION

Respondents with mild asthma were 11 people (73.3%) and moderate asthma were 4 people (26.7%). Mild asthma was evidenced by respondents' clinical condition in good general condition, reduced shortness of breath (minimal), respiratory rate 20-22 times/minute, able to cough effectively, and able to produce sputum. Moderate asthma was evidenced by moderate general condition, patients were still in shortness of breath, respiratory rate 24-26 times/minute, able to cough effectively, and able to produce sputum. From the results of the study on 15 respondents, it was found that 7 respondents had asthma with a history of bronchopneumonia, 1 respondent had asthma with a history of COPD, 1 respondent had asthma with a history of bronchitis, and 5 respondents with asthma alone. According to Kyung & Jeong, (2020) someone who has problems with their lungs has a higher risk of this disorder. This is because the lungs have previously experienced damage to the tissue in them.

Respondents with asthma who experienced bronchopneumonia were caused by having consumed drugs containing corticosteroids for a long time which can increase the risk of developing bronchopneumonia or other respiratory infections that can be dangerous for the lungs. Before the procedure, 100% said they were short of breath, coughing and could not expel sputum independently. After the clapping technique and effective coughing post-nebulization, there was an improvement in breathing patterns, with the results of respondents who said they were short of breath decreasing by 10 (66.6%) respondents and respondents

who said they were not short of breath 5 (33.3%) respondents. Sputum output increased, respondents who could expel sputum were 11 people (73.3%) and there were 4 people (26.6%) who could not expel sputum.

Coughing is still an unresolved health problem. According to Kyung & Jeong, (2020) clinical manifestations of asthma are shortness of breath, coughing with or without mucus, wheezing ronchi, and airway obstruction due to accumulation of secretions. Nebulization combined with clapping technique and effective coughing can reduce shortness of breath and remove more sputum than just nebulization. Clapping technique helps the flow of sputum to move from small segments to large segments with the help of gravity by patting and then making it easier for sputum to be removed with the help of coughing. The combination with effective coughing is a cough that is planned or trained in advance, with effective coughing respondents can save energy so that they do not get tired easily removing phlegm optimally (Kyung & Jeong, 2020).

Research Anggraini et al., (2022) stated that before the application of clapping and effective coughing, it was found that both subjects could not expel sputum, breath sounds were rhonchi. After clapping and effective coughing for 3 days, both subjects were able to expel sputum, breath sounds were still heard rhonchi, the characteristics of sputum became thin. Respiratory frequency of asthma respondents before and after intervention Based on the results of the study, the respiratory frequency data before the action was 31-35 times/minute, namely 1 person (6.7%), respiratory frequency of 26-30 times/minute as many as 10 (66.7%) and respiratory frequency of 20-25 times/minute as many as 4 people (26.6%). After the clapping technique and effective coughing post-nebulization were carried out, the results of respiration of 20-25 times/minute increased to 13 people (86.7%) and respiratory frequency of 26-30 times/minute to 2 people (13.3%).

Tamelia et al., (2023) said shortness of breath or dyspnea is a condition where a person lacks air so that their breathing rate becomes rapid, resulting in a feeling of tightness in the chest. The normal breathing rate for adults at rest is 16 to 20 times per minute. A breathing rate below 16 or more than 20 breaths per minute at rest is considered abnormal. The average breathing rate in adults increases with age and chest expansion tends to decrease due to chest wall stiffness (Pambudi, 2021). Non-pharmacological treatment of clapping and effective coughing techniques can reduce breathing frequency through inhalation therapy that loosens the respiratory tract and is then assisted by clapping techniques to move secretions that stick to the bronchi and expel phlegm through effective coughing so that the respondent's breathing is better. The author's research is in accordance with previous research Anggraini et al., (2022) on the Effectiveness of chest physiotherapy (clapping) in removing sputum and reducing breathing frequency. That the average breathing frequency before clapping was 45 times/minute and after clapping was 40 times/minute.

Another study conducted Zuriati et al., (2017) on effective coughing exercises showed that the patient's breathing frequency before implementation was 26 x/minute to 20 x/minute. Effective coughing exercises can reduce the patient's breathing frequency within the normal range, improve SPO₂, and increase phlegm excretion. Before the intervention, the respondents' breath sounds with wheezing + rhonchi were 5 people (33.3%). Respondents with wheezing breath sounds were 8 people (53.3%) and with rhonchi breath sounds were 2 people (13.3%). After the clapping technique and effective coughing post-nebulization, the results of respondents with wheezing + rhonchi breath sounds became 1 person (6.6%), wheezing breath sounds increased by 12 people (80%) this happened because there was an improvement in the respondents' breathing pattern from wheezing + rhonchi breath sounds to wheezing only.

Changes in breath sounds in respondents wheezing + rhonchi to only wheezing are caused by the administration of combivent inhalation therapy, where this therapy is the same as the research conducted Hulu et al., (2020) namely the administration of combivent inhalation therapy can widen the bronchial respiratory tract so that complaints of shortness of breath and breath sounds disappear. Another study Aslinda et al., (2023) stated that after post-nebulization using combivent there was an improvement in the respiratory pattern and the rhonchi sound disappeared. In the study, the author provides an illustration that once the clapping technique and effective coughing post-nebulization cannot overcome the problem of rhonchi breath sounds according to table. So it is necessary to plan long-term treatment so that asthma can be controlled and additional breath sounds can be overcome.

The treatment for asthma sufferers is the administration of inhalation therapy using a nebulizer. Inhalation is given to reduce symptoms of shortness of breath and additional breathing sounds. Drugs that form aerosols are inhaled and enter the respiratory tract, providing a bronchodilator effect that can overcome bronchospasm and reduce additional breath sounds due to the widening of the bronchial lumen. The author's research related to the administration of nebulization is in accordance with the theory Pratiwi & Chanif, (2021) which states that this inhalation therapy is chosen because the administration of inhalation therapy provides a bronchodilator effect or widens the bronchial lumen, phlegm becomes thin so that it is easier to remove, reduces bronchial hyperactivity and can overcome infections. The aerosol that is formed will be inhaled by the patient through a mouthpiece or mask and enters the lungs to thin the secretions (Yanti et al., 2020).

Further intervention with non-pharmacological therapy, clapping techniques and effective coughing helps widen the bronchial lumen through inhalation therapy that loosens the respiratory tract and is then assisted by the clapping technique to move secretions that stick to the bronchi and remove phlegm through effective coughing. The clapping technique is a pat on the back to drain secretions from various segments of the lungs, when the secretions have flowed into the larger airways, then the secretions are expelled through coughing. To facilitate the flow and removal of secretions from the lungs using gravity, so that shortness of breath decreases (Wedri et al., 2015). Effective coughing is done by sitting slightly bent over, asking the respondent to take a deep breath then hold and contract the abdominal muscles, exhale more forcefully and cough. This technique keeps the airway open when the sputum moves up and out of the lungs. Both techniques provide breathing changes in Bronchial Asthma, this is because both prevent sputum from moving back into the narrow airways (Samsi, 2018).

CONCLUSION

The results of the study showed that all respondents with breathing patterns and sputum output in the category of shortness of breath before the action was taken (100%), as well as coughing and unable to expel sputum independently. After the clapping technique and effective coughing post-nebulization, there was an improvement in breathing patterns, with the results of respondents who said they were short of breath decreasing by 10 (66.6%) respondents and those who said they were not short of breath 5 (33.3%) respondents. In sputum output there was an increase, respondents who could expel sputum were 11 people (73.3%) and there were 4 people (26.6%) who could not expel sputum. Asthma treatment with pharmacological therapy of inhalation was chosen because inhalation therapy provides a bronchodilation effect or widens the lumen of the bronchi, phlegm becomes thin so that it is easier to expel, reduces bronchial hyperactivity and can overcome infection. Combined with non-pharmacological therapy, clapping techniques and effective coughs can reduce shortness of breath and expel more sputum than just being given nebulization alone. The application of clapping techniques and effective coughing post nebulization can reduce the percentage of shortness of breath symptoms and respondents can expel sputum. Maximum results can be

applied according to research conducted on the application of chest physiotherapy and effective coughing carried out for 3 days with a frequency of exercise 2x a day. The results of the intervention can be used as a management of ineffective airway clearance with the criteria for airway patency results marked by normal breathing frequency, regular breathing rhythm, no additional breath sounds, patients are able to expel sputum.

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