

## Analysis of the application of buteyko breathing exercise to improvement of respiratory rate (RR) and oxygen saturation (SpO<sub>2</sub>) in asthma patients in the emergency room RSUP Dr. Kariadi

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### ABSTRACT

**Introduction:** Asthma is a chronic inflammatory disease of the respiratory tract characterized by coughing, shortness of breath, wheezing, and a feeling of heaviness in the chest, which is generally reversible both with and without treatment. Giving Buteyko breathing exercise action is more effective than before being given the action. **Objectives:** To analyze the application of Buteyko breathing exercises to improve respiratory rate (RR) and oxygen saturation (SpO<sub>2</sub>). **Methods:** Descriptive analysis in the form of case studies with total sampling based on inclusion and exclusion criteria of 3 patients under management. The Buteyko breathing exercise was applied, and vital signs were observed before and after the Buteyko breathing exercise. **Results:** Nursing problems are ineffective breathing patterns with Respiratory Rate (RR) > 26 x/minute, and two patients were found to have mild hypoxia with SpO<sub>2</sub> <95%. After applying the Buteyko breathing exercise, the three patients experienced an improvement in their condition with RR 18-20 x/minute and SpO<sub>2</sub> > 98%. The author describes the application of Buteyko breathing exercises to asthma patients, which improved the condition of RR and SpO<sub>2</sub>. They were supported by Lisavina's research (2019) on the difference between controlling asthma before and after implementing Buteyko breathing. **Conclusions:** The application of Buteyko breathing exercises in assessing improvement in respiratory rate (RR) and oxygen saturation (SpO<sub>2</sub>) did not harm patient conditions, hospital costs, time and effort, or infrastructure.

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## 1. Introduction

Asthma is a chronic inflammatory disease that usually infects the respiratory tract and can result in hyper-responsiveness of the airway, which is usually characterized by a recurrent episodic symptom in the form of coughing, shortness of breath, wheezing and heaviness in the chest, especially at night and early in the morning which is generally reversible both with and without treatment (Putra et al., 2018)—patients who come to the emergency room with nursing problems ineffective breathing patterns.

According to Kartikasari et al. (2020), the number of people living with asthma, according to WHO, is estimated to be 100-150 million worldwide. Kemenkes (2018) reported that 2.4 percent of Indonesians have asthma. Supported by the Central Java Health Office report (2019), people with asthma are 1.77 percent, which ranks first in Blora Regency at around 3.39 percent and followed by Magelang Regency at 3.24 percent. Data on asthma patients at RSUP Dr. Kariadi from January to August 2022 shows that 696 patients came to check both from the outpatient unit and the emergency department.

Based on the author's survey, the management of asthmatics in the emergency room of RSUP Dr. Kariadi Semarang, when patients come to the emergency room with complaints of

shortness of breath, the triage duty nurse will conduct COVID-19 screening. In contrast, the patient is given collaborative therapy for oxygenation, vital signs, a brief assessment, and a COVID-19 antigen swab. After that, the duty doctor will examine the patient and carry out therapy according to advice, such as giving nebulizer therapy. After that, observation will be carried out. Suppose the patient's complaints of shortness of breath improve with RR (respiratory rate) 18-20 x/min. In that case, the patient is recommended for outpatient care with control education to the poly. If the patient's complaints of shortness of breath persist or worsen with RR more than 26 x/min, it will be recommended for hospitalization. Buteyko breathing exercise at RSUP Dr. Kariadi has not been applied to asthma patients.

Buteyko breathing exercises were developed by a Russian doctor named Buteyko. The main component of Buteyko is breathing therapy. The breathing component aims to reduce hyperventilation through controlling breath reduction, known as slow breathing and reduced breathing, combined with breath holding, known as control pause and extended pause (Dramawan, 2015). The Buteyko breathing technique was developed to train asthmatics to reduce ventilation. Buteyko breathing exercise is a unique breathing therapy that uses breath control and breath holding to treat various health conditions associated with hyperventilation and low carbon dioxide. Buteyko breathing exercises do not conflict with conventional asthma management (Dramawan, 2015).

Buteyko breathing exercises complement asthma management. The benefits of Buteyko breathing are to reduce signs of hypoxia such as shortness of breath characterized by  $RR > 26 \text{ x / min}$ , increased pulse rate characterized by  $\text{pulse} > 100 \text{ x / min}$ , oxygen saturation  $< 95\%$ , comfortable sitting position 90°, reduce the use of bronchodilators, improve control in asthmatics, and reduce anxiety about asthma symptoms.

Juwita and Sary (2019) found that the Buteyko breathing exercise was more effective than before being given Buteyko breathing exercise. Based on the description above, the authors are interested in analyzing nursing care in asthma patients with nursing problems and ineffective breathing patterns by giving Buteyko breathing exercises to improve asthma control.

## 2. Methods

The design of this final scientific work uses descriptive analysis in the form of a case study focused on a particular case to be observed using a nursing care approach. In this case study, there were three subjects of asthma patients in the Emergency Room (IGD) of RSUP Dr. Kariadi. This case study focuses on nursing care by focusing on evidence-based practice management, namely applying Buteyko breathing exercises in asthma patients to improve respiratory rate (RR) and oxygen saturation (SpO<sub>2</sub>) conditions when patients come to the emergency room. Patients were assessed for asthma control using the Asthma Control Test (ACT) and assessed for the degree of shortness of breath using the Dalhousie dyspnea and perceived exertion scales.

## 3. Results and Discussion

### 3.1 Results

#### 3.1.1 Nursing Diagnosis

Based on the results of the assessment that has been carried out in 3 managed cases, nursing diagnoses of ineffective breathing patterns associated with respiratory center depression DD/dyspnea, orthopnea, use of breathing muscles, tachypnea breathing patterns, pursed-lip breathing (D.0005) are obtained.

Based on the results of the assessment conducted by the author, the data presented in tabular form are as follows:

Table 1 Patient Assessment

Patient Name	Age	Gender	Asthma Classification	Asthma Control Test	Degree of Shortness of breath
Mrs. F	35 years old	Female	Intermittent	Fully controlled	Slow walking
Mr. A	40 years old	Male	Intermittent	Fully controlled	Slow and heavy walking
Mr. S	50 years old	Male	Male Mild persistent	Partially controlled	Heavy walking

### 3.1.2 Nursing Care Plan

The nursing care plan that has been prepared is given when the patient comes to the emergency room and is made based on the nursing diagnosis of ineffective breathing patterns (D.0005), namely improved breathing patterns with the outcome criteria of decreased dyspnea (5), decreased use of breathing muscles (5), improved breathing frequency (5), decreased orthopnea (5), decreased pursed-lip breathing (5). The implementation is airway management by making observations: Monitor breathing patterns (frequency, depth, breath effort) and additional breath sounds (e.g., gurgling, wheezing, wheezing, dry Ronchi). Therapeutic: Position semi-Fowler or Fowler and give oxygen. Education: Teach Buteyko breathing exercises. Collaborate with bronchodilator therapy.

### 3.1.3 Nursing Implementation

Nursing actions taken for the three managed patients are monitoring breathing patterns, monitoring additional breath sounds, positioning the semi-fowler 45o position, collaborating in providing three liters per minute of nasal cannula oxygenation therapy, and collaborating in providing nebulizer combivent and Pulmicort bronchodilator therapy. The patient was observed and monitored for complaints and TTV every 1 hour. After 2 hours of observation, the patient's condition was stable, and complaints of shortness of breath were reduced. The patient was recommended to do Buteyko breathing exercises by removing oxygen. The Buteyko breathing exercise was conducted for 15 - 20 minutes with the patient sitting upright in bed. After the application of the patient, observation and monitoring of complaints and TTV every 1 hour. Then, observation is carried out to monitor the patient's vital signs after applying the Buteyko breathing exercise by monitoring RR and SpO2. Then, the patient can be outpatient with recommended control to the outpatient clinic.

### 3.1.4 Nursing Evaluation

Nursing evaluation is carried out for 6 hours from the time the patient comes to the emergency room, where the 6-hour waiting time or holding time in the emergency room where the patient can wait in the emergency room until there is a place or wants to be referred to another hospital and the patient is allowed to go home. The patient's condition is evaluated to determine whether there is improvement or worsening to determine the next patient program, whether the patient is outpatient or allowed to go home, and whether the patient must be hospitalized. The nursing evaluation of the three managed patients follows the outcome criteria based on SLKI guidelines. The three managed patients are allowed to be outpatients. They are recommended to control the outpatient clinic and continue practicing the application of Buteyko breathing exercises while at home with a booklet.

Table 2 Evaluation of Intervention Implementation Results

Patient Name		Pre	Post
Mrs. F	Respiratory Rate (RR)	28 x/min	18 x/min
	Oxygen Saturation (SpO2)	95 %	100 %
Mr. A	Respiratory Rate (RR)	30 x/min	20 x/min
	Oxygen Saturation (SpO2)	94 %	100 %
Mr. S	Respiratory Rate (RR)	32 x/min	20 x/min
	Oxygen Saturation (SpO2)	94 %	100 %

### 3.2 Discussion

#### 3.2.1 Patient Assessment Analysis

Assessment is part of the nursing care process and is the initial stage of determining the nursing care process: finding nursing problems. Based on case studies obtained from the three patients complaining of shortness of breath characterized by RR of more than 26 x/min and physical examination of the lungs and auscultation, they heard additional wheezing or wheezing sounds. This result follows [Setiawan \(2018\)](#), who said the clinical symptoms of classic asthma consist of a triad of shortness of breath, coughing, and wheezing. In asthma patients, it occurs due to chronic inflammatory disorders in the airway, resulting in hyperresponsiveness characterized by wheezing and shortness of breath. Airway hyperresponsiveness occurs due to gentle contraction of the bronchial muscles, causing narrowing of the airway, which results in shortness of breath and wheezing ([Rosfadilla & Tarigan, 2022](#)). Examination of additional breath sounds found signs of airway obstruction, and a distinctive sign is the sound of additional breath wheezing or wheezing during lung auscultation ([Setiawan, 2018](#)). The narrowing of the airway where the oxygen supply is reduced results in reduced oxygen supply to the lungs, and the patient's oxygen saturation (SpO<sub>2</sub>) drops. This result is under the patient assessment of the three managed patients, and there are two patients, namely Mr. A and Mr. A. A and Mr. S, experienced mild hypoxia with SpO<sub>2</sub> less than 95%.

Based on the problems that arise, it becomes the basis for the author to use the application of the Buteyko breathing exercise to train patient breathing during the case study process, which will then result in improved asthma control conditions measured through vital signs with respiratory rate (RR) and oxygen saturation (SpO<sub>2</sub>). It aligns with the research of [Sutrisna M et al. \(2018\)](#), a type of quasi-experimental research with a pretest and posttest one-group design approach involving 14 asthma patients selected by consecutive sampling. The collected data were analyzed descriptively and inferentially with a significance scale of  $p < 0.05$ . The results showed a significantly higher mean difference between ACT scores after being given the Buteyko breathing technique.

#### 3.2.2 Analysis of Emerging Nursing Problems

Table 3 Nursing Problem Analysis

Vital signs of	Mrs. F	Mr. A	Mr. S
Respiratory rate (RR)	28 x/min	30 x/min	32 x/min
Oxygen saturation (SpO <sub>2</sub> )	95 %	94 %	94%
Dyspnea	Yes	Yes	Yes
Use of breathing muscles	Yes	Yes	Yes
Breathing pattern	Tachypnea	Tachypnea	Tachypnea
Orthopnea	Yes	Yes	Yes
Pursed-lip breathing	Yes	Yes	Yes
Oxygenation therapy	Nasal cannula 3 pm	Nasal cannula 3 pm	Nasal cannula 3 pm

Based on the assessment, the author then categorizes objective and subjective data based on major and minor data per the SDKI. There are many nursing problems in asthma patients, but in the three managed patients, the nursing problem raised is ineffective breathing patterns (D.0005). The three managed patients came to the emergency room with complaints of shortness of breath with an RR of more than 26 x/min. Complaints of shortness of breath in asthma patients are a heterogeneous disease characterized by chronic airway inflammation followed by respiratory symptoms such as wheezing and shortness of breath, which vary from time to time with different intensities and limited airflow during expiration ([Gina, 2018](#)).

### 3.2.3 Analysis of Nursing Actions on Nursing Diagnoses

In compiling nursing interventions, the author uses references based on SIKI. In this case, each nursing plan is developed based on a theory that can be accepted logically and following the conditions of the patient's management by the theory of the patient using the observation, therapeutic, educational, and collaboration stages. In preparing interventions, the patient also applies Buteyko breathing exercises to reduce shortness of breath with improved RR and SpO<sub>2</sub>.

When providing interventions based on SIKI, the author monitors the patient's breathing pattern and breath sounds, positions the semi-fowler position, and collaborates in oxygenation and bronchodilator therapy. This action is supported by giving the semi-fowler position, which reduces oxygen consumption due to gravity pulling the diaphragm down, maximizes lung expansion, and maintains patient comfort. The semi-Fowler position increases oxygen in the lungs to relieve shortness of breath. This position will reduce damage to the alveolus membrane due to fluid buildup because it is influenced by the force of gravity so that oxygen transport is optimal (Majampoh et al., 2020). So, in this position, the patient's shortness of breath will decrease.

### 3.2.4 Analysis of Nursing Actions Following EBNP Results

This final scientific work focuses on evidence-based nursing practice, which applies Buteyko, a breathing exercise, to improve the condition of asthma patients. At the time of the implementation of this case study, the three managed patients were applied after the patient's condition was stable and cooperative to be applied. The Buteyko breathing exercise is applied after the patient is carried out nursing actions and collaboration in providing nebulizer therapy. Villareal et al. (2014) carry out this breathing technique after the patient gets bronchodilator drugs with a nebulizer. The three patients did well in the Buteyko breathing exercise from stage 1 to stage 3. The patient carried out the three stages correctly and well, feeling relieved and less tight after doing Buteyko breathing exercises. Buteyko breathing exercise reduces hyperventilation through controlling breath reduction, known as slow breathing and reduced breathing, combined with breath holding, known as control pause and extended pause (Dramawan, 2015).

The Buteyko breathing technique was developed to train asthmatics to reduce ventilation. Buteyko breathing exercise is a unique breathing therapy that uses breath control and breath holding to treat various health conditions associated with hyperventilation and low carbon dioxide. Before applying the Buteyko breathing exercise, it is recommended that the patient remove the oxygen attached to the patient. Applying this breathing technique involves stages where the oxygen air in the lungs feels empty (Hassan, 2012).

### 3.2.5 Nursing Evaluation Analysis

The author's evaluation is based on the objectives and outcome criteria compiled at the planning stage by monitoring and measuring vital signs of changes in improving conditions in managed patients. The author evaluates after 6 hours of the patient in the emergency room per the SPO that applies at Dr. Kariadi Hospital. At the time of the evaluation, it was found that the three managed patients experienced an improvement in their condition. When they arrived, the patient complained of shortness of breath; after being given the application of the Buteyko breathing exercise, the patient said the shortness of breath was reduced and experienced an improvement in oxygen saturation. When the patient came to the emergency room, two patients out of three patients experienced mild hypoxia. After applying the Buteyko breathing exercise, the patient's saturation was 99% - 100%.

The results show that applying Buteyko breathing exercises improves asthma control from respiratory rate (RR) and oxygen saturation (SpO<sub>2</sub>). This final scientific work of nurses is supported by research by Lisavina (2019) using a quasi-experiment design with a pretest-posttest design. The statistical test results obtained a value of 0.000, meaning there is a

difference between asthma control before and after implementing Buteyko breathing. [Marlin's research \(2018\)](#) uses a quasi-experimental design with a pretest and posttest one-group design approach. The results of the significance scale  $p < 0.05$  mean a significant difference in the higher mean between ACT scores after being given the Buteyko breathing technique. In other words, the Buteyko breathing technique improves asthma control and ACT (Asthma Control Test).

### 3.2.6 Nursing Implications

Based on the case study of the Ners Final Scientific Work that has been carried out, the application of the Buteyko breathing exercise in assessing improvements in respiratory rate (RR) and oxygen saturation (SpO<sub>2</sub>) does not hurt patient conditions, hospital costs, time and energy, or infrastructure in carrying out the application.

The application of the Buteyko breathing exercise is beneficial and influential on asthmatics. The benefits of the Buteyko breathing exercise are reducing shortness of breath, reducing the use of bronchodilators, improving asthma control, and reducing anxiety. Therefore, the Buteyko breathing exercise is highly recommended and applied to asthmatics.

## 4. Conclusion

The results of the EBNP evaluation show that the three patients managed after the evaluation experienced improvements in RR and SpO<sub>2</sub>, and complaints of patient shortness of breath were reduced. Therefore, the patient was allowed to be outpatient with home medication according to the doctor's advice, education to control the outpatient clinic, and education to continue doing Buteyko breathing exercises at home according to the booklet that was brought home.

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