



**EFFECT OF DIAPHRAGMATIC BREATHING AND POCKETED LIP BREATHING  
TECHNIQUES ON THE MANAGEMENT OF BREATHLESSNESS IN PATIENTS INEFFECTIVE  
RESPIRATORY PATTERN DISORDERS WITH MYCOBACTERIUM TUBERCULOSIS  
(PULMONARY TUBERCULOSIS)**

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**Abstract**

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Tuberculosis (TB) is a contagious disease caused by the bacterium Mycobacterium Tuberculosis and can spread from one person to another through the sputum droplet air transmission of the patient. Non-pharmacological management of pulmonary tuberculosis includes bed rest, semi-fowler position, comfortable environment, personal hygiene, diaphragm breathing. The purpose of this EBN is to determine the effect of diaphragmatic breathing and pocketed lip breathing on the handling of breathlessness in patients with ineffective respiratory disorders with mycobacterium tuberculosis (pulmonary TB). The implementation strategy used the techniques of literature review obtained through the online search process. The search was conducted via Google Scholar. Pursued lip breathing and diaphragmatic breathing are effective in the management of breathlessness in patients with ineffective breathing patterns.

## INTRODUCTION

Tuberculosis (Tuberculosis or TB in short) is still a major health problem and a global health problem as the main cause of death for millions of people worldwide every year after the Human Immunodeficiency Virus (HIV). Lung is an infectious disease caused by the bacteria *Mycobacterium Tuberculosis* and can spread from one person to another through the patient's sputum droplet air transmission (Ministry of Health (Indonesia), 2015)

According to the World Health Organization (WHO) Global Tuberculosis Report 2016, the distribution of tuberculosis cases occurred mostly in Southeast Asia (45 per cent), Africa (25 per cent), Eastern Mediterranean (7 per cent), Europe (3 per cent) and others in 2016. The last one was in the Americas (3 percent ). Indonesia is the third largest in the world with a population of 888,904 TB sufferers or 8 percent of 2018 sufferers. Ninety percent of the patients are pulmonary TB patients. The prevalence of TB disease in Indonesia was 335 per 100,000 population in 2017, 297 per 100,000 population in 2014 and 253 per 100,000 population in 2006 (Ministry of Health of Republic Indonesia, 2019). The trend of increasing prevalence rates is a challenge for us to reduce the prevalence of TB in Indonesia.

In 2017, MDR-TB cases in Indonesia amounted to 13 per cent in patients with relapse of TB or approximately 12,000 in patients with relapse of pulmonary TB and 2.4 per cent in new cases of pulmonary TB (Organization, 2008). This percentage decreased compared to 2006, i.e. 19 percent for elderly patients and 2 percent for new patients (Organization, 2008). Preventing transmission of MDR-TB is done by ensuring that patients take medication on a daily basis as required. A Drug Drinking Supervisor (PMO) is therefore needed, i.e. people who supervise TB patients to take medicine every day to heal and prevent drug resistance (Amira DA, 2018). The presence of PMO has a significant impact on the recovery rate of the patient (Muniroh and Aisah, no date) This is because the compliance of TB patients with taking drugs is only 727% (Sari, Mubasyiroh and Supardi, 2017).

According to (Panjaitan and others, 2012), the sex ratio of men and women suffering from pulmonary

tuberculosis is 3:2. And also according to (Ismah and Novita, 2017) more men than women suffer from shortness of breath in pulmonary tuberculosis. There are several reasons why men are more at risk than women, such as women's immunity is higher than men's immunity. The other possibility is due to male smoking habits. Smoking can increase the risk of pulmonary tuberculosis to 2-fold. According to Agus (2012), in smokers, continuous exposure to cigarette smoke will result in a narrowing of the airway diameter due to the body's defense mechanism, i.e. by increasing the production of mucus or phlegm, resulting in bronchoconstriction so that blood flow obstruction occurs. Constant airflow resistance can lead to damage to air bags or alveoli, which can lead to emphysema. Due to the damage to the alveoli, the patient will have difficulty breathing, which is getting heavier over time.

Age is another factor that causes shortness of breath. As age increases, the function of the body organs, including the function of the lungs in the breathing process, decreases and the supply of oxygen in the body decreases, making the elderly more prone to shortness of breath. According to (Laily *et al.*, 2015) Tuberculosis occurs mostly in adults due to two causes. First the adult was infected with primary tuberculosis in his environment at a young age, but there was no good preventive action to make him appear as an adult. The second possibility is the existence of activities and the working environment in groups of adults who interact with people with tuberculosis or an environment that makes it easy to get infected.

Factors affecting shortness of breath in patients with pulmonary tuberculosis include body position, environmental oxygen in the atmosphere at around 21 per cent, air pollution from industry and motor vehicles, allergens such as food, chemicals, lifestyle and habits. The use of alcohol and drugs, nutrition, increased body activity, impaired movement of the lungs, the ability to expand the lungs also affect the ability of the lungs and volume, obstruction of the respiratory tract inhibits the flow of air into the lungs (Tarwoto and Wartonah, 2010). Non-pharmacological management of pulmonary tuberculosis includes bed rest, semi-fowler position, comfortable environment, personal hygiene, diaphragm breathing (Indonesia, no date).



The most common breathing exercises are abdominal breathing or diaphragm breathing and bagged-lip breathing. Abdominal breathing allows for deep, full breathing with minimal effort. Pursed-lip breathing helps clients control their breathing (Kozier, Erb and Berman, 2009) Pursed lip breathing exercise is a method of breathing by prolonging the expiration phase. It aims to give the bronchi time to expand so that the shortness of breath can be reduced. In the meantime, diaphragmatic breathing is done by maximizing the function of the lungs in the lower part of the lungs, so that it can increase the capacity of the lungs to breathe, or by raising the stomach forward and slowly exhaling. The objective of this exercise is to teach abdominal breathing, to regulate breathing when breathing shortness, to overcome the problem of decreasing lung volume at peak expiratory currents (Spathis *et al.*, 2017).

Based on the background, the group is interested in applying the results of the case management breathing research outlined in Evidence Based Nursing (EBN) entitled The Effect of Diaphragmatic Breathing and Pocket Lips Breathing Techniques on the Handling of Breathlessness in Patients with Ineffective Breathing Patterns with Mycobacterium Disease TB disease (Pulmonary TB).

## METHOD

This study is a systematic review of available literature to evaluate the subjective response of diaphragmatic and bagged lips to breathability management in patients with ineffective mycobacterium tuberculosis breathing disorders (pulmonary TB).

### Research strategy

The implementation strategy used the techniques of literature review obtained through the online search process. A search was conducted via Google Scholar using the keywords “diaphragmatic breathing OR Pursed Lips Breathing OR tuberculosis” Journal research focuses on journals that use pocketed lip breathing and diaphragmatic breathing to treat shortness of breath in patients with Mycobacterium Tuberculosis ineffective breathing disorders (TB). Research included in the EBN is based on the inclusion criteria: Indonesian language, published from 2015 to 2020, human participant, clinical trial/randomized clinical trial and population of

patients with pulmonary tuberculosis, Diaphragmatic breathing and lip breathing.

### Article screening

Article screening shall be carried out by means of the initial title and the abstract screening shall be carried out in order to identify which articles have the potential to meet the desired criteria. After reviewing all the articles considered to be significant at the baseline screening stage. Additional publications not included in the original literature scan were retrieved through reference reviews in the report. Two reviewers reviewed each abstract on the basis of the inclusion criteria. The first reviewer checks all titles and abstracts with the aim of avoiding the repetition of the article. In addition, the second reviewer assessed the sample of titles and abstracts on the basis of the same selection criteria, and the two reviewers agreed which articles met the inclusion criteria.

### Extraction of data

Each report shall be processed by means of a review of each article, including the author, year, country of origin of the study, form of analysis, survey (including number of samples and conditions for inclusion), interview guideline, findings and limitations of the study.

### Quality evaluation of the analysis

The content evaluation of each article shall be carried out in the basic format of the Essential Appraisals Skills Program (CASP) in Indonesia. The criterion used to determine if each analysis is of good quality and the minimum likelihood of bias is 3, i.e. if the results of the analysis are valid, what are the effects, will improve the results of the test locally. There are 11 checklist points used to render an evaluation of yes/no/no recorded response options.

## RESULT

From the results of the search made by google scholar (Figure 1). A journal quest using the keywords Diaphragmatic breathing OR pocketed lip breathing OR tuberculosis culminated in 94 publications by google scholar. Subsequently, it was chosen according to the form of paper of the submitted publication, namely 68 articles. Then re-selected items that enter according to the intended inclusion criteria so that 16



journal papers from Google Scholar can be entered for review. Out of the 16 journal articles, 5 journal articles were obtained that met the necessary requirements.

### Methodological Assessment Results

Based on the findings collected, it can be inferred that there are variations in the implementation process or help behavior for the use of pure lip breathing and diaphragmatic breathing have an effect on raising the oxygen status of the patient. For example, in the research sector. The findings of (Tawangnaya, Arif and others, 2016) research indicate that out of 23 respondents, 16 respondents experienced an improvement in saturation values. (Qorisetyartha, Kristiyawati and Arief, 2015) study and (Amiar and Setiyono, 2020) study showed that the use of lip-breathing bags was more effective in improving oxygen saturation in patients with pulmonary TB.

In (Yenny Farida, 2020) studies, the findings of this study can be concluded that the diaphragmatic respiration technique with balloon-blowing techniques can minimize the degree of shortness of breath in patients with pulmonary tuberculosis, as diaphragmatic respiration exercise with balloon-blowing techniques increases the supply of air into the lungs such that oxygenation needs can be met.

### DISCUSSIONS

(Utami, Kesehatan and Surakarta, 2019) study entitled Effect of Orthopneic Role, Diaphragmatic Breathing Exercise and Pursed Lip Breathing on Increased Expansion of Thoracic Cages in Tuberculosis Patients at Dungus Madiun Hospital. This method of analysis is a quantitative study using a quasi-experimental pre-test and post-test configuration. The survey of this study used an accidental sampling of a total of 14 participants, consisting of 7 orthopneic, diaphragmatic, bagged lip respondents as an experimental group and 7 orthopneic, diaphragmatic, as a control group respondents.

Inclusion conditions (admission): Pulmonary TB patients who are hospitalized with an intensive phase, aged 70 years with a degree of shortness of breath assessed on a borg scale between 3-10 years, ready to respond, undergo bronchodilators (after 4 hours), difference in cage expansion thoracic procesus xipioideus <3.5 cm, difference in ICS 4 <2 cm. Exclusion conditions

(rejection) were extra pulmonary TB, pulmonary TB with a history of cardiac comorbidity, as indicated by X-rays, and the patient was not able to respond. The drop-out condition is that the patient who resigns does not want to be included in the study process.

### Summary of Search Results

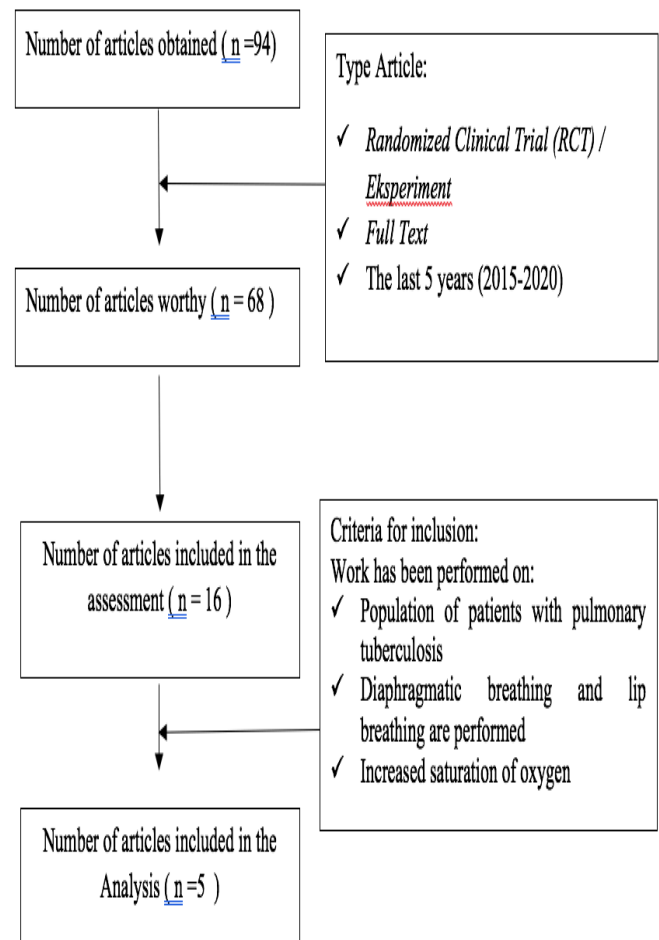


Figure 1. Search Flow Diagram

## Journal Analysis Results

No	Title	Author, Year, Country	Partisipan	Metode Penelitian	Intervensi	Outcome / Results	Score CASP
1.	Pengaruh <i>Orthopneic Position, Diaphragma Breathing Exercise</i> Dan <i>Pursed Lip Breathing</i> Terhadap Peningkatan Ekspansi Sangkar Thoraks Pada Pasien <i>Tuberculosis</i> Di Rumah Sakit Paru Dungus Madiun	(Utami, Kesehatan and Surakarta, 2019)	The sample in this study used an incidental sampling of a total of 14 people, consisting of 7 orthopneic, diaphragmatic, bagged lip respondents in the experimental group.	Quantitative research using quasi-experimental pre-test and post-test design	The sample consisted of 14 people, consisting of 7 respondents in a group of orthodontic, diaphragmatic, bagged lips as an experimental group. Seven respondents were given orthopedic, diaphragmatic, as a control group.	The sig is recognized in the experimental community. p value > 0.05, there was no effect in the study community between the pre-test and the post-test. It was concluded that the use of lip breathing and diaphragmatic bags had an effect on patient oxygenation.	11
2.	Pengaruh Diaphragmatic Breathing Exercise Dengan Teknik Ballon Blowing Terhadap Sesak Napas Pada Pasien Tuberkulosis Paru Di Puskesmas Pucuk Lamongan	(Yenny Farida, 2020)	The survey consists of 33 respondents with a random sampling methodology. Test results is obtained by observation and interviews.	Pre-Experimental Process for one pre-test group solution Design of post-test	The intervention is a diaphragmatic breathing exercise with balloon blowing technique 2 times a day in the morning and evening, each exercise session is done with 3 balloon blowing exercises. Data collection was carried out by researchers using interview and observation methods, including calculation of the level of breathlessness before (pre-test) and after (posttest) action, which was then reported in the observation sheet. The instrument used to calculate the shortness of breath using the VAS scale (visual analog scale). Conducted by the researcher himself with a Guide to Normal Operating Procedure (SOP)	The diaphragmatic respiration technique with balloon-lowering techniques can reduce the level of breathability in patients with pulmonary tuberculosis, as diaphragmatic respiration exercise with balloon-blasting technique improves the supply of air into the lungs such that oxygenation needs can be fulfilled.	10



3.	Efektifitas Posisi Semi Fowler dengan Pursed Lip Breathing dan Semi Fowler dengan Diaphragma Breathing terhadap SaO <sub>2</sub> Pasien TB Paru di RSP Dr. Ariowirawan Salatiga	(Qorisyartha, Kristiyawati and Arief, 2015)	The number of samples in this analysis was 38 respondents using the sampling technique for the purpose of sampling..	This method of quantitative analysis uses a Quasi-Experimental Framework with a two-group pre-test-post-test approach. Plan. Design.	Attempts to minimize shortness of breath or drop in oxygen saturation are by supplying semi-fowler positions with pocketed lip breathing and semi-fowler positions with diaphragm breathing. Another intervention that may improve SaO <sub>2</sub> is bagged lip breathing. Breathing techniques for lips that are pulled together	The findings showed that the p-value for the Mann-Whitney test was 0.020. It can be concluded that the semi-fowler position with the pocketed lip breathing is more effective than the semi-fowler position with the Diaphragm breathing.	10
4.	Efektivitas Pemberian Teknik Pernafasan Pursed Lips Breathing Dan Posisi Semi Fowler Terhadap Peningkatan Saturasi Oksigen Pada Pasien TB Paru	(Amir and Setiyono, 2020)	Pasien dengan TB paru	Quasy Experiment Pre-posttest	The work process in which the researcher starts to provide role-play to the respondents. After offering the role-play bagged lips breathing, the patient is instructed to take the bagged lip breathing procedure 10 times or less for 2 minutes. After 15 minutes, the oxygen saturation was assessed. After the patient has been given a semi-fowler role-play position, the patient will be given a semi-fowler position or the bed position will be changed to 45 degrees for 15 minutes, so the oxygen saturation will be measured again after 15 minutes. The step of termination, the researcher tests oxygen saturation	The findings revealed that the average oxygen saturation before the bagged lip breathing was 93.17 and after the bagged lip breathing was 96.30. As for the interference adjustment in the location of the semi-fowler, the average before the change of the semi-fowler was 92.83 and the half-fowler was 95.17. The outcome of the T-dependent test shows that the p value <0.005 means that there is a difference between the respiration of the bagged lips and the improved oxygen location of the semi-fowler. Pursed lip ventilation is more effective in improving oxygen saturation in patients with pulmonary TB.	10

5.	Perbedaan Nilai Saturasi Oksigen Sebelum Dan Sesudah Diberikan Posisi Tripod Dengan Pursed Lip Breathing Pada Pasien Tb Paru Di RSUD Ambarawa	(Tawang-naya, Arif and others, 2016)	The demographic was 215 respondents of pulmonary tuberculosis and a sample of 23 respondents. Sampling procedure for unintended sampling.	This type of analysis is... Build using Quasi Experiment (Quasi Experiment) for a one-group pre-test-post-test design approach.	Assessing and witnessing breathlessness in patients with pulmonary tuberculosis by testing SpO <sub>2</sub> using a pulse oxymeter, then reported on the first day observation panel. Place the patient on the bed on the overbed table (which is lifted to an acceptable height) and lie on both hands with the legs bent inward. Pocket lips ventilation in the form of breathing or inspiration through the nose for 2-3 seconds accompanied by a steady expiration through the mouth of at least 2 periods inspiration (4-6 seconds) performed for 30 minutes with tolerance for rest breaks for 5 minutes for 3 times (5 measures, 5 minutes of rest, followed by 5 minutes to 2 and 5 minutes of rest, then 5 minutes to 3 and 5 minutes.	The findings revealed that 23 respondents before being given a tripod position with their bagged lip breathing saturation value below the usual level (<95%) with a mean value of 86,7391. The findings revealed that of 23 respondents, 16 of whom experienced a rise in saturation value, the mean value rose to 91,7826.	11
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This journal consumption relies on the use of bagged lip breathing and diaphragmatic breathing, with the effects of both sign values.  $p$  value  $> 0.05$ , it can be inferred that there is an effect in the control community between the pre-test and post-test. The sig is recognized in the experimental community.  $p$  value  $> 0.05$ , there is no effect in the study community between pre-test and post-test. This means that bagged lip breathing and diaphragmatic breathing have an effect on improving the condition of the patient.

Characteristics of age respondents in patients with pulmonary tuberculosis who obtained Semi Fowler Position with Pursed Lip Breathing and Semi Fowler Position with Diaphragm Breathing, the findings revealed that the age of respondents in both categories was mainly middle adults (41-60 years of age), with the number of respondents in the Semi-Fowler position with Pursed Lip Breathing as many as 9 respondents (4-60 years of age) (36.8 percent ). The findings of this survey are consistent with research undertaken by Korua, Kapantow and Kawatu (2015) that the age of the 43 respondents in the study was the largest number of middle adults (41-60 years of age) or active age, including 33 respondents (64.7 % ).

Based on studies performed by (Sianturi and others, 2013), the productive age could be more vulnerable to pulmonary tuberculosis because the productive age has less stamina due to higher exercise than other ages such that it impacts the antibodies of a human. Your immune system will decline as you grow older. Low antibodies make it possible for tuberculosis to penetrate and invade the lung parenchyma.

Distribution based on gender Defines the characteristics of gender respondents in pulmonary TB patients receiving Semi Fowler Position with Pursed Lip Breathing and Semi Fowler Position with Diaphragm Breathing with outcomes, the most pulmonary TB patients being male, including 24 respondents (63 , 2 %). The findings of this analysis are consistent with the studies carried out by (Tawangnaya, Arif and others, 2016) In Ambarawa, which is collected from 23 respondents, there are 17 male respondents.

The immune system of men appears to be worse than that of women. According to Wittlieb, this is caused by genes in the human body in 2016. Any human being has 23 pairs of chromosomes and these chromosomes

are separated by sex. Women have two X chromosomes, while males have only one X chromosome and one Y chromosome. This two X chromosomes are the secret to extra resilience in the immunity of women, since the X chromosome contains more immune genes.

The average oxygen saturation value prior to the Semi Fowler position with Pursed Lip Breathing was 94 per cent. The average after the Semi Fowler position with Pursed Lip Breathing is 97%. The  $p$ -value of 0.000 shows that the Semi Fowler Position with Pursed Lip Breathing is effective in increasing the oxygen saturation of pulmonary TB patients. This study is in line with the research conducted by Hafizh & Basuki (2013) entitled The Effect of Pursed-Lip Breathing on Decreasing Respiratory Rate and Increasing Pulse Oxygen Saturation (SpO<sub>2</sub>) showing the effect of Pounded-Lip Breathing (PLB) on decreased respiratory rate (RR). ) and increased saturation of pulsed oxygen (SpO<sub>2</sub>).

In the semi-fowler position, the semi-fowler position is done as a way of reducing and helping to deal with shortness of breath. Semi-fowler position with an inclination of 30-45o, which relies on the force of gravity to help the lungs develop and reduce abdominal and diaphragm pressure (Snyder & Berman, 2011, p. 914).

Oxygen saturation among respondents who were given bagged lip breathing technique intervention experienced an increase from mild to normal hypoxia. Pursed lips breathing may increase lung ventilation. According to Garrod and Aon (2012) bagged lips breathing is part of breathing exercises that are needed for patients with respiratory system disorders, because bagged lip breathing has a good effect on the respiratory system. Comparing the efficacy of pocketed lips breathing with the semi-fowler position in pulmonary tuberculosis patients, there is a significant effect on oxygen saturation in pulmonary TB patients between pocketed lips breathing and semi-fowler positions. Pursed lip breathing technique is a breathing technique designed to increase maximum ventilation. The patient's response, expected to be able to breathe deeply and expand his lungs perfectly, enables the patient to use breathing techniques to increase ventilation (Andarmoyo, 2012). According to (Garrod and Mathieson, 2013) PLB is part of the breathing exercise needed for patients with respiratory



system disorders because PLB has a good effect on the respiratory system. This lip bundled stage can prolong exhalation, reduce air space loss trapped in the airway, increase CO<sub>2</sub> release and reduce CO<sub>2</sub> levels in arterial blood, and increase O<sub>2</sub> so that homeostatical improvements, i.e. CO<sub>2</sub> levels in normal arterial blood, and pH, can occur (Muttaqin, 2012).

Oxygen saturation of the respondents who were given tripod position intervention with bagged lip breathing increased. According to Saryono (2009), the position of the tripod increases the diaphragm and the external intercostal muscles at a position of approximately 45 degrees, making it easier for the earth's gravity to function properly on the main inspiration muscle, thus making it easier for these muscles to contract to move downwards, increasing the volume of the thoracic cavity by increasing its vertical length. The process of increased ventilation in shortness of breath in patients who are positioned on the tripod will increase the release of carbon dioxide and increase the intake of oxygen to the intra-alveoli so as to increase saturation in the body. Pursed Lip Breathing, according to Ramos et al (2009), is a breathing exercise consisting of two mechanisms: strong and deep inspiration and active and long expiration. Pursed lip breathing technique involves a forced expiration process. Forced expiration of course increases the strength of intra-abdominal muscle contraction so that intra-abdominal pressure increases. Increased intra-abdominal pressure will certainly increase the diaphragm's upward movement, making the thoracic cavity smaller, causing an increase in intra-alveolar pressure to exceed atmospheric air pressure. This condition causes the air to flow out of the lungs into the atmosphere. If the tripod position is given while the lip is breathing in patients with pulmonary TB, the work of inspiration and expiration will be even more optimal if the inspirational muscle load is reduced. As air trapped or hyperinflation decreases, residual capacity also decreases and the exchange of gas increases. Increased gas exchange in patients with pocketed lip breathing, oxygen moving to the pulmonary capillaries will increase and CO<sub>2</sub> released to the alveolus will also increase (Smeltzer and BG, 2013).

## CONCLUSION

Based on the journal described in the previous chapter, it was found that the outcome measures measured in this study were bagged lip breathing and diaphragmatic breathing interventions for the treatment of breathlessness in patients with ineffective respiratory disorders with mycobacterium tuberculosis disease. Pursed breathing of the lip and diaphragmatics. breathngee is effective given to the management of breathlessness in patients with impaired breathing patterns.

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## CONFLICT OF INTEREST

There is no conflict of interest to be declared by the author..

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