

EFFECTIVENESS OF ACTIVE CYCLE OF BREATHING TECHNIQUE ON DYSPNEA AND VITAL CAPACITY AMONG LUNG ABSCESS SUBJECT

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ABSTRACT

Background

Lung Abscess is defined as a local suppurative process with the lung, characterized by necrosis of lung tissue. It is a type of liquefactive necrosis of lung tissue and formation of cavities (more than 2cm) containing necrotic debris or fluid caused by microbial infection. It can be caused by aspiration which may occur during altered consciousness and it usually causes a pus-filled cavity.

Objectives

The study's primary objective was to find the effectiveness of Active Cycle of Breathing Technique on dyspnea and vital capacity among lung abscess subject.

Subject and Method

This study was done with 56 years old male who was clinically diagnosed with lung abscess, acute stage. The study duration was for 2 months. Active cycle of breathing technique was given to reduce dyspnea by clearing secretions, and to increase vital capacity. Modified Borg scale was used to assess the dyspnea, and Digital spirometry was used to assess the vital capacity.

Result

The results of this study showed a significant improvement in 56 years old male with lung abscess. The result shows the pre-test value as 3 and post-test value as 0.5 for dyspnea using Modified Borg scale and pre-test value as 1.5L and post-test value as 4.8L for vital capacity using digital spirometry at the end of 6th week respectively.

Conclusion

From this study, it was concluded that using Active cycle of breathing technique loosens and clears the secretions to reduce dyspnea and to improve vital capacity.

Clinical Implications

Active cycle of breathing technique is found to produce a significant effect on reducing dyspnea and improving vital capacity among lung abscess subject.

KEYWORDS: Lung Abscess, Active Cycle of Breathing Technique, Dyspnea, Vital Capacity

Article History

Received: 16 Jun 2024 | Revised: 16 Jun 2024 | Accepted: 21 Jun 2024

INTRODUCTION

Lung abscess is defined as a circumscribed area of pus or necrotic debris in lung parenchyma, which leads to a cavity, and after formation of bronchopulmonary fistula, an air-fluid level inside the cavity. Lung abscess is in the group of lung infections such as lung gangrene and necrotizing pneumonia which is characterized with multiple abscesses. The clinical signs and therapy of lung abscess was described for the first time by Hippocrates. In pre-antibiotic era, one third of patients with lung abscess would die, the other third of patients would recover fully, and the rest of them would survive with sequels such as chronic lung abscess, pleural empyema or bronchiectasis. In that time, surgery was considered as the only effective therapy, and today most of the patients will be fully recovered only with antibiotic therapy.

Epidemiology

Lung abscess accounts for up to 40 to 55 per 100,000 hospital admissions each year in the US. It occurs at any age, but most frequently from the 6th to 8th decades, and is predominantly seen in men.⁽²⁾

Pathophysiology

In most cases, lung abscesses are secondary to aspiration of oropharyngeal contents with anaerobes, which initially starts as aspiration pneumonia later complicated by pneumonitis progressing to tissue necrosis in one to two weeks if left untreated. Bronchogenic causes include bronchial obstruction by a tumor, foreign body, enlarged lymph nodes, aspiration of oropharyngeal secretions, and congenital malformation. In remaining cases, it is through hematogenous spread. Common causes of haematogenous spread are abdominal sepsis, infective endocarditis, and septic thromboembolism.⁽³⁾

Symptoms of Lung Abscess

The most noticeable symptom of a lung abscess is a productive cough. The contents that are coughed up may be bloody or pus-like, with a foul odour.

Other symptoms include:

- Halitosis (bad breath)
- Fever of 101 degree Fahrenheit or higher
- Chest pain
- Dyspnea
- Excessive sweating or night sweats
- Weight loss
- Fatigue

Investigations

X-ray and CT of chest aid in the diagnosis of a lung abscess. On imaging studies, lung abscess appears as cavity lesions with infiltrates. CT will be able to provide finer details along with anatomic relations of an abscess. Microbiologic analysis of sputum can potentially assist in management. Pleural fluid analysis and bronchoscopy is also used to investigate lung abscess.

METHODOLOGY

Study Design

A single case study design with pre and post evaluation to find out the effectiveness of active cycle of breathing technique on dyspnea and vital capacity among lung abscess subject

Case Study

A 56 years old male was diagnosed with pneumonia. After 2 weeks, there was pus collections over right upper lobe and was diagnosed with Acute stage of lung abscess. The procedure and technique of ACBT were clearly explained to the patient and consent was obtained, after giving clear instructions the treatment was started.

The physiotherapist on auscultating the patient, there was abnormal breathing pattern and while assessing his vital capacity it showed variations in the digital spirometry.

With the use of Modified Borg scale for dyspnea he had the score of 3 and with the use of digital spirometry for vital capacity he had the rate of 1.5L. He was given ACBT for 2 sessions 10 min per day and Home programme exercise were given. Breath control, thoracic expansion exercise and forced expiratory technique (huffing) was given to reduce dyspnea and to improve his vital capacity.

Intervention

Active Cycle of Breathing Technique

The Active Cycle of Breathing Technique (ACBT) is a set of breathing exercises that loosens and clears the sputum from the airways. The ACBT exercises are breath control, thoracic expansion exercise and forced expiratory technique (huffing) which are performed in a cycle.

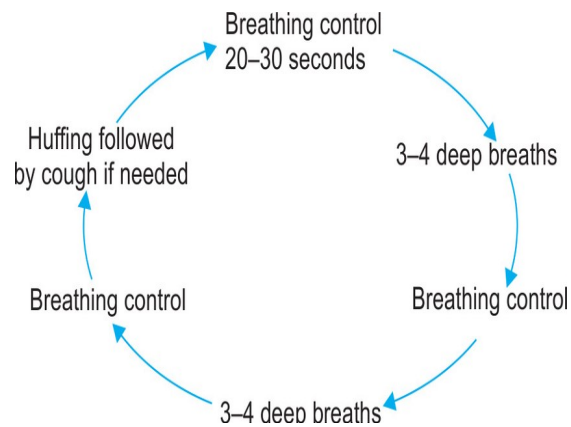


Figure 1

The Active Cycle of Breathing Techniques (ACBT) is an active breathing technique performed by the patient and can be used to mobilize and clear excess pulmonary secretions and to generally improve lung function. It is a flexible method of treatment that can be used in conjunction with positioning and adapted for use with most patients. Each component can be used individually or as part of the ACBT cycle depending on the patient's problem. Once ACBT has been taught, the patient can be encouraged to use it independently without the supervision of a physiotherapist. This exercise does not require the use of any special equipment.

It's used to Loosen and clear secretions from the lungs. Its helps to reduced the risk of chest infections. Improve ventilation in the lungs and Improves the effectiveness of a cough.

DATA ANALYSIS AND RESULTS

Demographical Data

Table 1: Demographic Data

S. NO.	PATIENT DESCRIPTION	MEASURE
1	AGE	56
2	GENDER	MALE
3	WEIGHT	55kg
4	HEIGHT	157cm
5	BMI	22.3

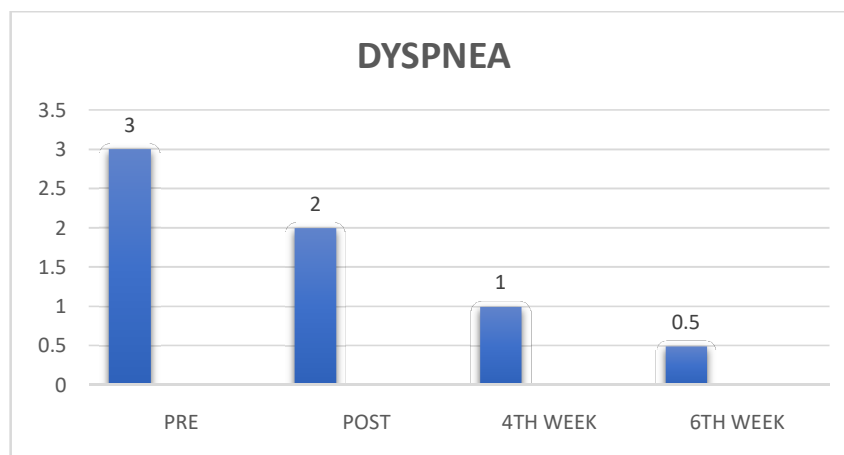
Descriptive Analysis of Pre and Post Test Values for Dyspnea at the of 2nd, 4th and 6th Week

Table 2

DYSPNEA SCALE	MODIFIED BORG SCALE
PRE TEST VALUE	3
POST TEST VALUE END OF 2 ND WEEK	2
END OF 4 TH WEEK	1
END OF 6 TH WEEK	0.5

Descriptive analysis of pre and post- test values for Dyspnea. The pre- test value was 3 and post- test value was 2, 1 and 0.5 for Dyspnea at the end of 2nd, 4th and 6th week.

Graphical Representation



GRAPH 1: Pre- Test Value 3 and Post- Test Value 2,1 and 0.5 for Dyspnea.

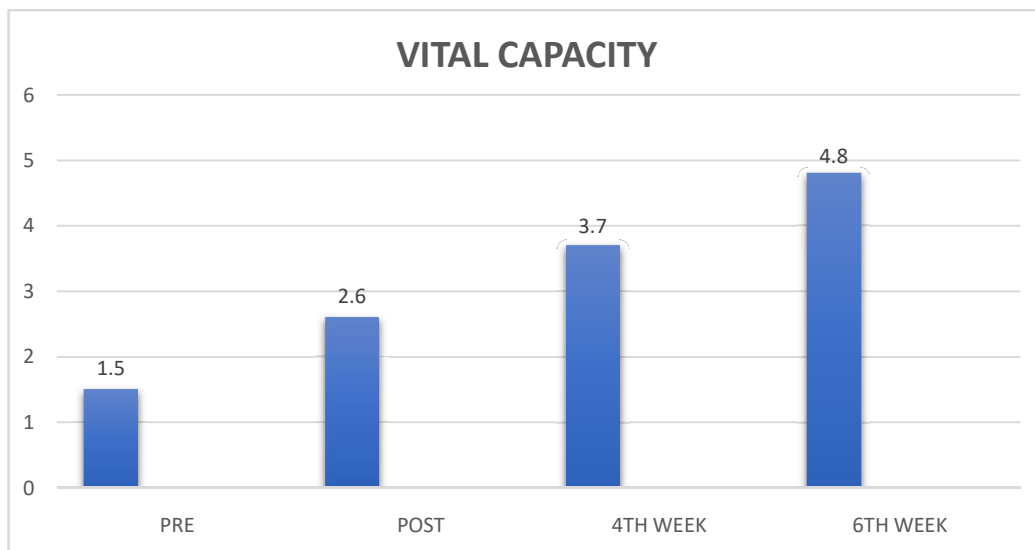
Descriptive Analysis of Pre and Post Test Values for Vital Capacity at the End of 2nd, 4th And 6th Week

Table 3

VITAL CAPACITY	DIGITAL SPIROMETER
PRE TEST VALUE	1.5L
POST TEST VALUE END OF 2 ND WEEK	2.6L
END OF 4 TH WEEK	3.7L
END OF 6 TH WEEK	4.8L

Descriptive analysis of pre and post- test values for vital capacity. The pre- test value was 1.5L and post- test value was 2.6L, 3.7L and 4.8L for vital capacity at the end of 2nd, 4th and 6th week.

Graphical Representation



GRAPH 2: Pre- Test Value 1.5L and Post- Test Value 2.6L, 3.7L and 4.8L for Vital Capacity.

DISCUSSION

Lung Abscess is defined as a local suppurative process with the lung, characterized by necrosis of lung tissue. It is a type of liquefactive necrosis of lung tissue and formation of cavities (more than 2cm) containing necrotic debris or fluid caused by microbial infection. It can be caused by aspiration which may occur during altered consciousness and it usually causes a pus-filled cavity. Alcoholism is the most common condition predisposing to lung abscess. Lung abscess is considered primary (60%) when it results from existing lung parenchymal process and is termed secondary when it complicates another process. In lung abscess cases most common problem is secretion and accumulation of sputum in the airways which cause breathing difficulty and worsening of the functional capacity of the lungs. Active cycle breathing technique plays a vital role in clearing the secretions, expectoration from the lungs. Thus the purpose of the study is to find the effectiveness of active cycle breathing technique on dyspnea by improving vital capacity in a subject with lung abscess.

Dr. CIPTO MANGUNKUSUMO et .al,(2019) A case presentation of 45 years old women, after lobectomy on right upper of lung aspergilloma, with history of cough and haemoptysis for 3 months. Pulmonary rehabilitation were breathing retraining exercise, mobilization technique, chest mobility exercise, active cycle breathing technique, postural correction exercise for 3 weeks. Results: There was dyspnea, and abnormal chest expansion. After 3 weeks of pulmonary

rehabilitation, there were no dyspnea. Conclusion: Pulmonary rehabilitation programs for 3 weeks relieved dyspnea, and increased the chest expansion.

SHEN.M et al, (2020) In this case study the intervention program is a comparison of ACBT with non- ACBT. For COPD patients, ACBT was more effective in sputum production and cough efficiency. Compared with usual care, ACBT improves lung function, blood gas analysis, and other parameters. Their systemic review found that ACBT can effectively improve sputum production and cough efficiency in patients with COPD.

R ALEJOS-PALOMARES et al, (2008) A spirometer is the ideal instrument to measure the mechanics of ventilation in respiratory studies that allow the analysis, determination and monitoring of diverse human respiratory diseases. The spirometer developed is an instrument portable, of easy handling and computerized that fulfills with the American norms given by the American Thorax Society (ATS) and the requirements of the Mexican population. By means of digital electronics and a pneumotachometer, the virtual instrument acquires and processes the respiratory flow. The spirometry test includes parameters of the mechanics of ventilation like the forced expiratory volume, forced vital capacity, maximum expiratory flow.

The pre score of dyspnea using Modified Borg Scale of dyspnea and vital capacity using digital spirometer was taken. He had a pre score of 3 on dyspnea and 1.5L on vital capacity. The patient received ACBT for 2 session per day for 10 minutes and 5 days per week for 6 weeks. Home program exercises were also done by the patient. The post test score were evaluated and recorded at the interval of every 2 weeks for 6 weeks. After the treatment period post test was taken. The post test value for dyspnea was 0.5 and for vital capacity it was 4.8L. A good improvement was seen in the patient after giving ACBT. With reference to the statistical analysis and interpretation it's noticed that, in this study, ACBT is used to reduce dyspnea and to improve vital capacity. The active cycle of breathing technique is used to mobilize and clear excess bronchial secretions.

LIMITATIONS AND SUGGESTIONS

Limitations

- The study was a single case study.
- This study does not produce enough demographic data on the effectiveness for wide range of patients.
- The study duration was only for a short period.
- Only few exercises were done in this study.
- The effectiveness of the treatment varies from person to person.

Suggestions

- Further study can be conducted with experimental study or comparative study.
- The study can be done with other interventions.
- Further study can be done in different age groups.
- Further studies can be done as long term study.

CONCLUSION

Hence it's concluded that after 6 weeks of treatment there was statistically significant application of Active cycle of breathing technique plays an important role in reducing dyspnea and increasing the vital capacity among lung abscess subject.

ACKNOWLEDGEMENT

First of all, I would like to express my gratitude to **ALMIGHTYGOD** for providing me with wisdom and knowledge to successfully complete this study. I thank **my parents**, who have given me the opportunity, guidance, encouragement and support throughout the course of my studies. I convey my sincere grateful thanks to **CHAIRMAN Dr. L.P. THANGAVELU, M.S., F.R.C.S AND CORRESPONDENT MRS. SHANTI THANGAVELU M.A.,P.P.G. GROUP OF INSTITUTIONS**, Coimbatore for their encouragement and for providing the resources for the success of this study. I would like to express my sincere thanks to my **PRINCIPAL Dr. C. SIVAKUMAR M.P.T. Ph.D.** who has given me his precious time and his vast experience, helped me successfully complete this dissertation. I extend my special thanks and sincere gratitude, to my **VICE-PRINCIPAL MRS.M. PRADEEPA, MPT., Ph.D.**, for her guidance, support and constant encouragement throughout this project. I also express my special thanks and gratitude to my **GUIDE, Mrs. J. PRIYA JOSEPHINE MPT., ASSOCIATE PROFESSOR** for offering me perceptive inputs and guiding me entirely through the course of my work. Without her tiredness guidance, support and constant encouragement this project would not have come through. My heartfelt thanks to all the **PHYSIOTHERAPY FACULTY** members for their guidance and encouragement during my studies. I would like to thank my **participants** who cooperated to fulfill this project work possible. I am privileged to express my thanks to my dearest friends especially the **"CONQUERORS"**, for their marvelous support, help, motivation and encouragement throughout my studies.

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