Original Article

Comparison of the Active Cycle of Breathing Technique (ACBT) versus Active Cycle of Breathing Technique with Flutter in Bronchiectasis

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ABSTRACT

Background: Bronchiectasis is defined as a permanent and abnormal dilatation of airways with impairment of mucociliary clearance mechanism that leads to inflammation and increased mucus production. It is the commonest disease with a high prevalence rate in the industrial and rural populations. The objective of the study was to compare the active cycle of breathing technique (ACBT) versus the active cycle of breathing technique and flutter in patients with bronchiectasis.

Materials and methods: Ethical approval was obtained. 40 subjects were included in the study with age groups of 55 to 75 years. A baseline assessment of participants was taken. Dyspnea was measured on mMRC and Spo2 was recorded on the pulse oximeter. Subjects were divided into two allotted 2 groups (control and experimental) and baseline readings were recorded. After the treatment dyspnea and spo2 were recorded.

Result: There was no statically significant difference in saturation level and in dyspnea value in both the groups. ($p<0.05$)

Conclusion: ACBT and flutter device shows significant improvement in treating bronchiectasis patients, but when compared both the techniques are equally effective.

Keywords: Bronchiectasis, ACBT, flutter device, mMRC, SpO2

INTRODUCTION

Bronchiectasis is defined as a permanent and abnormal dilatation of airways with impairment of mucociliary clearance mechanism that leads to inflammation and increased mucus production.[1] Bronchiectasis is the commonest disease with a high prevalence rate in the industrial and rural populations. Clinical features of the disease include fever, dyspnea, chronic cough, purulent sputum, hemoptysis, and pleurisy. Antibiotics and chest physical therapy maneuvers are the mainstay treatment for the disease.[2]

Active clearance techniques (ACT) are the essential part in treating bronchiectasis patients.[3] Various airways clearance techniques like postural drainage, autogenic drainage, ACBT are used in treating bronchiectasis patients. Devices like a flutter, acapella, high-frequency oscillation, positive expiratory pressure technique are also recommended recently in the treatment of bronchiectasis.[4]

The ACBT is the most routinely used technique for bronchial hygiene decreasing the rate of inflammation and infection and improving the lung functions by removing secretions.

It consists of three phases:-

(1)Breathing control

(2)Thoracic expansion exercise

(3)Forced expiratory technique[5]

Breathing control:- In this phase, a normal breathing pattern is followed with normal tidal volume, by relaxing the shoulders and upper chest using the lower chest. It helps for relaxing the airways: the patient keeps both the hands on the abdomen and patientinhales using nose and exhale using the mouth. This technique should be repeated six times.

Thoracic expansion exercises:-These exercises are also called as deep breathing exercises which focus more on inhalation. Through collateral channels, resistance to airflow is reduced resulting in increasing lung volume. In this phase, a patient inhales through the nose, holds it for two to three seconds, and exhales out. These exercises may be used in combination with chest percussion and using shaking followed by breath control phase.

Forced expiratory technique:- In this phase coughing and huffing techniques with breathing control are combined. Huffing is done through low lung volume that results in mobilizing and clearing the secretions. After the secretions are mobilized they are cleared using coughing or huffing techniques. This technique should be repeated till the clearance of mucus followed by a relaxed diaphragmatic form of breathing to prevent from bronchospasm.[6]

Flutter device is the small portable pipe-like device with a steel ball placed in the cone. As the displacement of steel balls occurs it creates an oscillating pressure wave, this positive expiratory pressure helps to loosen the secretions, prevent the closure of bronchi and mobilize the sputum.[7] It is a controlled vibratory system.[8]

Application of using flutter device:-

This device is used in sitting and supine positions. The patient is explained to breath deeply and hold the breath for two to three seconds.

Expiration should be done through the flutter device. During expiration, it causes up and down movement of steel ball creating oscillation in the chest wall followed by forced expiratory technique. This technique should be done for 20 minutes with 3 sets of repetition.[9]

Flutter is a portable instrument and it is somewhat costly, whereas ACBT does not require any instrument. ACBT is easy to learn and practice. So this study was undertaken to compare the effectiveness of ACBT versus ACBT and flutter in bronchiectasis and to find the immediate effect of ACBT alone and ACBT with flutter in bronchiectasis.

METHOD

The study was carried out after approval from an institutional ethical committee and with fully informed consent from the subjects. This was an experimental study on the diagnosed case of bronchiectasis. 40 subjects were included in the study and they were allotted in two groups. Group A with ACBT and group B with ACBT along with flutter technique. Subjects included are both male and female in the age group of 55 to 75 years with diagnosed cases of bronchiectasis since 1 year and on regular medications. Active smokers, presenting with co-existing pneumothorax, cardiovascular, and neurological disorders, patients on AKT treatment were excluded. After clinical assessment oxygen saturation was recorded by pulse oximeter and dyspnea was measured by mMRC scale for dyspnea. Subjects were trained with ACBT and flutter technique depending on the allotted groups and treatment was given. After treatment oxygen saturation and mMMRC scale were recorded.

The statistical analysis was done using Microsoft Excel [version 2010] Descriptive statistics was presented on the patient characteristics. Comparison was done using paired and unpaired t test within and between the groups on saturation level and dyspnoea. A significance level of .05 was used for all statistical tests.

RESULTS

There was total 40 subjects included in the study. More than half of the cases were between 55 to 65 year of age.

As shown in table 2 saturation levels and dyspnea are statistically significantly improved in group A post treatment. Saturation levels and dyspnea are also statistically significantly improved in group B post treatment.

A shown in table 3 Preintervention Saturation levels and dyspnea are not statistically significantly in between group A and in group B. Postintervention Saturation levels and dyspnea are not statistically significantly in between group A and in group B.

DISCUSSION

The present study was to compare ACBT versus ACBT along with flutter technique in bronchiectasis patients.

Table 1: Age wise distribution of subjects

Age group (year)	No. of patients
55 to 60	10
60 to 65	12
65 to 70	9
70 to 75	9

Table 2: Comparing mean of saturation level and dyspnea levels in group A and group B pre and post treatment

Study Group	Saturation level Mean ± SD	Dyspnea levels Mean ± SD
Group A		
preintervention	93.900±3.463	3.400±0.6806
postintervention	97.800±2.707	2.650±0.9881
P value	0.0003	0.0081
Group B		
preintervention	92.100±2.864	3.500±0.6882
postintervention	96.500±2.606	2.200±0.8944
P value	<0.0001	<0.0001

Table 3: Comparing preintervention mean and standard deviation values of oxygen saturation level and mMRC between group A and group B.

Comparison Groups	SPO2 (Mean ± SD)	mMRC (Mean ± SD)
Pre-treatment		
Group A	93.900±3.463	3.400±0.6806
Group B	92.100±2.864	3.500±0.6882
P value	0.0813	0.6295
Post treatment		
Group A	97.800±2.707	2.650±0.9881
Group B	96.500±2.606	2.200±0.8944
P value	0.0932	0.9203

The finding of the present study on Spo2 after treatment with ACBT showed improvement in oxygen saturation. The findings of the present study were supported by the study done by Bipin Puneeth et al 2012 performed a randomized experimental type(RCT) of study on 30 bronchiectasis patients and it was divided into two groups. One group received ACBT and the other group with postural drainage. Pre and post-treatment parameters was recorded on FVC, FEV1, PEFR, and Spo2. This study stated that postural drainage and ACBT both showed significant effects in clearing the secretions, but ACBT showed more effect in airway clearance than postural drainage.[2]

The finding of the present study on Spo2 after treatment with the flutter device showed significant improvement in the saturation level of oxygen. The findings of the present study were supported by the study done by Shambhan Jahan et al 2015 conducted a RCT on 30 patients of chronic obstructive pulmonary disease with the age group of 40 to 60 years. Patients were grouped into two and one group was treated with flutter device and other with autogenic drainage. Respiratory rate, pulse rate, oxygen saturation, and peak expiratory flow rate were assessed before and after the intervention. The study concluded that both the techniques are equally effective, but flutter is more effective than autogenic drainage in chronic obstructive pulmonary disease patients. [10]

Another study done by Joana Tambascio et al conducted a RCT on 18 patients of bronchiectasis and treated with a flutter device. Arterial pressure, respiratory frequency, cardiac frequency, and oxygen saturation were measured. The study showed significant improvement after giving treatment with a flutter device on the parameters.[11]

The finding of the present study on mMRC after giving treatment with ACBT showed significant improvement in dyspnea level. The findings of the present study were supported than the study done by Hesham A Abdel Halim et al 2015 conducted a RCT on 30 bronchiectasis patients. Patients were grouped into two groups. Group 1 was treated with ACBT and postural drainage and group 2 was treated with conventional chest physical therapy technique. Pre and post-assessment of patients were done with Leicester cough questionnaire, mMRC scale for dyspnea, clinical assessment including body mass index, weight, height, sputum examination, arterial blood gas, renal and liver function test, and spirometry. The study stated significant improvements after treated with ACBT with postural drainage in bronchiectasis patients. [12]

The findings of the present study after giving treatment with ACBT and flutter device on mMRC resulted in improvement in dyspnea level. The finding of the present study was supported by the study done by Bilge Uzmezoglu et al 2018 conducted a RCT on bronchiectasis patients. The patients were examined with pulmonary function, reversibility test, Borg scale for dyspnea, mMRC scale, Short-form- 36 Quality of Life questionnaire. The Study concluded that the flutter device and active cycle of breathing technique showed significant improvements in airway clearance.[13]

CONCLUSION

ACBT as well flutter device produces significant and remarkable benefits on patients of bronchiectasis but when compared active cycle of breathing technique and flutter device both are equally effective.

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