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ORIGINAL ARTICLE

Comparison between active cycles of breathing with postural drainage versus conventional chest physiotherapy in subjects with bronchiectasis



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KEYWORDS

Bronchiectasis;
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Abstract *Introduction:* Bronchiectasis is a chronic debilitating condition with abnormal permanent dilatation of the airways causing impaired mucus clearance, despite regular chest physiotherapy being mainstay of management for bronchiectasis, there is little evidence supporting regular chest physiotherapy in bronchiectasis which aims to mobilize secretions and facilitate effective expectoration, providing control of cough and improving airway clearance. The objective of this study was to compare between the efficacy of 2 techniques of chest physiotherapy ACBT with postural drainage and conventional chest physical therapy as a method of airway clearance in adults with productive bronchiectasis.

Methods: The study included 30 subjects, 20 males and 10 females; all having bronchiectasis, the study was carried out on October 6 at the University Hospital. The participating subjects underwent conventional chest physical therapy or ACBT following postural drainage as the airway clearance technique in random order on 14 successive days with twice daily frequency.

Results: There was a significant difference regarding mMRC before and after both ACBT and conventional physiotherapy, there was a significant improvement regarding FVC and MMEF after ACBT while there was a significant improvement of FEV1 and MMEF after conventional physiotherapy. As regards arterial blood gas data comparison, there were significant improvements regarding PaCO₂, PaO₂ and PAO₂ while there was no significant difference as regards P (A-a) O₂ after both types of physiotherapy techniques. Comparison between the 2 groups regarding mMRC dyspnea score, spirometry, arterial blood gas data, Leicester cough questionnaire (LCQ) and sputum wet volume before starting physiotherapy shows no significant difference while there were significant differences in advance to post ACBT physiotherapy sessions as regards PaO₂, P (A-a) O₂ gradient, LCQ (physical domain score and total score) and sputum wet volume.

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Conclusion: ACBT with postural drainage is found to be more effective than conventional chest physical therapy management of bronchiectasis during infective exacerbation.

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Introduction

Bronchiectasis is a chronic debilitating condition, with abnormal long-lasting dilatation of the airways causing compromised mucus clearance, chronic bacterial infection and persistent bronchial inflammation. Subjects suffer from daily cough, extra sputum production and frequent exacerbations [1]. They may also report breathlessness, wheeze and fatigue. Such incapacitating symptoms impact on subjects' health-related quality of life (HRQoL) [2].

Away from any sensible suspicion, one of the greatest accomplishments of medicine in the treatment of bronchiectasis is physiotherapy, where it effectively reduces its morbidity and mortality especially during repeated infective exacerbation [3]. Physiotherapy aims to loosen secretions and facilitate efficient expectoration, through control of cough and enhancing airway clearance. Therefore it is broadly advocated as a pillar of management of bronchiectasis.

Despite little evidence supporting the routine use of regular chest physiotherapy in bronchiectasis it provided significant profits compared with no chest physiotherapy [4].

Previous small studies in bronchiectasis have compared various techniques, some realized small alterations being achieved by many methods of chest physiotherapy as regards improvement in functional capacity and HRQoL [5,6]. More studies are needed to explore prospective benefits on other outcome measures in order to determine a method to be superior; however, patient preference was subjective besides the related effects on lung function during the exacerbations [1].

The aim of this study is to compare the efficacy of twice daily physiotherapy using active cycles of the breathing method with postural drainage (ACBT-PD) against conventional chest physiotherapy in bronchiectasis subjects not previously practicing regular chest physiotherapy.

Methods

Subjects

The study was conducted on 30 subjects, recruited from the inpatient department of October 6 University Hospital, complaining of infective exacerbation of bronchiectasis which was defined as a clinical deterioration with all of the following: increasing cough, increasing sputum volume and worsening sputum purulence [7].

The subjects were randomly assigned to receive either active cycle breathing technique physiotherapy with postural drainage or the conventional chest physiotherapy technique and accordingly they were divided into 2 groups; group (1): included 15 subjects who underwent the active cycle breathing physiotherapy technique with postural drainage; 10 males and 5 females, their mean age was (53.73 ± 14.78) years; and group (2): included 15 subjects who underwent the conventional chest

physiotherapy technique; 10 males and 5 females, their mean age was (49.40 ± 15.43) years). The study was approved by the review board of pulmonary medicine department of the Ain Shams University and signed informed consents were obtained from all subjects. All subjects were subjected to the following on admission: medical history including a history of smoking, Leicester Cough Questionnaire (LCQ) and modified medical research council (mMRC) dyspnea scale (filled by the attendant physician), clinical examination including anthropometric measurements (weight, height and calculated body mass index (BMI), sputum collection daily with monitoring of amount (in mL) and type, sputum examination including (Gram stain, Zeihl Nelsen stain, culture and sensitivity) high resolution chest computerized tomography with contrast, electrocardiogram, liver and renal function tests, spirometry, arterial blood gas analysis, calculated PAO_2 (using alveolar gas equation) and $P(A-a)O_2$ gradient.

Exclusion criteria

Participants were excluded if they have:

- (1) Smoking history or physician diagnosis of COPD [8].
- (2) A clinical diagnosis of asthma [9].
- (3) Interstitial lung disease (clinical/radiological diagnosis); pneumonia (clinical/radiological diagnosis); acute or chronic other comorbid disease (clinical/laboratory diagnosis).
- (4) Respiratory failure.
- (5) Hemoptysis.
- (6) Inability to perform the physiotherapy techniques.
- (7) Corticosteroid intake during the previous 4 weeks.

All subjects received standard medical treatment in the form of: empirical antibiotics, inhaled bronchodilator (β_2 -agonist and/or anticholinergic), mucolytic. The antibiotic regimen was modified later on (if needed) according to the results of the sputum culture and sensitivity.

Cough specific health-related quality of life (HRQoL)

HRQoL was measured using the Leicester Cough Questionnaire (LCQ) which measures the physical, psychological and social impact of chronic cough [10]. It consists of 19 items with responses based on a 7-point scale and has been validated in subjects with bronchiectasis. A higher score indicates less impact on HRQoL [11].

mMRC dyspnea scale

A scoring method was used which uses a simple grading system to assess a patient's level of dyspnea. It is composed of 5 grades (0–4) with higher scores indicating more dyspnea severity [12].

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