

# A Comparative Study on the Effectiveness of Active Cycle of Breathing Technique with Postural Drainage Versus Conventional Chest Physiotherapy in Bronchiectasis

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## ABSTRACT

**Aim:** The aim of the study was to improve the quality of breathing in bronchiectasis by comparing the effectiveness of active cycle of breathing technique with postural drainage versus conventional chest physiotherapy.

**Methods:** A sample of 30 patients within age group of 40-65 years with bronchiectasis were divided into two groups A and B. Each group consist of 15 subjects. The subjects in group A treated with ACBT with postural drainage, group B treated with conventional chest physiotherapy. The score of dyspnea and the expiratory flow rate was measured with the modified borg dyspnea scale and the peak flow meter. The pre and post-test results were tabulated and assessed.

**Results:** The study concludes that there was statistically significant improvement in group A compared to group B in response to treatment.

**Conclusion:** Based on the result the finding suggests that the Active cycle of breathing technique with postural drainage was more effective than conventional chest physiotherapy in bronchiectasis.

**Keywords:** Active cycle of breathing, postural drainage, conventional chest physiotherapy, peak flow meter, modified borg dyspnea scale

## INTRODUCTION.

Bronchiectasis is still a gruelling habitual lung complaint in developing countries. It is characterised by endless dilation and abnormal widening of the bronchi that generally occurs in the context of airway inflammation [1]. The clinical diapason of the complaint is broad. While some patients with mild disease are asymptomatic between exacerbations, others usually have mucoid foam that becomes purulent during the infective process [1]. The complaint can lead to intermittent lower respiratory tract infections, worsening pulmonary functions, respiratory failure, and pulmonary arterial

hypertension (PH), resulting in increased morbidity and premature mortality [2, 3].

Patients with bronchiectasis can also have PH and cardiac pathologies [4, 5]. Towards these goals, the European Multicentre Bronchiectasis Audit and Research Collaboration (EMBARC) was developed in 2012 as the first international bronchiectasis network, seeking to promote clinical and translational research in bronchiectasis. (6) Although historically considered a neglected disease, bronchiectasis has become a disease of renewed interest over the past decades in light of an increase in prevalence and an increasing burden on healthcare systems ((7-

8) The current model of bronchiectasis pathophysiology originates with Cole's "vicious cycle hypothesis" (9). Cole described how chronic bronchial sepsis depended on an initially compromised mucociliary clearance that allowed certain microbes to colonize the airway through their ability to release factors that inhibit and damage the ciliated epithelium. Once established, this microbial colonization prompted the host to respond with a nonspecific and immune inflammatory response that failed to clear the microbial flora but damaged the innocent bystander lung. This further compromised bronchial clearance mechanisms in a vicious cycle of events with the end result of progressive lung damage (10). The ACBT is an ACT which uses modulation of breathing to employ the physiological effects of interdependence and collateral ventilation to improve ventilation, which when combined with a huff will aid secretion clearance [11]. requires no equipment and can be completed in differing positions Postural drainage is the positioning of a patient with an involved lung segment such that gravity has a maximal effect of facilitating the drainage of broncho-pulmonary secretions from the tracheobronchial tree.[12]It is based on the concept of gravity-assisted mobilization of secretions and transport it for removal. Chest physiotherapy aims to mobilise secretions and facilitate effective expectoration, providing control of cough and improving airway clearance. It is widely advocated as a mainstay of management for this chronic disease (13)

**Methods:** The study was conducted at Srinivasa Mult speciality hospital and erode medical hospital under the supervision of concerned authority. A sample of 30 patients with in the age group of 40-60 years with bronchiectasis were randomly divided into two groups. A total number of 30 subjects were selected by random sampling method after due consideration to inclusion criteria. They were divided into two groups. Group A and Group B with 15 subjects in.

each group. Group A received ACBT with postural drainage and group B received conventional chest physiotherapy in addition to selected physiotherapy programme for a total duration of 14 days with twice daily. The parameter used for the study was modified borg dyspnea scale and peak flow meter, both males and females are included in the study. exclusion criteria of respiratory failure, hemoptysis, COPD, history of asthma.

## PROCEDURE

The 30 subjects who met inclusion criteria were recruited for the study by purposive sampling method. After the informed consent was obtained, they were divided into two groups, group A and group B Group A with 15 subjects and group B with 15 subjects. Group A were given with Active cycle of breathing technique with postural drainage and group B Were given with conventional chest physiotherapy only for 30 minutes for 2 times per day for 2 weeks. And pre test and post-test treatment values are measured before and after 2 weeks for comparison.

**TECHNIQUE:** For group A the active cycle of breathing technique with postural drainage were given to remove the excess secretion.

### Active cycle of breathing technique: Procedure

Breath in and out gently through the nose for 20 to 30 sec to control breathing followed by a long slow deep breath into the lungs and hold the air for 2 to 3 seconds before breathing out. repeat for 3 to 5 times. One or two Huffing followed by coughing is needed to remove the secretion.

### Postural drainage Procedure

The patient is tilted at an angle required and chest percussion is performed to loosen the secretions. In generally the upper lobe segment have the advantage of gravity drainage. An middle and lower lobes

required 14 to 18 inches tilt for drainage. Position should generally held for 10 to 15 minutes. Standard positions are modified according to the patient's condition.

**Chest physiotherapy.**

For group B the conventional chest physiotherapy is given for the effectively increasing in the lung volume and also helps to reduction in the viscosity of mucus.

**PROCEDURE**

Gently Perform chest percussion rhythmically by striking the chest wall alternately with cup shaped hand. Perform

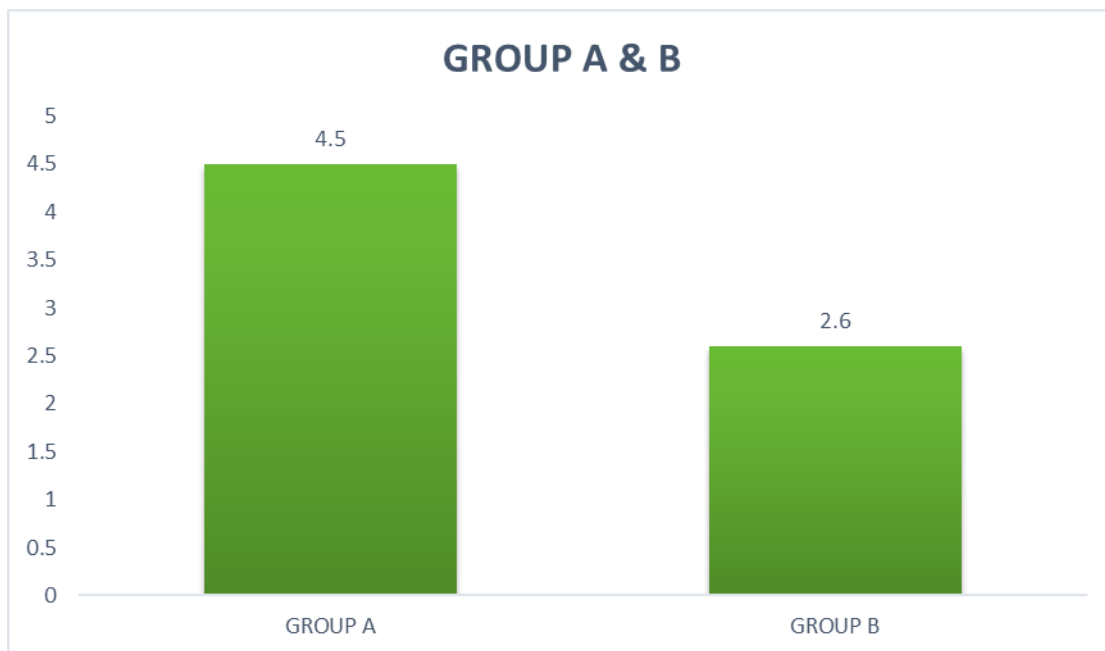
percussion over single layer of clothing and each area is percussed for 30 to 60 seconds. Gently vibrate the chest wall as the patient exhales slowly through the pursed lips. After each vibration encourage the patient to cough and expectorate secretion into the sputum container.

**RESULTS**

The Unpaired t test for Group A vs Group B in modified borg dyspnea scale. The comparative mean value, mean difference, standard deviation and unpaired "t" values between pre-Vs post-test of Modified Borg dyspnea scale in Group A and Group B.

S. No	Group	Modified borgdyspnea scale			Un Paired t-Value
		Mean	Mean Difference	Standard deviation	
1	Group A	4.5	1.9	0.2	5.7
2.	Group B	2.6			

**MODIFIED BORG DYSPNEA SCALE  
Unpaired t test Group A vs Group B**



The unpaired t test value of 5.7 was greater than tabulated t value of 2.15 which shows statistically significant difference at 0.05 level between the Group A and Group B. The pre vs post-test mean Group A was 4.5 and pre vs post-test mean of Group B was 2.6 and mean difference of Group A and Group B was 1.9 which showed that there

was statistically improvement in Group A than Group B. The unpaired t test value for group A and B in peak expiratory flow meter. The comparative mean value, mean difference, standard deviation and unpaired "t" values between pre Vs post-test of peak expiratory flow rate in Group A and Group B.

S.No	Group	Peak expiratory flow rate			UN Paired t-Value
		Mean	Mean Difference	Standard deviation	
1	Group A	137.33	56	4.06	13.78
2.	Group B	81.33			

GRAPH: Group-A & GROUP B {peak expiratory flow rate}



The unpaired t test value of 13.78 was greater than tabulated t value of 2.05 which shows statistically significant difference at 0.05 level between the Group A and Group B. The pre vs post-test mean Group A was 137.33 and pre vs post-test mean of Group B was 81.33 and mean difference of Group A and Group B was 56 which showed that there was statistically improvement in Group A than Group B.

## DISCUSSION

The purpose of the study was to compare the Active cycle of breathing technique with postural drainage versus conventional chest physiotherapy in bronchiectasis to improve the quality of breathing. The modified borg dyspnea scale and peak expiratory flow rate was taken as the parameters for measuring the dyspnea and expiratory flow rate in bronchiectasis. The study sample comprised of 30 patients of which each 15 subjects in group A and group B. The age of the subjects was 40 to 65 years. Among the 30 subjects. 15 were treated with Active cycle

of breathing technique with postural drainage and 15 were treated with conventional chest physiotherapy.

The J E Patterson proposed a randomized study on Active cycle of breathing techniques versus test of incremental respiratory endurance in bronchiectasis. He randomly selected 20 patients in a single session. Author concluded that Active cycle of breathing techniques is more effective than the test of incremental respiratory endurance.

The Lisa J Franks evaluates in this study, the researcher used a modified borgs cale for measuring the dyspnea score in bronchiectasis patient. Each participants recorded performance of the modified borg scale was scored Independently, the research demonstrated that the modified scale shows good Test-retest reliability. These modified borg scale could be used to assess the dyspnea of the patient in bronchiectasis.

### **In the analysis and interpretation of modified borg dyspnea scale between Group A and Group B.**

The unpaired t test value of group A and group B was 5.7 greater than tabulated t value of 2.05 which shows statistically significant difference at 0.05 level between the pre-test and post-test results of group A and group B. The pre vs post-test mean value of Group A was 1.4 and pre vs post-test mean of Group B was 2.6 which was greater than group A and mean difference of Group A and Group B was 1.2 which showed that there was statistically improvement in Group A than Group B.

### **In the analysis and interpretation of peak expiratory flow rate test between Group A and Group B.**

The unpaired t test value of group A and group B was 13.78 greater than tabulated t value of 2.05 which shows statistically significant difference at 0.05 level between the pre-test and post-test results of group A and group B. The pre vs post-test mean value of Group A was 137.33 and pre vs post-test mean of Group B was 81.33 which was greater than group A and mean difference of Group A and Group B was 56 which showed that there was statistically improvement in breathing quality of patient in bronchiectasis in Group A than Group B. Based on the statistically analysis and interpretation the results of the study showed that there was significant improvement in breathing quality of modified borg dyspnea scale and peak expiratory flow rate test in bronchiectasis treated with Active cycle of breathing technique with postural drainage than with the conventional chest physiotherapy.

### **CONCLUSION**

The study concluded that the Active cycle of breathing technique with postural drainage was effective in removal of secretion and improve the quality of breathing than the conventional chest physiotherapy.

### **Recommendations**

A similar study may be extended with larger sample.

Further studies can be conducted over other respiratory conditions.

The Active cycle of breathing technique and postural drainage may be applied to the other COPD conditions also.

The ACBT may be compared with breathing exercises also.

The study can be conducted for different age also.

### **Declaration by Authors**

**Ethical Approval:** Approved

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**Conflict of Interest:** The authors declare no conflict of interest.

### **REFERENCE**

1. N. Al-Shirawi, H. H. Al-Jahdali, and A. Al Shimemeri, "Pathogenesis, etiology and treatment of bronchiectasis," *Annals of Thoracic Medicine*, vol. 1, pp. 41–51, 2006. View at: [Google Scholar](#)
2. M. Habesoglu, A. Ugurlu, and F. Eyuboglu, "Clinical, radiologic, and functional evaluation of 304 patients with bronchiectasis," *Annals of Thoracic Medicine*, vol. 6, no. 3, pp. 131–136, 2011. View at: [Publisher Site](#) | [Google Scholar](#)
3. M. C. Pasteur, S. M. Helliwell, S. J. Houghton et al., "An investigation into causative factors in patients with bronchiectasis," *American Journal of Respiratory and Critical Care Medicine*, vol. 162, no. 4, pp. 1277–1284, 2000. View at: [Publisher Site](#) | [Google Scholar](#)
4. C. D. Vizza, J. P. Lynch, L. L. Ochoa, G. Richardson, and E. P. Trulock, "Right and left ventricular dysfunction in patients with severe pulmonary disease," *Chest*, vol. 113, pp. 576–83, 1998. View at: [Publisher Site](#) | [Google Scholar](#)
5. S. Öcal, O. Portakal, A. Öcal, A. U. Demir, A. Topeli, and L. Çöplü, "Factors associated with pulmonary hypertension and long-term survival in bronchiectasis subjects," *Respiratory Medicine*, vol. 119,

- pp. 109–114, 2016. View at: [Google Scholar](#)<sup>4</sup>
6. Chalmers JD, Aliberti S, Polverino E, et al. The EMBARC European Bronchiectasis Registry: protocol for an international observational study. *ERJ Open Res* 2015; 1: 00081-2015. [Google Scholar](#)
  7. Quint JK, Millett ER, Joshi M, et al. Changes in the incidence, prevalence and mortality of bronchiectasis in the UK from 2004 to 2013: a population-based cohort study. *Eur Respir J* 2016; 47: 186–193. [Abstract/FREE Full Text](#) [Google Scholar](#)
  8. Cole PJ. 1986. Inflammation: a two-edged sword—the model of bronchiectasis. *Eur. J. Respir. Dis. Suppl.* 147:6–15 Cole’s vicious-cycle hypothesis remains the bedrock of subsequent mechanistic iterations.
  9. Cole P. 1989. Host-microbe relationships in chronic respiratory infection. *Respiration* 55(Suppl.1)
  10. O’Neill K, O’Donnell AE, Bradley JM. Airway clearance, mucoactive therapies and pulmonary rehabilitation in bronchiectasis. *Respirology*. 2019 doi: 10.1111/resp.13459. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
  11. West MP. Postural Drainage. *Acute Care Handbook for Physical Therapists*. 2013 Sep 27:467.
  12. O’Neill B, Bradley JM, McArdle N, et al. The current physiotherapy management of patients with bronchiectasis: a UK survey. *Int J Clin Pract* 2002; 56:34–35.
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