

Effects of Active Cycle of Breathing Techniques on quality of life in patients with Chronic Bronchitis

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ABSTRACT

Background: In patients with a range of respiratory disorders such as chronic bronchitis, active cycle of breathing techniques which includes cycle of breathing control, thoracic expansion exercises and forced expiratory technique (FET), appears to have beneficial effects.

Objectives: To determine the effectiveness of active cycle of breathing techniques with conventional medicine among chronic bronchitis patients.

Methods: A quasi-interventional study was conducted in a physiotherapy department of 600 bedded Ibne Siena Hospital of Multan, from August 2020 to July 2021 with 26 patients in the experimental group who followed the pharmacological and active cycle breathing techniques treatment while the 26 patients in control group patients received the basic routine pharmacological treatment only. Patients were assessed through the help of the Saint George Respiratory Questionnaire (SGRQ) from baseline to 3 months in both groups.

Results: Baseline treatment showed mean SGRQ total score was 26.53 ± 27.39 in the control group and 20.0 ± 20.27 ($p < 0.33$) in the experimental group. Assessment after 3 months showed mean SGRQ total score was 14.50 ± 12.26 in control group and 8.11 ± 10.32 ($p < 0.04$) in experimental group.

Conclusion: Active cycle of breathing techniques was more effective with conventional medicine among chronic bronchitis patients in comparison with patients with medicine alone. Significant differences was observed in symptoms, activity, impact, and total SGRQ scores of the experimental group.

Keywords: ACBT, breathing exercise, COPD, pulmonary rehabilitation, quality of life

DOI: <http://doi.org/10.33897/fujrs.v2i2.275>

Introduction:

Individuals with chronic lung illness who have excess bronchial secretions are frequently prescribed to employ airway clearance procedures on a daily basis. (1) Clearing secretions and improving alveolar ventilation are the goals of these procedures including chronic bronchitis patients. (2) Conventional chest physiotherapy, which includes gravity-assisted drainage positions, percussion, vibrations, and coughing, has been the traditional airway clearance method for those individuals among chronic bronchitis patients. (3) The prevalence of chronic bronchitis is 3.6% (95% CI: 3.1-4.0%) in Pakistan. (4) The active

cycle of breathing techniques (ACBT) is an airway clearance treatment that can be done with or without an assistant and has been demonstrated to be more successful than traditional chest physiotherapy in terms of weight and rate of sputum expectorated. Because of the increased incidence of chronic bronchitis, active cycle of breathing techniques has gotten a lot of attention. Similarly, pharmaceutical therapies such as bronchodilators are often administered for chronic bronchitis patients in outpatient departments and pulmonology units. (5)

The active cycle of breathing technique (ACBT) is a technique for mobilizing and clearing excess pulmonary secretions from the periphery of the lungs without obstructing airflow. It's a combination of thoracic expansion exercises, breathing control, and forced expiratory technique (FET) and FET is the combination of forced expiration with an open glottis and intervals of breathing control. The ACBT also help in improving breathing or ventilation, reduce chest infection and loosen secretions of the lungs. (6) ACBT consists of three main phases. (7) First one is breathing

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Received: March 3rd, 2022; **Revision:** June 21st, 2022

Acceptance: June 29th, 2022

How to Cite: Mansha H, Rashid S, Khalid MU, Khan RR, Hassan M, Khalid H. Effects of Active Cycle of Breathing Techniques on quality of life in patients with Chronic Bronchitis. Foundation university journal of rehabilitation sciences. 2022 July;2(2):40-45.

control, second is deep breathing exercises and third one is huffing or also known as forced expiratory technique (FET). We can add manual chest techniques along with ACBT according to patient condition that can create a more complex and beneficial plan for the improvement and removal of secretions of the lungs. When using ACBT on a patient, he/she is asked to take six deep breaths. Instructions will be given to the patient: your one hand should rest on your abdomen and keep your shoulders at ease to downward position. As you breathe in and out feel your stomach rise and fall accordingly. Repeat this around three to four times, if the patient feels comfortable then it is advised to follow-up back or repeat breathing control cycle. Inspiratory hold should be performed by holding air in the lungs for three seconds at the end of the inspiration and deep breathing exercises are introduced for assistance in peripheral airways to reach mucus plugs present in chest cavity.(8, 9)

Huffing then helps moving the sputum from the small lung airways to the larger lung airways and after that, the coughing is encouraged to remove secretions. Thus coughing alone does not help much removing secretions from terminal airways, excluding the larger inspiration. Repeat this whole process to clean sputum from the end of terminal parts of chest/lungs. The patient can also do ACBT in sitting, lying and side lying positions.(8, 10-12)

Indication of ACBT includes post-surgical pain that can be rib fracture, chronic increase in production of sputum for example in chronic bronchitis and cystic fibrosis.(10, 13) Acute conditions can also be included, reduced lung volumes, continuous secretion production, bronchitis, atelectasis, chronic respiratory muscle weakness, bronchiectasis, mechanical ventilation and asthma.(14)

A quasi-experimental study with 30 participants was conducted to determine the efficiency of autogenic drainage over the ACBT in clearing the airway in chronic bronchitis. The study found no significant difference between the effects of autogenic drainage and the ACBT on mucus clearance and dyspnea levels. Depending on the patient's and therapist's preferences, both airway clearance approaches can be employed effectively in Chronic Bronchitis.(15) In another randomized controlled trial, 500 plus patients were included in the studies that were hospitalized with chronic obstructive pulmonary disease including chronic bronchitis. Patients received manual chest physiotherapy, for airway clearance. The Saint George

Respiratory Questionnaire showed that manual chest physiotherapy may have therapeutic value to subgroups of COPD patients in specific circumstances.(16) Another study with thirty COPD (acute) numbers of patients was allocated in autogenic drainage and active cycle techniques for the period of exactly twenty day after the group randomization. The ACBT showed effective results in increasing the flow-rate of peak expiration, arterial-oxygenation, forced vital capacity, and exercise tolerance. In autogenic drainage, increased level of saturation of oxygen were significantly higher as compared to active cycle breathing method.(17) A study based on the reviews of the available evidences in COPD patients included chronic bronchitis patients receiving different airway-clearance-techniques to find out their significance. 26 articles in the study showed that active-breathing-technique such as ACBTs can be effective in the treatment of COPD including chronic bronchitis patients.(18) In COPD patients, a study was undertaken to see how ACBT is compared to autogenic drainage approach. By using a simple random sample procedure, 30 patients with moderate chronic obstructive lung disease aged 50 to 90 years were chosen and screened according to inclusion criteria. ACBT was found to be more effective in comparison with the other interventions.(19)

There is less high quality research literature available for the comparison of effects of Active Cycle of Breathing Technique with conventional medicine in chronic bronchitis patients alone. So the objective of this study was to find out the effectiveness of active cycle of breathing techniques with conventional medicine among chronic bronchitis patients.

Methods:

A quasi-interventional study was conducted in a physiotherapy department of 600 bedded Ibne Siena Hospital Multan, from august 2020 to July 2021 with 26 patients in experimental group followed the pharmacological and active cycle breathing techniques treatment while the 26 patients in control group patients received the basic routine pharmacological treatment only. Ethical approval PSB/511/2020/MCPM was obtained from ethical committee of Multan College of Physiotherapy, Multan. Inform consent was also taken from the participants.

Age of the participants was between 50 to 80 years old, Stage II COPD patients with no smoking history or 1 pack / week were included. Patient with severe respiratory complications, uncontrolled cardiac and

arterial hypertensive conditions, any active malignancy present, coronary cardiac problems and compromised physical performances due to any musculoskeletal impairment were excluded from the study.

Patients were assessed through the help of Saint George respiratory Questionnaire (SGRQ) which is disease-specific instrument designed to measure impact on overall health, daily life, and perceived well-being in patients with obstructive airways disease. Scaling includes Part 1: (Symptoms) frequency & severity with 1, 3 or 12-month recall (best performance with 3- and 12-month recall) Part 2: (Activity and Impacts) Activities that cause or are limited by breathlessness; Impact components (social functioning, psychological disturbances resulting from airways disease) refer to current state as the recall. Validity include significant correlations between total score and presence of cough, sputum, and wheeze. Data was collected from baseline to 3 months in control and experimental groups for chronic bronchitis patients.(20) Sample size was calculated through sample size calculator. Convenience sampling technique was used. 52 patients were divided into 2 groups, 26 patients received the basic routine pharmacological treatment with no physiotherapy intervention and home plan in control group and 26

patients in experimental group followed the pharmacological and active cycle breathing techniques treatment. Both groups were assessed through the help of Saint George respiratory Questionnaire from baseline to 3 months. Experimental group were taught active cycle breathing techniques and given it as a home plan for at least 2 times a day. Post data was collected after 3 months. The data was analyzed through SPSS version 21 and Independent t test was applied.

Results:

52 patients were recruited in the study with 26 patients/participants in the control group and 26 patients/participants in the interventional groups.

Table 1 showing mean age and gender distribution in control and experimental groups with percentages

	Control group (Mean±SD)	Experimental group (Mean±SD)
Age (Years)	55.19±4.56	52.19±6.34
Gender	Male 14(53.8%)	21(80.8%)
	Female 12(46.2%)	5(19.2%)

Table 2: showing mean results of pre and post SGRQ symptoms, activity, impact and total score in control and experimental groups by applying Independent t test

SGRQ	Control group mean±SD	Experimental group mean±SD	p-Value
Pre SGRQ symptoms	31.19±24.75	37.0±29.11	0.44
Post SGRQ symptoms	26.03±24.38	14.11±17.60	0.04
Pre SGRQ activity	39.76±28.78	47.23±33.31	0.39
Post SGRQ activity	25.11±22.69	13.96±17.08	0.05
Pre SGRQ impact	30.50±24.45	34.80±25.64	0.53
Post SGRQ impact	25.50±22.35	13.26±16.54	0.02
Pre Total SGRQ Score	26.53±27.39	20.0±20.27	0.33
Post Total SGRQ Score	14.50±12.26	8.11±10.32	0.04

Table 3: showing within group analysis results of pre and post SGRQ symptoms, activity, and impact by applying paired t test

Variable	Study Group	Pre Values mean±SD	Post Values mean±SD	p-value
SGRQ symptoms	Experimental group	37.0±29.11	14.11±17.60	0.001
	Control group	31.19±24.75	26.03±24.38	0.133
SGRQ activity	Experimental group	47.23±33.31	13.96±17.08	<0.001
	Control group	39.76±28.78	25.11±22.69	0.028
SGRQ impact	Experimental group	34.80±25.64	13.26±16.54	0.002
	Control group	30.50±24.45	25.50±22.35	0.413
Total SGRQ	Experimental group	20.0±20.27	8.11±10.32	0.004
	Control group	26.53±27.39	14.50±12.26	0.005

Assessment after 3 months showed mean SGRQ symptoms of 26.03±24.38 in control group and 14.11±17.60 ($p<0.04$) in experimental groups, mean SGRQ activity of 25.11±22.69 in control group and 13.96±17.08 ($p<0.05$) in experimental group, mean SGRQ impact of 25.50±22.35 in control group 13.26±16.54 ($p<0.02$) in experimental group while mean SGRQ total score was 14.50±12.26 in control group and 8.11±10.32 ($p<0.04$) in experimental group. Differences within groups from baseline to 3 months are shown in Table 2. Table 3 showed within group analysis results of pre and post mean SGRQ symptoms of 5.15±16.92 ($p<0.413$), pre and post mean SGRQ activity of 14.65±32.11 ($p<0.28$), pre and post mean SGRQ impact of 5.00±30.63 ($p<0.02$) and pre and post mean SGRQ total score was 12.03±19.75 ($p<0.05$) in control group. pre and post mean SGRQ symptoms of 22.88±32.00 ($p<0.001$), pre and post mean SGRQ activity of 33.26±37.03 ($p<0.000$), pre and post mean SGRQ impact of 21.53±32.52 ($p<0.02$) and pre and post mean SGRQ total score was 11.88±19.00 ($p<0.04$) in experimental group.

Active cycle of breathing techniques was more effective with conventional medicine among chronic bronchitis patients in comparison with patients with medicine alone. Significant difference was observed in SGRQ Activity, SGRQ impact, and SGRQ total scores

of the intervention group.

Discussion:

In individuals with airway problems, active cycle of breathing technique is a common intervention. Previous researches has shown that pulmonary rehabilitation can help COPD patients improve their endurance and reduce their problems. Nonetheless, there are limited high quality studies on the impact of active cycle of breathing technique in improving patient quality of life.

Both groups were similar at the start of the trial in terms of age. However, there was a significant improvement in the experimental group in comparison to the control group in terms of SGRQ total score, indicating that active cycle of breathing technique with standard medical/pharmacological treatment has more effective results in better symptoms, activity, impact and total score, when compared with medical/pharmacological treatment alone. The findings are also supportive or in line with previous researches that it has been found that active cycle of breathing technique can help chronic bronchitis patients improve their functional status.(21, 22)

In the terms of physical performances by the evaluation through st. George respiratory Questionnaire. According to Baumann, 2012 effective outcomes were present between control/experimental

groups in 6 minute walk test distance showed +59 m and 95% of CI 28 to 89 m, work load was ranged from +7.4 - Watt and 95% of CI 0.5 - 13.4 Watt and Saint George's Respiratory Questionnaire $p > 0.005$ while our study shows the p value 0.04 for total SGRQ score(23)

Another study of 100 patients with chronic obstructive pulmonary disease, active cycle of breathing technique showed significant results in the short-term improvement of sputum viscosity, quality of life and cost effectiveness.(24)

Better results can be gained with the same regime including more motivated patient with long duration of follow-up.

Conclusion:

Active cycle of breathing techniques was more effective with conventional medicine among chronic bronchitis patients in comparison with patients with medicine alone. Significant differences were observed in SGRQ symptoms, SGRQ activity, SGRQ impact, and total SGRQ scores of the group with conventional medicine combined with active cycle of breathing techniques.

Disclaimer: The study is part of thesis project of t-DPT submitted to university of health sciences Lahore.

Conflict of interest: Signatory of ethical approval is also a co-author in the paper and research supervisor appointed by University of Health Sciences, Lahore. The signatory was not involved in the ethical approval process and evaluation.

Funding source: None to declare.

References:

1. Herrero-Cortina B, Lee AL, O'Neill B, Bradley JJBS, European Respiratory Society. Airway clearance techniques, pulmonary rehabilitation and physical activity. 2018;331-52.
2. Maria RRJJ. The Position of Leaning Forward to Reduce Breathing of COPD Patients: Literature Review. 2021;5(2):62-8.
3. Mlcak RP, Suman OE, Sousse LE, Herndon DN. Respiratory care. Total burn care: Elsevier; 2018. p. 195-204. e2.
4. Jarhyan P, Hutchinson A, Khaw D, Prabhakaran D, Mohan SJBotWHO. Prevalence of chronic obstructive pulmonary disease and chronic bronchitis in eight countries: a systematic review and meta-analysis. 2022;100(3):216-30.

5. Smallwood N, Ross L, Taverner J, John J, Baisch A, Irving L, et al. A palliative approach is adopted for many patients dying in hospital with chronic obstructive pulmonary disease. 2018;15(5):503-11.
6. Thomson AM, Skinner AT, Piercy J. Tidy's physiotherapy: Butterworth-Heinemann; 1991.
7. Cecins N, Jenkins S, Pengelley J, Ryan G. The active cycle of breathing techniques—to tip or not to tip? Respiratory medicine. 1999;93(9):660-5.
8. Dong J, Li Z, Luo L, Xie H. Efficacy of pulmonary rehabilitation in improving the quality of life for patients with chronic obstructive pulmonary disease: Evidence based on nineteen randomized controlled trials. International Journal of Surgery. 2020;73:78-86.
9. Mane E, Memushaj LJAJotA-IfEL, Studies A. The Effects of Respiratory Physiotherapy in Pneumological Patients. 2018;7(8):83-90.
10. Aggarwal R, Dua V. Physiotherapeutic Management. Textbook of Neuroanesthesia and Neurocritical Care: Volume II-Neurocritical Care. 2019:261.
11. Westerdahl E, Osadnik C, Emtner M. Airway clearance techniques for patients with acute exacerbations of chronic obstructive pulmonary disease: Physical therapy practice in Sweden. Chronic respiratory disease. 2019;16: 1479973119855868.
12. Pryor JJERJ. Physiotherapy for airway clearance in adults. 1999;14(6):1418-24.
13. Harden B, Cross J, Broad MA. Respiratory physiotherapy: An on-call survival guide: Elsevier Health Sciences; 2009.
14. Walker RW, Apte KK, Shimwela MD, Mwaiselage JD, Sanga AA, Namdeo AK, et al. Prevalence, risk factors and clinical correlates of COPD in a rural setting in Tanzania. European Respiratory Journal. 2018;51(2).
15. Samuel JJJoC, Research D. Immediate Effect of the Autogenic Drainage over the Active Cycle of Breathing Technique in Airway Clearance in Subjects with Chronic Bronchitis-A Quasi Experimental Study. 2019;13(11).
16. Cross JL, Elender F, Barton G, Clark A, Shepstone L, Blyth A, et al. Evaluation of the effectiveness of manual chest physiotherapy techniques on quality of life at six months post exacerbation of COPD

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- (MATREX): a randomised controlled equivalence trial. *BMC pulmonary medicine*. 2012;12(1):33.
17. Alnawaiseh N, El-Gamal F. The Effect of Low Altitude on the Performance of Lung Function in Alaghwar Region, Dead Sea, Jordan. *J Pulm Respir Med*. 2018;8(445):2.
 18. D'Abrosca F, Garabelli B, Savio G, Barison A, Appendini L, Oliveira LV, et al. Comparing airways clearance techniques in chronic obstructive pulmonary disease and bronchiectasis: positive expiratory pressure or temporary positive expiratory pressure? A retrospective study. *Brazilian journal of physical therapy*. 2017;21(1):15-23.
 19. Pawadshetty V, Munde S, Sureshkumar T, Pawadshetty U. A Study To Evaluate The Effect Of ACBT Over Autogenic Drainage Technique In COPD Patients-A Comparative Study. *Indian Journal of Physiotherapy and Occupational Therapy-An International Journal*. 2016;10(4):86-90.
 20. Jones P, Quirk F, Baveystock CJRm. The St George's Respiratory Questionnaire. 1991;85:25-31; discussion 3.
 21. Reardon JZ, Lareau SC, ZuWallack RJTAjom. Functional status and quality of life in chronic obstructive pulmonary disease. 2006;119(10):32-7.
 22. Lewis LK, Williams MT, Olds TSJRm. The active cycle of breathing technique: a systematic review and meta-analysis. 2012;106(2):155-72.
 23. Baumann HJ, Kluge S, Rummel K, Klose H, Hennigs JK, Schmoller T, et al. Low intensity, long-term outpatient rehabilitation in COPD: a randomised controlled trial. *Respiratory research*. 2012;13(1):86.
 24. Shen M, Li Y, Xu L, Shi H, Ni Y, Lin H, et al. Role of active cycle of breathing technique for patients with chronic obstructive pulmonary disease: A pragmatic, randomized clinical trial. 2021;117:103880.
- Authors Contribution:**

Mansha H: Design of the work and acquisition of data

Rashid S: Drafting the work and revising it critically for important intellectual content

Khalid MU: Data Analysis

Khan RR: Data Collection

Hassan M: Interpretation of data

Khalid H: Literature review collection and drafting
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