

A Study of effects of Buteyko Breathing Technique on Asthmatic Patients

Ravinder Narwal¹, S.N. Bhaduri², Ajita Misra³

¹Lecturer, HIHT University, Dehradun, UK, ²Head of Deptt. of Physical Medicine & Rehabilitation, Army Hospital (R & R) New Delhi, ³, Lecturer, Sai Institute of Paramedical and Allied Sciences, Dehradun, UK

ABSTRACT

Aim & Objective: The increasing prevalence of asthma is a global phenomenon. Prolonged hyperventilation causes a resetting of the body's acceptable level of carbon dioxide & allowing the respiratory system to maintain chronic over breathing. This larger volume of breathing is the primary element in producing asthma symptoms. Therefore, shallow breathing exercise, in the form of Buteyko Breathing Technique in asthmatic patients may be helpful in reversing hyperventilation & reducing symptoms. So this study is design to evaluate the role of Buteyko breathing technique in improving the lung function, and relieve dyspnea in asthmatic subjects.

Methodology: This experimental study is based on the sample of 30 subjects with mean age of 30 years & diagnosed as having asthma. Patients with known causes of COPD and others respiratory problems were excluded. They were randomly divided into two groups. Group - A, comprising of 15 subjects were treated with Buteyko Therapy and 15 subjects of Group - B were treated with Diaphragmatic Exercise (DE) and Pursed Lip Breathing Exercise (PLBE). Both groups were given treatment 6 days a week for 6 weeks. Parameters were recorded before commencement of treatment and subsequently at completion of 2nd week, 4th week and 6th week of treatment by PFT & dyspnea scale .

Data Analysis: Data was analyzed by using SPSS ver.14.0. Comparison between groups is done with help of 't' test. The level of significance was set at $p < 0.05$.

Result: Group - Buteyko Breathing Technique (BBT) group-A showed significant improvement in the FEV1 and PEFr, and a significant decrease in the levels of dyspnea, where PLBE with DE Group - B showed no significant changes in any of the three measurements.

Discussion & Conclusion: Buteyko Breathing Technique has given a logical treatment for reversing hyperventilation disorders which is responsible for recurrent asthmatic attack, So it can be concluded that Buteyko Breathing exercise when done regularly and properly can stop or reverse the decline in the lung function and reduce dyspnea in asthmatic patients.

Keywords: Asthma, Buteyko Breathing Technique (BBT), Pursed Lip Breathing Exercise (PLBE), Diaphragmatic Exercise (DE), Dyspnea.

INTRODUCTION

Asthma is a chronic inflammatory condition of the airways that is characterized by an increased responsiveness of the airway smooth muscle to various stimuli. It is manifested by widespread narrowing of the airways that reverses either spontaneously or as a result of treatment.¹

Asthma is associated with airway hyper responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing particularly at night or in the early morning. These symptoms are usually associated with widespread but variable airflow limitation that is at least partly reversible either spontaneously or with treatment. The inflammation also causes an associated

increase in airway responsiveness to a variety of stimuli.²

Even though genetic predisposition is one of the factors for the increased prevalence - urbanization, air pollution and environmental tobacco smoke contribute more significantly. Asthma is now one of the world's most common long-term conditions, according to the Global Burden of Asthma Report. The disease is estimated to affect as many as 300 million people worldwide and this number could increase by a further 100 million by 2025.³

Lung function tests are usually used in asthma to measure air flow and lung volumes. If these measurements are done properly, they can prove to be a reliable and objective means of assessing the diagnosis

and treatment of asthma. There are different ways in which PFT can be used to diagnose asthma .

Hyperventilation is an aggravating factor in asthma as it appears to contribute to the inflammation and bronchospasm of the lungs found in asthma through a number of mechanisms including drying and cooling of the airways and possibly also increased friction. Hyperventilation also results in lowered levels of alveolar and arterial carbon dioxide tension⁴

Local and systemic effects of hypocapnia can contribute to breathing related symptoms in asthmatics by increasing bronchospasm, vasospasm and increased nervous system irritability. As increased respiratory volume is a common symptom of an attack, asthma plays a role in increasing hyperventilation and therefore symptoms. There is some evidence that breathing retraining that can break this cycle of hyperventilation may be beneficial for patients with asthma.⁵

Hence the purpose of this study is to evaluate the effect of breathing retraining in asthmatic patients with the help of a shallow breathing exercise called as Buteyko Breathing Technique. The Buteyko Method is a complementary therapy for controlling the symptoms of asthma and other breathing related disorders. The Buteyko Method involves very specific breathing exercises together with reduced breathing work. Butyeko Breathing Technique was developed as a logical treatment for reversing Chronic Hyperventilation Disorders which have been researched, discussed and well documented in the medical literature for the entirety of the 20th Century.⁶

METHODOLOGY

The samples of this experimental study are selected from the asthmatic patients attending the respiratory OPD of Army Hospital (Research & Referral) in New Delhi.

Outcome measurements:- The parameters used for assessment of the treatment were FEV1, PEFr, grades of dyspnea by Spirometer, Stop Watch, ATS Scale of Dyspnea. These parameters were recorded before commencement of treatment and subsequently at completion of 2nd week, 4th week and 6th week of treatment.

GROUP –A - Buteyko breathing technique (shallow Breathing) Consist of 3 steps –

Step 1 - The “control Pause” Breathing Test. Subject was instructed for breath holding as long as subject feel comfortable. The goal is to be able to hold it for at least 60 seconds.

*Step 2 –*Shallow Breathing phase - subject is instructed to take shallow breaths, only through nose,

keeping the mouth shut, for 5 minutes. Then after the 5th exhalation, control pause test is repeated, and the time of control pause is recorded for any improvement.

Step 3 - Putting it together i.e. the “test – breath - test” routine is repeated 5 times in a row. This training session was repeated 2 times a day, every day for six weeks.⁷

GROUP-B- Pursed Lip Breathing Exercise (PLBE) , Diaphragmatic Exercise (DE) or (C P- Group)

The group was treated with Diaphragmatic breathing Exercise (DE) with pursed lip expiration. The subject is then instructed to take a deep breath through nose, feel the air filling round the waist by keeping a hand on the abdomen, hold the breath for 1-2 seconds and then exhale through pursed lips i.e. the lips are kept in a whistling manner and the air is exhaled out of the small orifice formed. The complete cycle of deep inspiration and pursed lip expiration is repeated 5 times in one session. The treatment consists of two sessions in a day.⁸

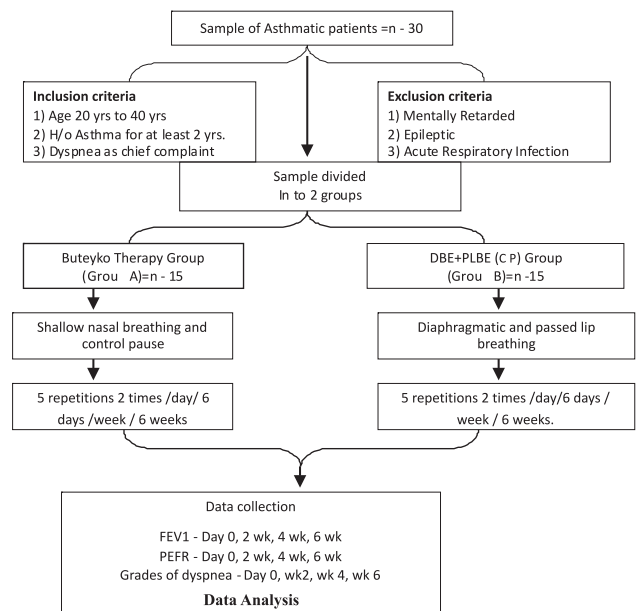


Fig 1:- Data collection by Spirometry Testing

DATA ANALYSIS

Data analysis is done using SPSS 14. The significance level is set at $p < 0.05$. The confidence level is 95%. The samples t test is used for the comparison of means between inter & intra groups.

RESULT

Result of this study is based on the sample of 20-40 years subject with male /female ratio of 48/ 52% respectively.

Fig 2:- Male /Female ratio of sample

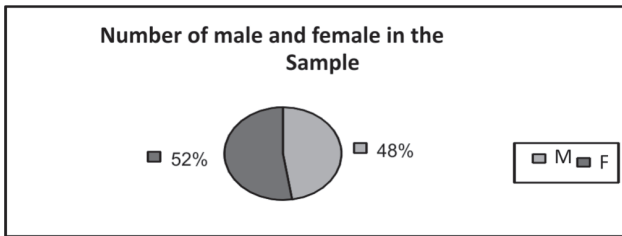


Table 2:- Comparison of FEV1 from

1. Comparison of FEV₁ between Buteyko Breathing technique & DBE with PLBE(C P) group

Table 1:- Comparison of FEV1 variable from

Sessions	Mean ± SD	t value	p value
FEV1 day 0	1.48 ± 0.54	-2.176	0.047
FEV1 week 2	1.55 ± 0.53		
FEV1 week 2	1.55 ± 0.53	-5.495	0.001
FEV1 week 4	1.58 ± 0.53		
FEV1 week 4	1.58 ± 0.53	-2.827	0.013
FEV1 Week 6	1.83 ± 0.46		
FEV1 day 0	1.48 ± 0.54	-4.175	0.001
FEV1 Week 6	1.83 ± 0.46		

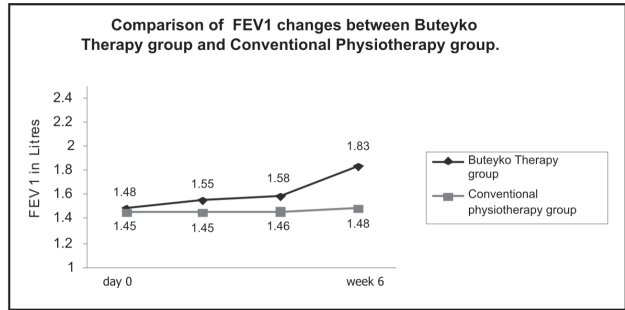
Significance level is $p < 0.05$

Table 2. Comparison of FEV1 from day 0 to week 6 for Conventional physiotherapy(C P) group (group B).

Sessions	Mean ± SD	t value	p value
FEV1 day 0	1.45 ± 0.49	-1.871	0.082
FEV1 week 2	1.45 ± 0.49		
FEV1 week 2	1.45 ± 0.49	-1.464	0.165
FEV1 week 4	1.46 ± 0.48		
FEV1 week 4	1.46 ± 0.48	0.000	1.00
FEV1 week 6	1.46 ± 0.48		
FEV1 week 0	1.45 ± 0.49	-1.702	0.111
FEV1 week 6	1.46 ± 0.48		

Significance level is $p < 0.05$

Fig.3. Comparison of FEV1 between BBT and DBE & PLBE Group from day 0 to weeks-6



2. Comparison of PEFR between Buteyko Breathing technique & DBE with PLBE (C P) group

Table 3. Comparison of PEFR for

Sessions	Mean ± SD	t value	p value
ay 0	289.67 ± 54.35	-4.707	0.001
Week 2	300.73 ± 58.86		
Week 2	300.73 ± 58.86	-7.152	0.001
Week 4	306.45 ± 58.14		
Week 4	306.45 ± 58.14	-6.258	0.001
Week 6	316 ± 57.08		
Day 0	289.67 ± 54.35	-8.775	0.001
Week 6	316 ± 57.08		

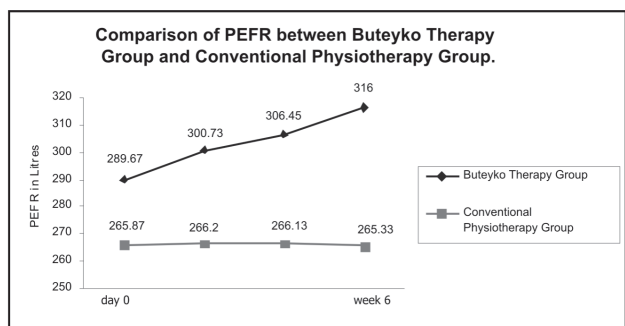
Significance level is $p < 0.05$

Table 4. Comparison of PEFR for Conventional physiotherapy group(C P) (group B).

Sessions	Mean ± SD	t value	p value
Day0	265.87 ± 37.96	-1.234	0.238
Week 2	266.20 ± 37.61		
Week 2	266.20 ± 37.61	-0.323	0.751
Week 4	266.13 ± 37.76		
Week 4	266.13 ± 37.76	-1.219	0.243
Week 6	265.33 ± 38.07		
Day0	265.87 ± 37.96	0.684	0.505
Week 6	265.33 ± 38.07		

Significance level is $p < 0.05$

Fig.4:- Comparison of PEFR between BBT and DBE & PLBE Group from day 0 to weeks-6



3. Comparison of dyspnea between Buteyko Breathing technique & DBE with PLBE (C P)group

Table 5. Comparison of grades of dyspnea for subjects of Buteyko Therapy group from day 0 to week 6

Sessions	Mean ± SD	t value	p value
Day0	2.93 ± 0.88	9.539	0.001
Week 2	2.07 ± 0.88		
Week 2	2.07 ± 0.88	3.500	0.001
Week 4	1.60 ± 0.74		
Week 4	1.60 ± 0.74	3.055	0.001
Week 6	1.20 ± 0.68		
Day0	2.93 ± 0.88	14.67	0.001
Week 6	1.20 ± 0.68		
Sessions	Mean ± SD	t value	p value
Day 0	2.73 ± 0.88	1.382	0.189
Week 6	2.53 ± 0.83		
Week 2	2.73 ± 0.88	1.382	0.189
Week 6	2.53 ± 0.83		
Week 4	2.73 ± 0.88	1.382	0.189
Week 6	2.53 ± 0.83		

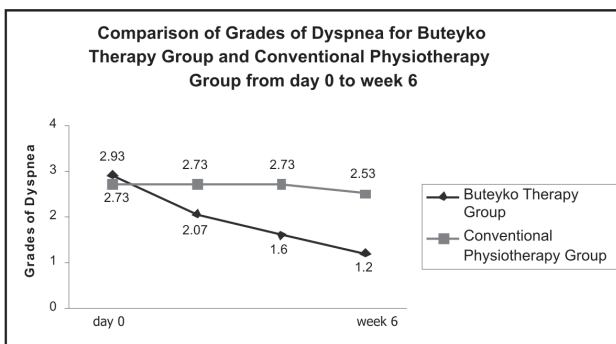
Significance level is p<0.05

Table 6:- Comparison of Grades of Dyspnea for the subjects of C P. Group from day 0 to week 6.

Sessions	Mean ± SD	t value	p value
Day 0	2.73 ± 0.88	1.382	
	0.189		
Week 6	2.53 ± 0.83		
Week 2	2.73 ± 0.88	1.382	
	0.189		
Week 6	2.53 ± 0.83		
Week 4	2.73 ± 0.88	1.382	0.189
Week 6	2.53 ± 0.83		

Significance level is p<0.05

Fig.5. Comparison of Grades of Dyspnea(GOD) for Buteyko Therapy Group and C P Group from day 0 to weeks-6



DISCUSSION

The present study is conducted on 30 asthmatic patients with a mean age of 30 years and without any dominance of male /female gender .The comparison between both groups result is selected for discussion on the basis of changes in the FEV1& PEFR values and Grades of Dyspnea.

The result of our study reveals significant changes in the FEV₁ variable within the both groups but on comparison between groups shows no significance changes by 6 weeks supervised training of both groups techniques. Asthmatic patients have lower levels of Alveolar co₂ due to a higher respiratory rate & minute volume. Under normal conditions, the PaCO₂ is maintained at approximately 39 to 41 mm Hg by alveolar ventilation under the control of respiratory centers in the pons and medulla. Changes in the production of carbon dioxide are usually accompanied by corresponding alterations in alveolar ventilation with little or no change in PaCO₂.¹⁰

The main physiologic causes for hypocapnia are related to hyperventilation .The direct effect of Hypocapnia can be seen as spasm of the airway smooth muscle and bronchoconstriction resulting into asthma symptoms. This is supported by Fisher et al and McFadden et al, that a low alveolar carbon dioxide in patients with asthma was associated with increases in airway tone. Sterling also have stated that Hypocapnia (loss of carbon dioxide) is due to voluntary hyperventilation and causes increased resistance to airflow.^{11,12}

The changes in FEV₁ in our study are significant starting right from the second week to the sixth week, as the carbon dioxide levels of the body increase which may help in the relaxation of airway smooth muscles and relieve bronchoconstriction. So hyperventilation and depth of breathing are better treated by the Buteyko Therapy Group as compared to Conventional Physiotherapy Group (DBE+PLBE) in 6 weeks of training and hence proved better itself.¹³

Second important finding of our study shows the significant changes in the PEFr variable within the both groups but on comparison between groups shows no significance changes by 6 weeks supervised training of both groups techniques.

The explanation for this improvement in lung function can be related the cycle of hyperventilation which gets breached, a normal carbon dioxide level can be achieved and hence asthma attacks can be prevented.¹⁴

So the physiology of hyperventilation and depth of breathing with O_2 dissociation curve shifting are better treated by the Buteyko Therapy Group as compared to Conventional Physiotherapy Group (DBE+PLBE) in 6 weeks of training and hence proved better itself.

Apart from the lung functions, Third finding of study shows that the significance reduction of in level of perceived dyspnea in the subjects who practiced Buteyko breathing exercise for 6 weeks. Since the normal carbon dioxide level is achieved, the oxygen dissociation improves and the supply of oxygen to the body also improves ,functional capacity improves and dyspnea relieved.¹⁵

In summary, prolonged hyperventilation causes a resetting of the body's acceptable level of carbon dioxide, allowing the respiratory system to maintain chronic over breathing. This larger volume of breathing is the primary element in producing asthma symptoms. Therefore, breathing exercises in the form of Buteyko breathing techniques are the best remedies which can be practices for reversing hyperventilation and in reducing asthma symptoms.

Conclusion: The results revealed that regular and proper practice of Buteyko Breathing Technique asthmatic patients will be helpful in significant improvement in the lung function of subjects and may also prevent further decline in the Pathophysiology of the diseases. The improved carbon dioxide content of the body can relax smooth muscles and dilate airways resulting into reduced levels of Dyspnea.

Diaphragmatic Breathing though very effective in some respiratory conditions, does not seem to produce effective changes in lung function in asthmatic subjects, as it may lead to further hyperventilation. So deep and pace breathing exercises should not be practices in asthma patients.

CLINICAL RELEVANCE

This study will help asthmatic patients in controlling their asthma symptoms without continuous use of medications i.e. asthma patients can have a drug free life. This study will also establish the importance of shallow breathing exercises in the management of respiratory illnesses.

Limitations of the study & Future Research

This study is limited to the subject of 20- 40 years with three variables i.e. PEFr, FEV₁ & grades of dyspnea for outcome measurement.

Buteyko breathing technique can be used for many other conditions such as stress disorders, sleep apnea, snoring, anxiety attacks, and panic disorders. The

sample size and study duration can be increased for more reliable results.

REFERENCES

1. Peter Lange, M.D., Ph.D. et al. A 15-Year Follow-Up Study of Ventilatory Function in Adults with Asthma. Volume 339:1194 – 1200; October 22, 1998; number 17.
2. Global Initiative for Asthma. National Institute of Health. National Heart, Lung and Blood Institute Publication No. 02-3659.
3. CS Ulrik and P Lange et al. Decline of lung function in adults with bronchial asthma. American journal of Respiratory and Critical Care Medicine., Vol 150, No. 3, 09 1994, 629-634.
4. Anne Bruton, PhD et al. Hypocapnia and Asthma: A Mechanism for Breathing Retraining? American College of Chest Physicians: DSc Chest. 2005; 127:1808-18112005.
5. Jan Parner, Jørgen Vestbo, M.D., Ph.D, et al., A 15-Year Follow-Up Study of Ventilatory Function in Adults with Asthma . Volume 339:1194 – 1200; October 22, 1998; number 17.
6. David P. Johns PhD, CRFS et al. Spirometer the measurement and interpretation of ventilatory function in clinical practice; The Thoracic society of America. 2006; 123:508-654.
7. Buteyko K.P., Buteyko Method; Experience of Application in Medical Practice. Patriot, Moscow, 1990.
8. Thomas, M, McKinley, RK, Freeman, E, et al .Breathing retraining for dysfunctional breathing in asthma: a randomized controlled trial. Thorax, 2003;58,110-115
9. Fabio Cibella, MD; et al; Lung Function Decline in Bronchial Asthma, American College of Chest Physicians. *Chest*.2002;122:1944-1948 ,2002.
10. McFadden ER, Jr (2004). "Asthma", Harrison's Principles of Internal Medicine, 16th ed., New York: McGraw-Hill, 1508–1516.
11. McFadden ,Fisher et al, Arterial Blood Gas Tension in Asthma, New England Journal of Medicine, 278:19, 1027-1032, 1998.
12. Sterling, The Mechanism of Bronchoconstriction due to Hypocapnia in Man, Clinical Science, 34: 277-285, 1968.
13. CA Osborne, Sterling et al ; Hyperventilation and Asymptomatic Chronic Asthma; Thorax 2000; 55; 1016-1022.
14. Demeter SL, Cordasco EM, "Hyperventilation Syndrome and Asthma", The American Journal of Medicine, Vol 81,December, 1986, 989-994.
15. Bowler S., Green A, Mitchell C, Buteyko Breathing Techniques in Asthma, a blinded randomised controlled trial; MJA, Vol. 169, p575-578 1998.