



Immediate Effect Of Pursed Lip Breathing As Compared To Conventional Physiotherapy On Breath Holding Test In Chronic Bronchitis Patient

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ABSTRACT

Background: Chronic bronchitis is defined as a condition associated with excessive tracheobronchial mucus production to cause cough with expectoration for at least 3 months of the year, for more than 2 consecutive year. Chronic bronchitis is characterized by long-term inflammation and irritation of the bronchial tubes, which brings excess mucus into the airways. This results in chronic cough, excessive sputum production, wheezing, breathlessness, and tightness in the chest. . It is one of the most common respiratory disease and leads to limitation of airflow as well as deteriorating health status. The aim of study is to find out the immediate effect of pursed lip breathing and conventional physiotherapy on breath holding test in chronic bronchitis patients.

Materials and Methodology: In this study patients include both males and females between age group 40 to 60 years diagnosed with chronic bronchitis for at least 3 months of the year for more than 2 consecutive year were included in the study. Patients with unstable cardiovascular disease, severe hepatic and renal dysfunction, malnutrition, malignant tumour and severe anaemia, history of taking regular corticosteroids

or other immunosuppressive agents and acute exacerbation of COPD or pneumonia within past 6 weeks were eliminated from the study. 40 male or females with chronic bronchitis in tertiary care hospital were randomly chosen. Pursued lip breathing and conventional physiotherapy is performed in those patients to fill in the required data. Breath holding test is performed to see the significant effect in reduced breathing. The participant signed the consent form willingly. The collected data was statistically analysed for finding.

Result: There was significant effect of pursed lip breathing (group A) and conventional physiotherapy (group B) on breath holding test within the group A and B in both groups with more significant effect in group A compared to group B ($p=0.002$). Also there was significant effect on breath holding test in group A compared with that of group B ($p=0.001$).

Conclusion: On the basis of results we have concluded that the both pursed lip breathing and conventional physiotherapy are effective in reduced breathing in chronic bronchitis patients. We also concluded that pursed lip breathing is more significant than conventional physiotherapy.

Key Words: pursed lip breathing, conventional physiotherapy, chronic bronchitis patients, breath holding test

INTRODUCTION

Chronic bronchitis is defined as a condition associated with excessive tracheobronchial mucus production to cause cough with expectoration for at least 3 months of the year, for more than 2 consecutive year . (1) According to WHO estimates 65 million people have moderate to severe COPD. More than 3 million people died of COPD in 2005 corresponding to 5% of all deaths globally and it is estimated to be the third leading cause of death by 2030. The reported prevalence have ranged from 2 to 22% in men and from 1.2 to 19% in women. (2) The healthy population vary between 3% to 7% of healthy adults. It is estimated as high as 74% among those diagnosed to have COPD (3) Prevalence of chronic bronchitis in rural area lie between 6.5% and 7.7%. (4)

The common causes of chronic bronchitis include cigarette smoking, families and genetic factors , many inhaled irritants to the respiratory tract (1) . Repeated exposure to infections, environmental pollutants have a higher risk of developing chronic bronchitis . (3)

Cough and sputum production are the most common symptom . Usually lasts for at least 3 months and occur daily. Shortness of breath (dyspnoea) gradually increases with the severity of the disease. (5).

The common medicine treatment include bronchodilators, glucocorticoids, antibiotic therapy , phosphodiesterase -4 inhibitor plays a role in treating chronic bronchitis . smoking session can heals to reduce airway injury. (3)

Physiotherapy management includes various inspiratory and expiratory breathing exercises, secretion removal techniques and various relaxation techniques. Aerobic exercise and upper and lower limb resistance training have shown positive changes in reduction of airflow obstruction, clearing of airway, improved functional capabilities increased energy level and sputum expectoration (6).

conventional physiotherapy -these include: postural drainage , percussion , vibration and shaking.

In pursed lip breathing person inspire through nose and exhale through mouth at a slow controlled flow. The expiratory phase of respiration is prolonged as compared to inspiration ⁽⁷⁾ Pursed lip breathing creates a positive expiratory pressure that prevents early bronchial collapse and maintain the potency of the airway ⁽⁸⁾

Breath holding test is the ability to hold breath for a long period of time ⁽⁹⁾ It is used for measuring the apnoea time after a deep inspiration ⁽¹⁰⁾

AIMS AND OBJECTIVES

AIMS

To study immediate effect of pursed lip breathing as compared to conventional physiotherapy on breath holding test in chronic bronchitis patients.

OBJECTIVE

To compare immediate effect of pursed lip breathing as compared to conventional physiotherapy on breath holding test in chronic bronchitis patients.

NULL HYPOTHESIS

There is no significant effect of pursed lip breathing as compared to conventional physiotherapy on breath holding test in chronic bronchitis.

ALTERNATE HYPOTHESIS

There is significant effect of pursed lip breathing as compared to conventional physiotherapy on breath holding test in chronic bronchitis.

CRITERIA FOR STUDY

INCLUSION CRITERIA

Age 40 to 60 years

Male and female

Diagnosed with chronic bronchitis

Willing to participate

EXCLUSION CRITERIA

Unstable cardiovascular disease, like uncontrolled high BP, congestive heart failure, angina

Severe hepatic and renal dysfunction, malnutrition, malignant tumour and severe anaemia

Mental illness

History of taking regular corticosteroids or other immunosuppressive agents

Exclusion criteria related to lung includes arterial oxygen saturation <90% at rest

Acute exacerbation of COPD or pneumonia within past 6 weeks.

METHODOLOGY

A comparative study was done in the physiotherapy department of Maharashtra Institute of Physiotherapy, Latur. Approval was obtained from the institutional ethical committee (Ref No: IEC/2022/UG-18/2022), before recruiting participants for the study. A prior written informed consent was taken from each participant

PROCEDURE

A total number of 40 patients are included in the study. Before selecting the intervention, the patients were asked to select the chit from the bowl which were marked as Pursed lip breathing and conventional physiotherapy. If the patients picks up the Pursed lip breathing named chit the Pursed lip breathing exercise is selected and vice versa.

Each group consist of 20 subjects. One group intervened with Pursed lip breathing and other group with conventional physiotherapy.

Pre intervention breath holding test is Carried out in both the groups.

PURSED LIP BREATHING

Mostly pursed lip breathing is carried out in group 1 by asking the participant to sit in a comfortable position such that it relax their neck and shoulder muscles, then breath in slowly through nose for two second with mouth closed, then purse lips as going to whistle. Then breath out slowly through pursed lip for four to more seconds.

CONVENTIONAL PHYSIOTHERAPY

Then Conventional physiotherapy these include postural drainage; percussion, vibration and shaking is given in group 2. Conventional physiotherapy is given by putting the patient in a tilted or propped position at an angle required and chest percussion is performed to loosen the secretions.

Later the post values are noted in both the group. After that Breath holding test is carried out in both group 1 and group 2 by counting the duration of breath holding by a stopwatch from the beginning of the inspiration to the appearance of reflex contractions of the epigastric region. After completing breath holding test post values are noted.



PURSED LIP BREATHING



CONVENTIONAL PHYSIOTHERAPY

The best cut off value for predicting $\text{Spo}_2 < 90\%$ in the 6 MWT was 94% for the minimum Spo_2 in the 15.8 BHT, with this cut off, the sensitivity was 85.7%, the specificity was 58.3 % and the positive and negative likelihood were 2.06 and 0.25 .

STATISTICAL ANALYSIS

Data will be collected by using a structure proforma. Data entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA .

Quality data will be expressed in terms of proportion.

Qualitative data will be expressed in terms of mean and standard deviation.

Comparison of mean between two groups will be done using unpaired t – test.

A p value <0.05 will be considered as statistically significant where as a p value <0.001 will be considered as highly significant.

RESULTS

a). Findings related to the effect of Pursed Lip Breathing on breath-holding among Chronic Bronchitis.

In order find significant Mean Breath-holding before and after Pursed-Lip breathing. Paired 't' – test was computed and the data is presented in table -1

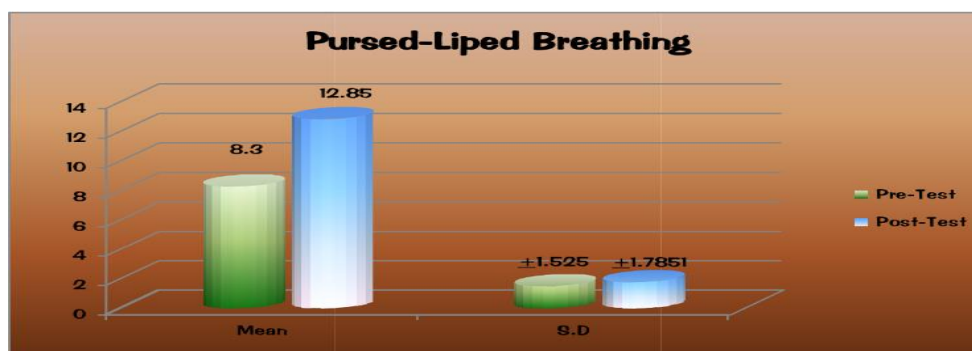
Table.no – 01

N = 20

Pursed-Lip Breathing Exercise	Mean	Std.Deviation	Std.Error Mean	t	Df	P-Value
Pre-test – Post-Test on Breath-holding	4.5500	±0.8870	.1983	20.939	19	0.002

$$t_{(19)} = 2.09$$

The data presented in table.no-01 shows the Mean Breath-holding scores before and after Pursed-Lipped breathing is 4.5500 with standard deviation ± 0.8870 and Standard error of Mean .1983. In order to find significant difference in mean scores before and after intervention Paired 't'-test was computed and the obtained value of 't' = 20.939 was found to be significant at 0.05 level of significance as the calculated value is higher than the table value and P-Value is less than 0.05 implying Pursed lipped breathing is successful significantly improving Breath-holding abilities among Chronic Bronchitis patients.



Graph -1

INTERPRETATION - The data presented in Table – 1 and Graph-1 reveals, The Mean Pre-test and post-test scores of Breath-holding before and after Pursed-lip breathing exercise was 8.3 and 12.85 respectively, with Standard deviations ± 1.525 and ± 1.785 respectively.

b). Findings related to the effect of Conventional Physiotherapy on breath-holding among Chronic Bronchitis.

In order find significant Mean Breath-holding before and after Conventional-physiotherapy. Paired 't' – test was computed and the data is presented in table -2.

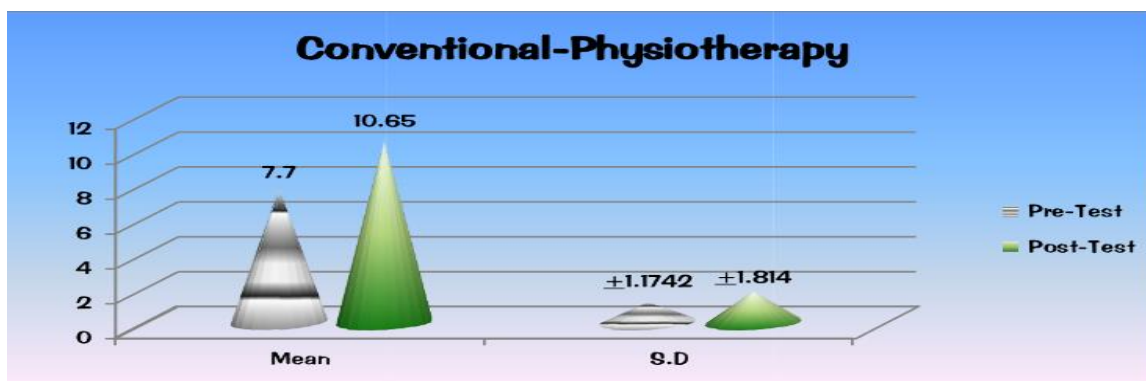
Table.no – 02

N = 20

Conventional-Physiotherapy Exercise	Mean	Std.Deviation	Std.Error Mean	t	Df	P-Value
Pre-test – Post-Test on Breath-holding	2.9500	± 1.316	.29447	10.018	19	0.001

$$'t'_{(19)} = 2.09$$

The data presented in table.no-02 shows the Mean Breath-holding scores before and after Conventional-Physiotherapy exercise is 2.9500 with standard deviation ± 1.316 and Standard error of Mean .29447. In order to find significant difference in mean scores before and after intervention, Paired 't' -test was computed and the obtained value of 't' = 10.018 was found to be significant at 0.05 level of significance as the calculated value is higher than the table value and P-Value is less than 0.05 implying Conventional-Physiotherapy exercise is successful significantly in improving Breath-holding abilities among Chronic Bronchitis patients.



Graph – 2

INTERPRETATION : The data presented in Table – 1 and Graph-2 reveals, The Mean Pre-test and post-test scores of Breath-holding before and after Conventional-Physiotherapy was 7.7 and 10.65 respectively, with Standard deviations ± 1.1742 and ± 1.814 respectively.

c) Findings related to comparison between Pursed lip breathing and Conventional Physiotherapy on breath-holding among Chronic Bronchitis.

In order to find significant difference in Mean Breath-holding between the two interventions, i.e Pursed Lipped- breathing and Conventional- Physiotherapy, Independent-‘t’-test was computed and the findings are displayed in the table -03

Table no.3

$n_1 + n_2 = 40$

Quality of Sleep	Mean	Mean difference	Standard Error Difference	Independent ‘t’ test	P-Value
Pursed Lipped Breathing	12.850				
Conventional-Physiotherapy	10.650	1.6000	.35504	4.507	0.002

$$t'_{(38)} = 2.02$$

INTERPRETATION :The data presented in table.no-04 shows the Mean difference between Pursed lipped Breathing and Conventional Physiotherapy is 1.6000, To find significant Mean difference for improved Breath-Holding, Independent ‘t’-test was computed and obtained $t'_{(38)} = 4.507$ is found to be significant at 0.05 level of significance, as computed ‘t’ value is higher than the table Value (2.02) indicating Null Hypothesis is rejected and Alternative Hypothesis is accepted implying there is significant difference

between two interventions. As Pursed Lipped breathing has higher mean than Conventional Physiotherapy. Hence Pursed lipped breathing exercise has more pronounced effect on enhancing Breath-Holding when compared to Conventional-Physiotherapy exercise.

DISCUSSION

The present study is conducted on immediate effect of pursed lip breathing as compared to conventional physiotherapy on breath holding test in chronic bronchitis patients. The aim of the study is to find out the immediate effect of pursed lip breathing as compared to conventional physiotherapy on breath holding test in chronic bronchitis patients. The results of the study showed that pursed lip breathing is significantly effective in improving breath holding time in chronic bronchitis patients. Also the conventional physiotherapy is significantly effective in improving breath holding time in chronic bronchitis patients. But there was significant result found in between pursed lip breathing and conventional physiotherapy in chronic bronchitis patients. Also we found that pursed lip breathing is more effective than conventional physiotherapy in chronic bronchitis patients.

With support to above findings author Gandevia studied and stated that the pursed lip breathing is effective in increasing the breath holding time in obstructive lung disease like chronic bronchitis. She also stated that, pursed lip breathing is relaxed breathing which increase in the volume of air expired around by 20%. The mechanism behind that was relaxed type of expiration method which increases the volume of air expired and thus decreases the trapping of air that will ultimately help in decrease in air trapping thus decrease in hyperinflation and thus decreases dyspnea.

Also, A study done by Snehal Potdar studied and found that the purse lip breathing is effective in reducing the breathlessness and improving the patient's breath hold time. She also stated that the purse lip breathing has more expiratory flow rate than other breathing control technique.

Therefore in the current study, pursed lip breathing was found to be more effective in improving breath holding time in chronic bronchitis patients. Therefore, the p value was found to be $p < 0.001$. The mechanism behind it was PLB increases intrathoracic pressure by creating a positive pressure gradient in the thoracic cavity. This increased pressure helps to reduce lung hyperinflation, increase lung volume and improves respiratory muscle function. Also it improves gas exchange by increasing oxygenation, reducing carbon dioxide levels and improves diffusion capacity.

With support to above findings, Savci et al., in their study on comparison of airway clearance and pursed lip breathing in patients with COPD have also found both the techniques to be effective in mucus clearance as well as to improve lung functions.

Similar to the above study, in our present study we found that, conventional physiotherapy which included postural drainage was found to be effective on breath holding test in chronic bronchitis patients. And the p value was found to be $p < 0.001$.

A study conducted by Main E, Prasad et al, conducted on conventional chest physiotherapy compared to other airway clearance technique for cystic fibrosis, found that postural drainage was more effective than newer techniques. The mechanism behind it was that it helps clear mucus from specific lung segments, reducing airway obstruction and improving lung mechanics. Also decreases airway resistance, making it easier for patients to breath. It helps in better lung function and reduced airway obstruction improve oxygenation and carbon dioxide removal. Breath holding improves lung function and reduced airway resistance enable COPD patients to hold their breath longer. It enhances gas exchange during postural drainage increases oxygen levels, delaying the onset of breathlessness.

Another study done by Auwal Abdullahi concluded that all type of chest physiotherapy interventions were found very effective in improvement of quality of life in covid-19 survivors. It improved not only quality of life but health status including fatigue, exertion were also improved.

So, in our study we found that, pursed lip breathing is more effective than conventional physiotherapy on chronic bronchitis patients. The mechanism behind that it is that it improves PLB specifically targets lung hyperinflation and airway collapse. It is a simple, easy-to-perform technique, promoting better adherence. PLB slows respiratory rate, decreasing dynamic hyperinflation. It improves oxygenation and carbon dioxide removal.

CONCLUSION

With the above results we have concluded that the both pursed lip breathing and conventional physiotherapy are effective in increasing breath holding time in chronic bronchitis patients. But the pursed lip breathing is more effective than conventional physiotherapy on breath holding in chronic bronchitis patients

LIMITATIONS:

The present study was conducted in chronic bronchitis patients with 40 -60 years of age only.

Also the study was carried out on immediate effect of pursed lip breathing and conventional physiotherapy only.

FUTURE SCOPE:

The similar study can be carried out in different population with different age group.

DATA AVAILABILITY

The dataset generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

FUNDING: Self.

CONFLICT OF INTEREST: The authors confirm that they have no conflicts of interest.

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