

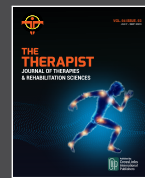


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## Original Article

# Effectiveness of Pursed Lip Breathing and Alternate-Nostril Breathing in Patients with Respiratory Dysfunction

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## ABSTRACT

Respiratory dysfunctions are the diseases or disorders like Asthma, emphysema, bronchitis, lung cancer, pulmonary hypertension, COPD and tuberculosis. Among respiratory dysfunctions, COPD is the most common and may be fatal. **Objective:** To observe the effectiveness of pursed lip breathing and alternate-nostril breathing in patients of respiratory dysfunction. **Methods:** This study is aimed to see the effects of PLB and ANB on respiratory outcomes in COPD patients. Quasi Experimental study was completed on 100 participants of age between 24-60 years. Purposive sampling is used to select the population. The participants were selected on the basis of inclusion criteria. Informed consent was taken before the start of exercise. Pulse oximeter was used to assess oxygen saturation values, numeric pain rating scale rating pain from 1-10, was used to check pain level and Samn-perelli fatigue scale rating fatigue from 1-7 from fully alert till completely exhausted was used respectively. SPSS (version 23) was used for statistical analysis. Findings show that there is marked improvement in respiratory functions including oxygen saturation, pain and fatigue. **Results:** Outcomes after 4-6 weeks of performing pursed lip breathing shows improvement in oxygen saturation and alternate nostril decreases fatigue and pain with the p-value 0.05 which is highly significant. According to statistics, all respiratory variables are highly significant with the p-value < 0.05. **Conclusions:** It is concluded that pursed lip breathing and alternate nostril breathing is an effective in improving oxygen saturation and respiratory rate. It is an inexpensive, non-pharmacological and easy method and helped in improving respiratory outcomes.

## INTRODUCTION

In respiratory dysfunctions lung functions are compromised. It affects the respiration of the subject. Symptoms can range from mild to severe. The most common forms of obstruction are emphysema and chronic bronchitis. The subjects have problems in exhalation phase. Their oxygen saturation has also decreased. It may develop gradually over time (chronic) or all of a sudden

(acute). Serious respiratory issues can result from cigarette smoking, prolonged exposure to pollutants, air pollution, inhaled irritants, and bronchial hyper-responsiveness. Various types of medication including inhalers and bronchodilator and physical therapy management should be considered [1]. Infections involving the bodily components used for respiration, such as the

sinuses, throat, airways, or lungs, are known as respiratory tract infections, or RTIs. Changes to the volume and air pressure in the lungs trigger pulmonary ventilation. Some kind of infections caused by bacteria and viruses may also affect the function of respiratory system [2]. Lack of respiration occurs when an individual with obstructive lung disease finds it challenging to breathe out all of the air from their lungs. The exhaled air exits the body more gradually than it should due to lung injury or constriction of the airways within the lungs. After a full expiration, there can be too much air in the lungs. The lungs, blood vessels, and airways comprise the respiratory system. Pulmonary ventilation is brought on by variations in the volume and air pressure within the lungs [3]. Because of this, the chest X-ray remains the recommended method for preliminary examinations. As of right now, no solid data support a positive estimate of CT's risk-benefit ratio when used as a screening technique. The benefit of early detection of bronchial carcinoma is outweighed by the drawback, especially in high-risk individuals with a lengthy smoking history [4]. Reducing the amount of lung irritants you are exposed to and the course of your therapy will help you live a better, longer life, and delay the progression of your diseases [5]. A review of the impact of alternate nostril breathing (ANB) on an assortment of cardio-respiratory tasks were investigated. For four weeks, subjects took part in ANB exercise (15 minutes per day in the morning). Before and after the 4-week workout phase, cardio-respiratory parameters were determined. According to the results of the study, alternating nostril blowing boosts parasympathetic activity and substantially reduces systolic blood pressure (SBP). By alternate nostril breathing, the parasympathetic system substantially enhanced [6]. Another study was aimed to decide the impact of pursed lip breathing on measures of breathlessness and oxygen saturation (SaO<sub>2</sub>) in COPD sufferers. The approach used became quasi-experimental design. A pattern of sixty eight contributors (60 respondents PLB institution, and 8 respondents control group) become determined through overall sampling method. Independent T-test was used which showed a difference between PLB and control group in boom in shortness of breath scale ( $p=0.018$ ) and SaO<sub>2</sub> ( $p=0.023$ ). The results showed an effect of PLB on shortness of breath scale ( $p=0.030$ ) and SaO<sub>2</sub> ( $p=0.002$ ) [7]. The ventilatory lung functions of 33 normal males and 42 normal women of average age were examined before and after a six-week course of alternate nostril breathing. They had better forced vital capacity (FVC), forced expiratory volume at the end of one second (FEV<sub>1</sub>), maximal voluntary ventilation (MVV), peak expiratory flow (PEFR-lit/s), and longer breath holding times, all indicators of

improved ventilatory functioning [8]. Examination carried out to investigate the outcomes of pursed-lip inhalation on dyspnea, respiration pattern, lung extent and respiratory mechanics in sufferers with COPD. Eighteen sufferers with a median (+SD) age of  $58 \pm 11$  years and an average FEV<sub>1</sub> of one. Forty four L ( $50 \pm 21\%$  anticipated) were decided on for this observation. Pursed-lip respiratory promotes deep and slow respiratory patterns in sufferers at relaxation or at some stage in exercising. Changes in dyspnea rankings had been notably correlated with changes in quit-lung quantity (EELV) ( $r=0.82$ ,  $p=0.002$ ) [9]. A study conducted on 40 stable COPD patients between the ages of 40 and 70 were enrolled. The most amount of lung volume could be expelled in COPD patients thanks to PLB. Several strategies that reduce ventilator demand (physical conditioning and Oxygen therapy) have demonstrated the benefits of reducing DH and increasing exercise tolerance [10]. A study conducted at Mansoura University Hospital and Chest Hospital outpatient clinics inside the Mansoura area, the use of a quasi-experimental examine design on sixty patients identified with COPD. Patients had vast improvement in dyspnea and anxiety at put up- and observe-up assessments ( $p < 0.05$ ) [11]. Data from this study showed changes in chest wall muscle recruitment styles with pursed lip respiration (PLB) in COPD. Suggest stepped forward ventilation with this showed that pursed lip breathing accelerated the recruitment of the rib cage and accessory muscles throughout the muse and expiration section. Decreased inspiratory muscle obligation cycle, respiration and improved SaO<sub>2</sub> were located at some stage in this take a look at [12]. Pursed-lip respiration is considered a non-pharmacological measure used to treat asthma assaults. 10 sufferers had been enrolled, concluded that pursed-lip respiratory ought to save you the chance of relapse in asthmatic sufferers. Results confirmed improvement in breathing parameters in asthmatic patients [13]. A randomized crossover have a look at to evaluate the 6-minute stroll check (6MWT) without pursed lip respiration (PLB) and the 6MWT using PLB. Spirometry at some stage in tidal and essential potential, maximal inspiratory and expiratory mouth pressures were measured at baseline and after 10 minutes of PLB. A visual analogue scale (VAS) turned into extensively utilized to assess breathlessness at rest, after the 6MWT without PLB and after the 6MWT with PLB.  $P < 0.01$  became tremendous [14]. The impact of respiration sample and sitting function with PLB and quiet everyday breathing on COPD patients. 12 guys with COPD were covered on this have a look at and their TV, FVC, RR were measured as pre-values. Their PLB and herbal breath had been taken and the results had been discovered significant [15]. Ventilatory lung functions of 33 normal males and 42 normal women of average age were

examined before and after a six-week course of alternate nostril breathing. They had better forced vital capacity (FVC) and longer breath holding times, all indicators of improved ventilatory functioning [16]. Pursed lip respiratory and diaphragmatic respiration have been taught to participants and achieved every day for 10 minutes with a one-month comply with-up. The intervention stepped forward inhaling fifty two.9% of topics, at the same time as each day activities advanced in sixty seven.6% of subjects [17]. Pursed lip breathing is a respiratory approach that will increase resistance in the course of exhalation, increasing pressure within the trachea. It is a non-pharmacological remedy that reduces COPD symptoms, pursed lip respiration using a windmill toy also can enhance these COPD blowing patterns. The fine consequences had can visible after 12 weeks because of modifications in body composition from lengthy-term. PLB additionally progressed lung function, health-related pleasant of life and breathing muscle energy [18]. The rationale of this study is to observe the effectiveness of pursed lip breathing and alternate nostril breathing in patients with respiratory dysfunction. According to evidences found pursed lip breathing and alternate nostril breathing both are effective for the treatment of patients of respiratory dysfunction and there is significant immediate effect of pursed-lip breathing alternate nostril breathing on oxygen saturation, dyspnea and blood pressure as well as both are used in immediate management for dyspnea reliving, pain management and to maintain oxygen saturation. According to evidences found pursed lip breathing and alternate nostril breathing both are effective for the treatment of respiratory dysfunction. and there is significant immediate effect of pursed-lip breathing and alternate nostril breathing on oxygen saturation, dyspnea and blood pressure as well as both are (pursed-lip breathing and alternate nostril breathing) used in immediate management for dyspnea reliving. But which maneuver is most effective for improving the cardiorespiratory parameter and time efficacious for clinical use in patients so there is need to compare in present study.

## METHODS

A sample size of 100 patients were selected through inclusion and exclusion criteria, variables included in this study were numeric pain rating scale, fatigue scale, and saturation. Purposive sampling is used to analyze data. Data were collected from public and private hospital of Faisalabad during the time period of November 2022 till January 2023. Data from each patient was collected between the period of 4 to 6 weeks using variables like numeric pain rating scale, pulse oximeter and Samn-perelli

fatigue scale. G\*POWER formula is used to get population size of 100 which is mostly used in Qausi-experimental studies in which power analysis for a one-tailed paired-samples t-test indicated that the minimum sample size to yield a statistical power of at least .8 with an alpha of .05 and a medium effect size ( $d = 0.5$ ) is 100. The Inclusion Criteria was age: 24-60, gender: both (male and female), patients with respiratory dysfunction, able to understand (with or without attendant), patients with 3+ dyspnea scale (moderately severe breathlessness). Exclusion Criteria includes patients who were unconscious, Mentally Retarded Patients with lungs carcinoma, patients congenital lungs deformities, patients with chest trauma acute exacerbation of COPD, uncontrolled hypertension, patients with other systemic illness ,surgery involving chest or abdominal area, patient with other cardiac abnormality (e.g. Ischemic heart disease) and patient who are unable to understand and follow command. Assessment was done on selected patients daily for 4 to 6 weeks during their stay in hospital or post follow-up. Pre readings were taken at the time of history and post were taken after performing the exercise for the desired time. In pursed lip breathing exercise patient must be in comfortable and upright position such as sitting. Relax his/her shoulder and neck muscles. With the mouth closed, slowly inhale (breath in) through nose for at least 2 seconds. Also, it may help to count to themselves. With them mouth closed slowly exhaled (breath out) all the air in their lungs with your lips pursed "as if them going to whistle of gently flicker the flame of a candle," don't force the air out. Breathing out should be twice as breathing in. Perform pursed lip breathing in 20 minutes in this procedure. In Alternate nostril breathing first of all patient assumed posture (the comfortable posture). Open the right hand and bend index and middle finger against palm. The thumb was used for closing right nostril while the fourth and fifth fingers were used for the left nostril. Place the right thumb against the ala at the end of the nostril to close it and similarly press the fourth and fifth fingertips against the left nostril. Start the exercise in the 'relax sittings posture' with the relaxed attitude. Exhale slowly and deeply without closing the nostrils. Inhale slowly and quietly through the left nostril while closing the right. At the end of the inhalation, closed both nostrils and hold the breath for a while (not more than 1-2 seconds). Keep the left nostril closed and exhale through the right as quietly as possible. After exhaling completely, inhale slowly as quietly through the right nostril. Close both nostril and wait for a while, the open the left nostril and exhale slowly and silently, Inhale through the same nostril. & the alternate nostril breathing continued for 20 minutes. Variables were analyzed using SPSS version 23. Results were concluded by applying

paired t-test which is used to compare the pre and post values. P-value<0.05 was considered as significant.

## RESULTS

Table 1 showed the pre and post intervention pain, saturation, and fatigue scale. There was significant difference in mean pain score (6.45±0.99 vs. 3.95±1.68, p-value<0.0), Saturation (92.4±0.49 vs. 96.46±0.61, p-value<0.0), and Fatigue (6.22±0.75 vs. 4.24±1.56, p-value<0.007). The results showed significant improvement in pain, saturation and fatigue score.

**Table 1:** Pre-Post Analysis of Numeric Pain Rating Scale

Variables	Mean ± SD	p-value
Pre Numeric Pain rating scale	6.45±0.99	0.00
Post Numeric Rating Scale	3.95±1.68	
Pre Saturation	92.4. ±0.49	0.00
Post Saturation	96.46±0.61	
Pre Fatigue Scale	6.22±0.75	0.00
Post Fatigue Scale	4.24±1.56	

Demographics shows that the respiratory dysfunctions are more prevalent in males (65% as compare to female (35%). Out of 100 participants 65 (65%) were male and 35(35%) were female (Table 2).

**Table 2:** Gender distribution

		Frequency (%)	Valid Percent	Cumulative Percent
Valid	Female	35 (34.1)	35.0	35.0
	Male	65 (65.9)	65.0	100.0
	Total	100 (100.0)	100.0	

## DISCUSSION

This experimental study was executed on patients with respiratory dysfunction of Faisalabad, Pakistan to survey the influence of high impact practice on cardiorespiratory wellness in respiratory dysfunction patients and to comprehend the effects of pursed lip breathing exercise and alternate nostril breathing on respiratory outcomes in them. Respiratory risk factors were checked to protect them from other adverse effects. Risk factors, pattern of breathing, severity of breathlessness are studied so that findings can help respiratory dysfunction participants concerned for physiotherapy intervention. In this study males and females both of age between 24-60 years were included. 100 participants were selected on the basis of inclusion criteria. All the participants were explained about the purpose of our study before the start of exercise. The consent form was signed from all the participants and clearly explained them about the procedure of pursed lip breathing and alternate nostril breathing. All the participants were assessed by using pulse oximeter for oxygen saturation measurement, numeric pain rating scale for pain measurement and fatigue scale for fatigue for respiratory outcomes. The purpose of that study was to

determine the effect of PLB and ANB on oxygen saturation (SaO<sub>2</sub>), numeric pain rating scale for pain measurement fatigue scale for fatigue for respiratory outcomes in respiratory dysfunction patients. The data were then evaluated by using descriptive statistics. We measured the pre values of all the variables before starting exercise and then measured their post 4 weeks values and post 6 weeks values respectively. After therapy we can see some clear effectiveness on oxygen saturation in pre value the minimum oxygen saturation was 90% but after therapy the minimum oxygen saturation is 92% which shows the effectiveness of therapy and after 6 weeks minimum oxygen saturation is 93% which shows more effectiveness. On numeric pain rating scale we can also see some clear improvements as we had a maximum decrease in pain but after therapy we had 5 as the maximum grade in the patient of respiratory dysfunction with shows the effectiveness of the therapy. In breathing rate, we have also seen some clear improvements. After therapy their breathing rate is quite normal about 20 towards the standard breathing rate after 6 weeks. And improvements were shown in some of the patients. The descriptive Statistics of chest expansion, fatigue scale, six minute walk test along with quality of life for patients of respiratory dysfunction shows some more improvements then pre values and 4th week of therapy, after the week as we have come to see the increase in the means values. The comparison of pursed lip breathing and alternate nostril breathing patient before the treatment and after the treatment .There is a difference in the mean of numeric pain rating scale and fatigue scale between pre and post interval. Results of paired sample T test shows there is a significant difference in means of pre and post values of numeric pain rating scales, quality of life for respiratory illness(modified), oxygen saturation, chest expansion and fatigue scale score P-value<0.05 (results of standard deviation and mean are discussed in Table 1). According to past research studies, found pursed lip breathing and alternate nostril breathing both are effective for the treatment of respiratory dysfunction. and there is significant immediate effect of pursed-lip breathing and alternate nostril breathing on oxygen saturation, dyspnea and blood pressure as well as both are (pursed-lip breathing and alternate nostril breathing ) used in immediate management for dyspnea reliving. But which maneuver is most effective for improving the cardiorespiratory parameter and time efficacious for clinical use in patients so there is need to compare in present study. And the present studies when compared with the past shows significant improvement in saturation and dyspnea. All of this description in the post values are an evidence for the effectiveness of therapy. Patients with COPD level in excessive resistive airflow, hyperinflation



and air trapping, a research was conducted to study the consequences of PLB on oxygen saturation, breathing muscle power and ventilatory characteristic. The populace in this look at changed into all COPD patients, the sampling approach used became consecutive sampling. The consequences of the two imply statistical test of paired t-assessments confirmed a big distinction within the oxygen saturation cost after six days of pursed lip respiratory [19]. In healthy individuals, the benefits of alternate nostril breathing were demonstrated in the areas of neurocognition, psychophysiology, respiratory, biochemistry, and metabolism. They were also discovered to be helpful in the treatment of several clinical issues [20]. There is marked improvement in oxygen saturation, numeric pain rating scale for pain measurement and fatigue scale for fatigue with the significance of  $p$ -value  $< 0.05$ . Hence the alternate hypothesis is accepted and that there is the improvement in respiratory outcomes in respiratory dysfunction participants through. Pursed lip breathing and alternate nostril breathing. As the  $p$  value we obtained is 0.00 or less than 0.05 which are highly significant so our alternate hypothesis is accepted it shows highly significance of pursed lip breathing and alternate nostril breathing on respiratory variables. Pursed lip breathing and alternate nostril breathing has been advocated to improve respiratory outcomes and decrease respiratory rate. Several studies proved the effectiveness of PLB and ANB on respiratory outcomes. Oxygen saturation has marked improvement. There were significant improvements in participants at post and follow-up test ( $p < 0.05$ ).

## CONCLUSIONS

It is concluded that pursed lip breathing and alternate nostril breathing is effective in improving oxygen saturation and respiratory rate. It is an inexpensive, non-pharmacological and easy method and helped in improving respiratory outcomes. There is marked improvement in oxygen saturation, numeric pain rating scale for pain measurement and fatigue scale for fatigue with the significance of  $p$ -value  $< 0.05$ . Hence the alternate hypothesis is accepted and that there is the improvement in respiratory outcomes in respiratory dysfunction participants through pursed lip breathing and alternate nostril breathing in patients of respiratory dysfunction.

## Authors Contribution

Conceptualization: MM, RK

Methodology: AQ, AK

Formal analysis: HS

Writing-review and editing: MM, AQ, AB, IM, ME

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest

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