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The Immediate Effect Of Positional Relaxation Along With Pursed Lip Breathing Exercise Vs Pursed Lip Breathing Exercise On Shortness Of Breath And Respiratory Rate In Patients Of Acute Exacerbative Chronic Obstructive Pulmonary Diseases

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ABSTRACT

BACKGROUND: Chronic obstructive pulmonary disease (COPD) is preventable and treatable disease characterised by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious gases and particles. The aim of the study was to determine the effect of pursed lip breathing vs positional relaxation along with pursed lip breathing on shortness of breath and respiratory rate in patients with acute exacerbative COPD.

METHODOLOGY: In this study patients included both male and female between the age group 50 and greater than 50 years were recruited for the study. Total 36 patients were selected and were divided among two groups. Pursed lip breathing was given to one group and forward trunk lean position along with

pursed lip breathing were given to another group. Pre and post measurements of of shortness of breath and respiratory rate were taken. The collected data was statistically analysed for finding.

RESULT: The result of the study showed that both Pursed lip breathing and positional relaxation along with Pursed lip breathing are statistically significant in reducing shortness of breath and respiratory rate in acute exacerbative COPD patients. But Positional Relaxation along with pursed lip breathing showed more significant results than Pursed lip breathing exercise.

CONCLUSION: Based on study results it can be concluded that positional relaxation along with pursed lip breathing was found to be more effective than Pursed lip breathing exercise in reducing shortness of breath and respiratory rate in acute exacerbative COPD patients.

KEY WORDS: Pursed lip breathing, positional relaxation along with pursed lip breathing, Shortness of breath, Respiratory rate, Acute exacerbative COPD patients.

INTRODUCTION

Chronic Obstructive Pulmonary Disease is characterised by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious gases and particle[1].COPD is the third leading cause of death worldwide, causing 3.25 million deaths in 2019. Over 80% of these deaths occur in low- and medium-income countries. The estimated prevalence of COPD in India is between 6.5 to 7.7% In India it accounts for 7% of all deaths from chronic disease and 3% loss of disability adjusted life years[2].There was increased prevalence of COPD among males, heavy smokers, lower income groups, and women cooking for long hours using firewood and cow dung cakes. COPD includes chronic bronchitis & emphysema. The signs and symptoms of chronic bronchitis are cough, mucoid and tenacious sputum, wheeze, dyspnoea, barrel shaped chest, cyanosis. Patient with emphysema have progressive dyspnoea, fish like respiratory pattern, cough with sputum, thoracic kyphosis, polycythaemia, cor pulmonale[1].

PATHOLOGY: chronic inflammation is hall mark of COPD. Increased activity of oxidants combined with reduced activity of antioxidants has been implicated in the development of inflammation [1]. Inflammation causes structural changes, narrowing of small airways and destruction of lung parenchyma which leads to reduced lung elastic recoil [1].

Cigarette smoking is one the major risk factors and air pollution, occupational hazards (dust, smoke fumes, toluene di-isocyanate in plastic industry are also responsible factors) [1]. There are many medical and physiotherapy interventions available which are used to treat patients with COPD. Certain medical interventions include use of Bronchodilators (salbutamol, terbutaline, salmeterol, formoterol) steroid therapy, long term antibiotics, long term domiciliary oxygen therapy. Reduction of bronchial irritation (stop smoking completely, dusty atmosphere should be avoided) [1]. Certain physiotherapeutic interventions used in patients with COPD includes Postural drainage (removal of secretions) Breathing Exercises, Relaxation positions, Thoracic mobility exercises[3]. During acute exacerbation condition worsens from previous condition leads to severe shortness of breath, increased sputum production [4].

Dyspnea is the most common and distressing symptom of pulmonary disease. It is sensation of disability to get air lead to uncomfortable breathing, extremely on a regular basis. Dyspnea is complaint of difficult,

labored, or uncomfortable breathing. The major goal of management and treatment for patients with COPD is improved of inspiratory muscle functions (IMF) and reduced shortness of breathing[5].

Breathing controlled training and a sitting posture have been evidenced as therapeutic interventions in patients with chronic obstructive pulmonary disease to alleviate breathlessness and improve ventilation[6].

PURSED LIP BREATHING: It is a breathing technique that consists of inhaling slowly through nose and then exhaling against pursed lips; to eases breathing and to prevent small airway collapse, **Pursed** lip breathing is a breathing technique used as part of treatment for COPD. It is frequently used to alleviate dyspnea, help restore diaphragmatic function and reduce anxiety disorders. Pursed lip breathing is commonly used to improve ventilation and alleviate dyspnea as it increases the tidal volume and reduces respiratory rate.[7].

LEANING FORWARD ALONG WITH PURSED LIP BREATHING:

Dyspnea position (forward leaning positioning) is to stand erect, leaning slightly forward, and let your shoulders and arms hang slightly forward to help improve respiratory rate and reducing breathlessness. Leaning forward in COPD patients improves the pressure-length relationship and the geometry of the diaphragm, which improves the breathing process

ALTERNATE HYPOTHESIS: There will be significant difference of positional relaxation along with pursed lip breathing exercise vs pursed lip breathing exercise on shortness of breath and respiratory rate in patients of acute exacerbation COPD

NULL HYPOTHESIS: There will be no significant difference of Positional Relaxation along with pursed lip breathing exercise vs pursed lip breathing exercise on shortness of breath and respiratory rate in patients of acute exacerbation COPD

CRITERIA FOR SELECTION

INCLUSION CRITERIA

Age Greater than or equal to 40 years [8]

Gender Males and females both[8]

Patients with acute exacerbative COPD

EXCLUSION CRITERIA

Symptomatic heart failure[8]

Patients with respiratory diseases like Asthma, cystic fibrosis.

Active cancer of lungs and mouth.

Neurologic conditions like Traumatic brain injury.

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

Av total number of 36 patients are included in the study. Before selecting the intervention, the patients were asked to select the chit from the bowel which were marked as Pursed lip breathing and positional relaxation along with pursed lip breathing. 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 18 subjects. One group intervened with Pursed lip breathing and other group with Positional relaxation along with Pursed lip breathing.

Pre intervention Shortness of breath and Respiratory rate is measured prior to the treatment by using Borg scale and by observation.

Five minutes of rest is given to the patients prior to treatment.

PURSED LIP BREATHING

Subjects was instructed to come in supine lying position and relax for at least 2 min before the start of test. Patient was asked to inhale through nose for 2-3 seconds followed by slow expiration through lightly pursed lips as if blowing on and bending the flame of candle but not blowing it out[7], that is atleast 2 inspirations (4-6 seconds) continued for 30 minutes with a resting pause tolerance of 5 minutes for 3 times[8].

POSITIONAL REXATION ALONG WITH PURSED LIP BREATHING

Patients was given positional relaxation i.e forward lean position through trunk and relax for 2 minutes before the start of test.Patient was asked to inhale through nose for 2-3 seconds followed by slow expiration through lightly pursed lips as if blowing on and bending the flame of candle but not blowing it out, that is at least 2 inspirations (4-6 seconds) continued for 30 minutes with a resting pause tolerance of 5 minutes for 3 times. The baseline assessment included and Modified BORG scale is used for measuring shortness of breath and therapist will assess manually the respiratory rate in a given minute. These outcome measures will be taken pre-treatment and post treatment session.

After the both intervention on different individuals the post Shortness of breath and respiratory rate is measured and noted down. The collected data was inserted into the excel sheet and used for stastical analysis.

OUTCOMES MEASURES

BORG RPE SCALE (Shortness of Breath)

Respiratory Rate

STASTICAL ANALYSIS

Data will be collected by using a structure proforma. Data entered in MS Excel sheet and analyzed by using the Statistical software namely SPSS 24.0 version IBM USA.

Qualitative data will be expressed in terms of proportions.

Quantitative data will be expressed in terms of Mean and Standard deviation.

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

Descreptive statics of each variable will be presented in terms of Mean, standard deviation and standard error of the mean.

A p value of <0.05 will be considered as stastically significant whereas a p-value < 0.001 will be considered as highly significant.

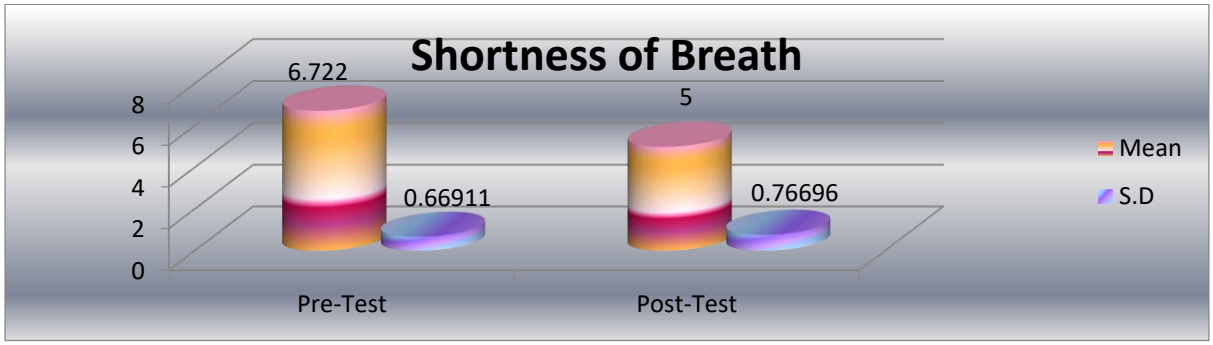
RESULTS

Effect of Pursed lip breathing on Shortness of breath and respiratory rate (pre and post measurements)

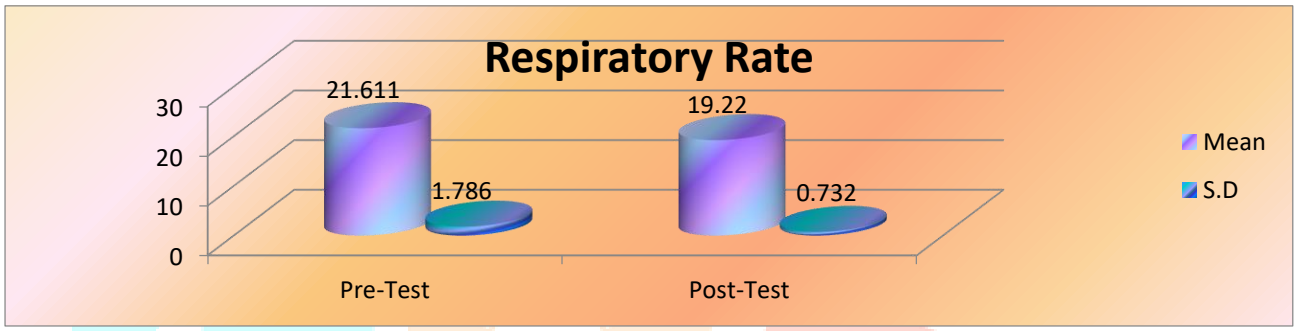
Description of COPD patients Mean Shortness of Breath and Respiratory pain related to Positional relaxation Pursed Lip Breathing exercise before and after Intervention.

Table. No. 1: Mean and Standard Deviations of COPD patients before and After Intervention (N = 18)

Shortness of Breath				**Respiratory rate**			
Pre –test		**Post-Test**		**Pre –test**		**Post-Test**	
Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
6.722	.66911	5.00	.76696	21.611	1.786	19.22	.732



The data presented in Table – 1 and Graph – 1 reveals, The Mean Pre-test and Post-test scores of Shortness of breath before and after Positional relaxation Pursed lip breathing is 6.722 & 5.00 respectively, and Standard deviation scores of Pre-test and post-test before and after intervention is .66911 and .76696 respectively.



Graph - 2

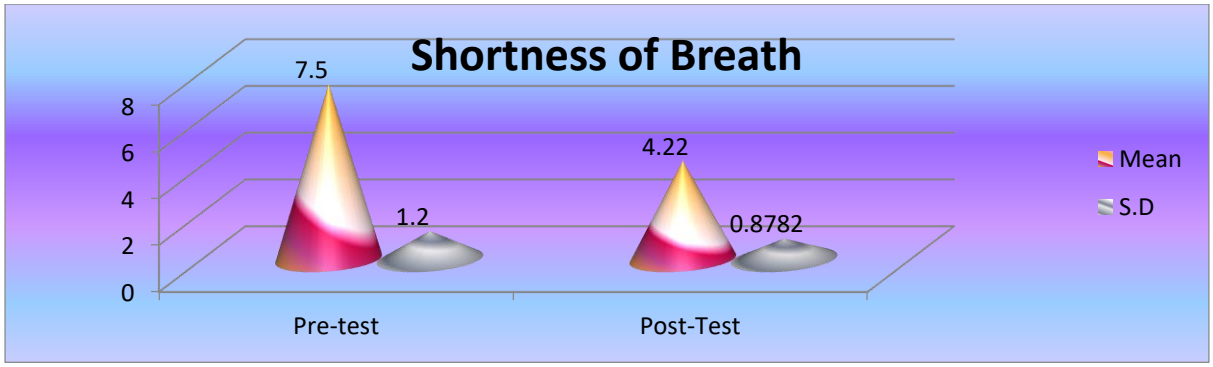
The data presented in Table – 1 and Graph – 2 reveals, The Mean scores of Respiratory rates during Pre-test and Post-test was 21.611 and 19.22 respectively before and after Positional relaxation Pursed lip breathing exercise and Standard Deviation at Pre-test and Post-test was 1.786 and 0.732 respectively.

Description of COPD patients Mean Shortness of Breath and Respiratory rate related to Pursed Lip Breathing exercise before and after Intervention.

To explore the impact of Pursed lip breathing exercise on Shortness of Breath and Respiratory rate was assessed and the findings are tabulated below.

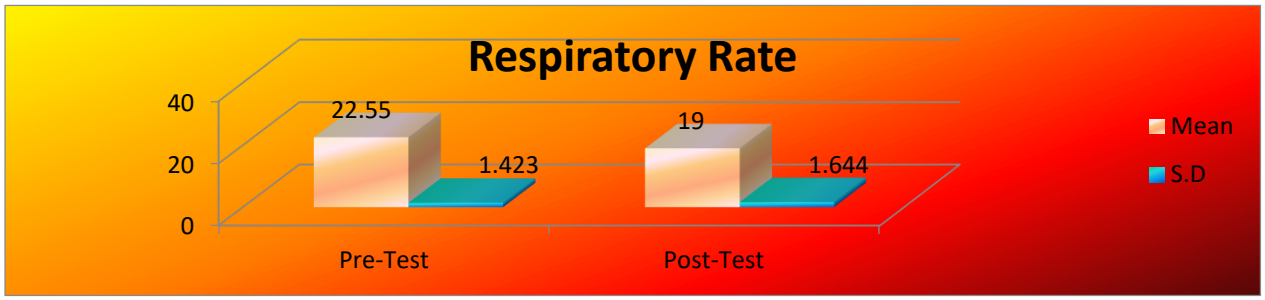
Table.No.2: Mean and Standard Deviations of COPD patients before and After Intervention (N = 18)

Shortness of Breath				**Respiratory rate**			
Pre –test		**Post-Test**		**Pre –test**		**Post-Test**	
Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
7.5	1.200	4.22	.8782	22.55	1.423	19.00	1.644



Graph -3

The data presented in Table – 2 and Graph – 3 reveals, The Mean Pre-test and Post-test scores of Shortness of breath before and after Pursed lip breathing is 7.500 &4.22 respectively, and Standard deviation scores of Pre-test and Post-test before and after intervention is 1.200 and .87820 respectively.



Graph – 4

The data presented in Table – 2 and Graph – 4 reveals, The Mean scores of Respiratory rates during Pre-test and Post-test was 22.55 and 19.00 respectively before and after Pursed lip breathing exercise and Standard Deviation at Pre-test and Post-test was 1.423 and 1.644 respectively.

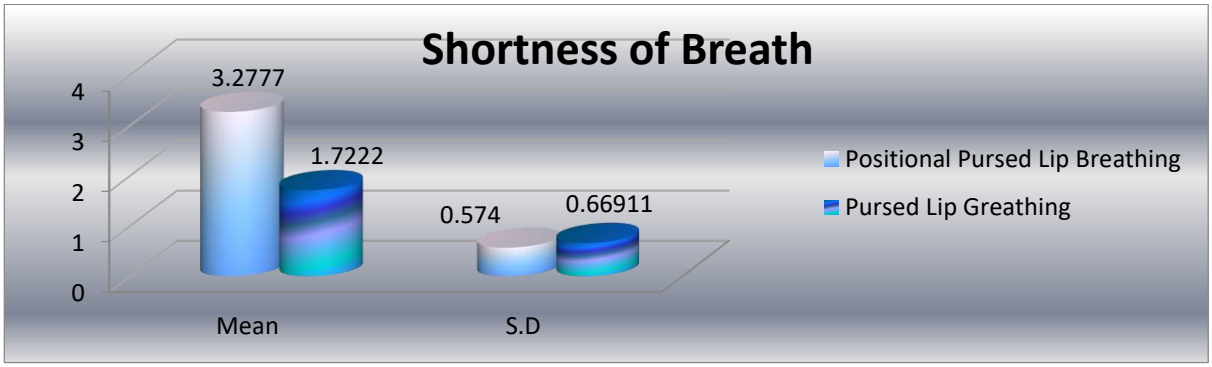
In order to find significant difference in Mean Shortness of Breath between Positional relaxation Pursed lip breathing exercise and Pursed lip breathing exercise, Independent-'t'-test was computed and the findings are displayed in the table no. 3

Table No. 3: Mean difference between reduced shortness of breath Positional relaxation pursed lip breathing and Pursed lip Breathing ($n_1+n_2=36$)

Shortness of Breath	Mean	Mean difference	Standard Error Difference	Independent 't' test
Positional relaxation pursed lip breathing exercise	3.277	1.555	.20787	7.483
Pursed lip breathing Exercise	1.7222			

P = 1.697, p>0.05

The data presented in Table No.-3 shows the Mean difference between Positional relaxation pursed lip breathing and Pursed lip Breathing is 1.555, To find significant Mean difference for reduced Shortness of Breath Independent `t`-test was computed and obtained $`t`_{(28)} = 7.483$ is found to be in-significant at 0.05 level of significance, as computed `t` value is higher than P Value (1.697) indicating Null Hypothesis is rejected implying there is significant difference between two interventions. As the Mean of positional relaxation pursed lip breathing exercise has higher mean than Pursed lip breathing exercise, hence Positional relaxation lip breathing has pronounced effect on in reliving shortness of breath than Pursed lip breathing.



Graph 5

The data represented in graph – 5 reveals the Mean scores of Shortness of Breath during Positional Pursed lip breathing and Pursed lip breathing was 3.2777 & 1.7222 respectively with Standard deviations 0.574 and 0.66911 respectively.

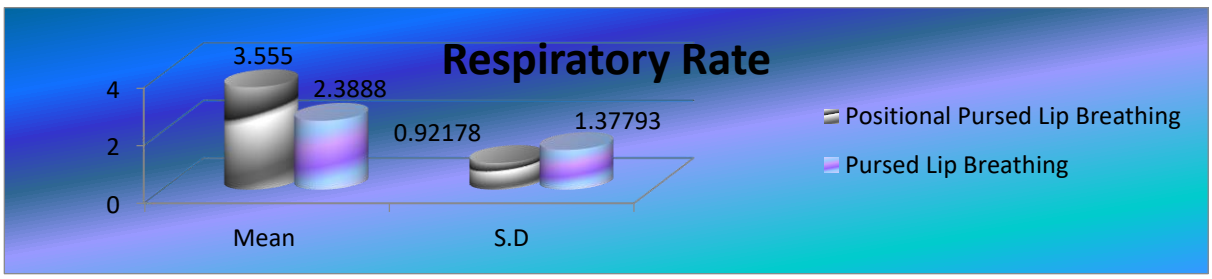
In order to find significant difference in Mean Respiratory rate between Positional relaxation Pursed lip breathing exercise and Pursed lip breathing exercise, Independent 't'-test was computed and the findings are displayed in the table no. 4

Table No.-4: Mean difference for reduced Respiratory rate between Positional relaxation pursed lip breathing and Pursed lip Breathing ($n_1+n_2=36$)

Respiratory rate	Mean	Mean difference	Standard Error Difference	Independent 't' test
Positional relaxation pursed lip breathing exercise	3.555	1.1666	.3907	2.986
Pursed lip breathing Exercise	2.388			

P = 1.697, p>0.05

The data presented in table.no - 4 shows the Mean difference between Positional relaxation pursed lip breathing and Pursed lip Breathing is 0.3907, To find significant Mean difference for reduced Respiratory Rate Independent `t`-test was computed and obtained $`t`_{(34)} = 2.986$ is found to be in-significant at 0.05 level of significance, as computed `t` value is higher than P Value (1.697) indicating Null Hypothesis is rejected& Alternate hypothesis is accepted implying there is significant difference between two interventions. As the Mean of positional relaxation pursed lip breathing exercise has higher mean than Pursed lip breathing exercise, hence, Positional relaxation lip breathing has pronounced effect on Respiratory rate than Pursed lip breathing.



Graph – 6

The data presented in graph – 6 reveals the Mean scores of Respiratory rate during Positional Pursed lip breathing and Pursed lip breathing was 3.555 & 2.388 with Standard Deviations 0.92178 and 1.37793 respectively.

Based on results of our study, p value is 1.697 and mean difference is 1.555 between shortness of breath of Pursed lip breathing and positional relaxation along with pursed lip breathing of COPD patients ,Mean value of shortness of breath with Pursed lip breathing is 1.7222 and positional relaxation along with pursed lip breathing is 3.277 and p value is 1.697 and mean difference is 1.166 between respiratory rate of pursed lip breathing and positional relaxation along with pursed lip breathing Mean value of Respiratory rate with Pursed lip breathing is 2.388 and positional relaxation along with pursed lip breathing is 3.555. Result showed that both PLB and positional relaxation along with pursed lip breathing exercises are statistically effective in reducing shortness of breath and respiratory rate in acute exacerbative COPD patients.

By analysing mean values, results of this study yielded that patient in group which performed positional relaxation along with pursed lip breathing showed more clinically significant decrease in shortness of breath and respiratory rate than pursed lip breathing exercise which were performed by group. Hence, we concluded that positional relaxation along with pursed lip breathing is more effective for reducing shortness of breath and respiratory rate in acute exacerbative COPD patients.

Null Hypothesis is rejected& Alternate hypothesis is accepted implying there is significant difference between two interventions. As the Mean of positional relaxation pursed lip breathing exercise has higher mean than Pursed lip breathing exercise, hence Positional relaxation along with pursed lip breathing exercise has pronounced effect on Respiratory rate and shortness of breath than Pursed lip breathing exercise.

DISCUSSION

This study was designed to see the immediate effect of positional relaxation along with Pursed lip breathing exercise vs Pursed lip breathing exercise on Shortness of breath and Respiratory rate in Acute exacerbative COPD patients. Purpose of this study was to find out which technique is more effective in reducing shortness of breath and Respiratory rate in patients with acute exacerbative COPD patients. There are studies done separately on Pursed lip breathing exercise and positional relaxation along with pursed lip breathing exercise.

In COPD patients resistance to airflow is increased because the airways are narrowed. Because airways widen during inhalation, air can usually be pulled in. However, because airways narrow during exhalation air cannot be exhaled from the lungs as fast as normal people wheeze and breathing is laboured. Dyspnea results when too much air is left in the lungs after exhaling.

In COPD patients may get prone to alterations in oxygen and carbon dioxide levels in the blood and when individual is having low blood oxygen level (partial pressure of oxygen) body may respond with rapid breathing leads to increased respiratory rate[10].

Salwa A. Mohamed et.al (2019) conducted a study on the effects of positioning and pursed lip breathing exercise on dyspnea and anxiety status in patients with chronic obstructive pulmonary disease. They conducted experimental study on 60 COPD patients, to assess the pre and post differences in dyspnea by applying pursed lip breathing and positioning. The study concluded that the forward leaning position and breathing technique in COPD patients helps to improve physiological outcomes, dyspnea symptoms and anxiety status after implementing of program[5].

Aat Djanatunisah and Riri Maria et.al (2022) similarly studied the position of leaning forward to reduce breathing of COPD patients. Also, he explained the mechanism behind that the PLB is a breathing exercise thar emphasizes the expiration process which is done calmly and relaxed with the aim of facilitating the process of expelling air trapped by the airways. Through this technique the air that comes out will be blocked by the lips, which causes the pressure in the oral cavity to be more positive. This positive pressure will spread into the narrowed airway and is useful for keeping the airways open. With the opening of the airway, air can easily escape affects the strength of the respiratory muscles to reduce shortness of breath. And he concluded that the forward leaning position is effective in reducing shortness of breath in COPD patients[9.]

Shahriar Sakhaei, Hassan Ebrahimpour Sadagheyani, Soryya Zinalpoor et.al (20 Oct 2018) They conducted study on the Impact of Pursed Lip Breathing Maneuver on cardiac, Respiratory and oxygenation parameters in COPD patients. The result of this study indicated that using effective PLB as an easy, inexpensive, non- pharmacological method is considered as an improving the status of oxygenation and physiological indicators in patients with COPD.

Pursed lip breathing is a breathing exercise thar emphasizes the expiration process which is done calmly and relaxed with the aim of facilitating the process of expelling air trapped by the airways. Through this technique the air that comes out will be blocked by the lips, which causes the pressure in the oral cavity to be more positive. This positive pressure will spread into the narrowed airway and is useful for keeping the airways open. With the opening of the airway, air can easily escape affects the strength of the respiratory muscles to reduce shortness of breath[11.]

Positional Relaxation along with Pursed lip breathing, than forward leaning position increases intraabdominal muscle pressure and decreases the pressure of the diaphragm muscle to the abdominal cavity during inspiration.

Based on results of our study, p value is 1.697 and mean difference is 1.555 between shortness of breath of Pursed lip breathing and positional relaxation along with pursed lip breathing of COPD patients Mean value of shortness of breath with Pursed lip breathing is 1.7222 and positional relaxation along with pursed lip breathing is 3.277 and p value is 1.697 and mean difference is 1.166 between respiratory rate of pursed lip breathing and positional relaxation along with pursed lip breathing Mean value of Respiratory rate with Pursed lip breathing is 2.388 and positional relaxation along with pursed lip breathing is 3.555. Result showed that both PLB and positional relaxation along with pursed lip breathing exercises are statistically effective in reducing shortness of breath and respiratory rate in acute exacerbative COPD patients.

By analysing mean values, results of this study yielded that patient in group which performed positional relaxation along with pursed lip breathing showed more clinically significant decrease in shortness of breath and respiratory rate than pursed lip breathing exercise which were performed by group. Hence, we concluded that positional relaxation along with pursed lip breathing is more effective for reducing shortness of breath and respiratory rate in acute exacerbative COPD patients.

CONCLUSION

Based on the present study results it can be concluded that Pursed lip breathing exercise and positional relaxation along with pursed lip breathing exercise are effective in reducing shortness of breath and respiratory rate in acute exacerbative COPD patients also it was found that positional relaxation along with pursed lip breathing is more effective than pursed lip breathing exercises in reducing shortness of breath and respiratory rate.

LIMITATIONS:

The study is conducted with small sample size so result of study cannot be generalized.

The study is conducted at only one institute.

Study is limited only for one session.

FUTURE SCOPE:

Study can be done with large sample size.

Also, to make precise result of intervention same study with large sample size and different institute at the same time.

Different outcome measures can be used for future studies which are affected in COPD patients.

Also, intervention can be given for long duration.

Study can be performed in multiple medical conditions.

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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