

“A Comparative study between the effect of breathing control and pursed lip breathing exercises in COPD patients on expiratory flow rate.”

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ABSTRACT
BACKGROUND

WHO has included COPD in the global action plan of prevention and control of non-communicable diseases. To help relieve this global health burden, we studied the comparative effectiveness of “breathing control” and “pursed lip breathing exercises” techniques on the expiratory flow rate of COPD patients.

METHODOLOGY

We performed a randomized control trial by selecting 40 patients of COPD from Mayo hospital of Pakistan and divided them randomly into 2 groups A and B

Group A received breathing control exercises treatment while group B received pursed lip breathing exercise treatment. Treatment frequency was 3 times a week for 2 weeks.

RESULT

Patients in group B showed marked improvement as compared to group A.

CONCLUSION

This study concluded that pursed lip breathing exercise proved to be more advantageous in raising the PEFr of COPD patients.

INTRODUCTION:

According to WHO, COPD ranks on 3rd number as a cause of death, hence it's a serious health burden globally. ⁽¹⁾ .COPD is a chronic condition which is characterized by inflammatory airways leading to obstructed airflow from the lungs. It's an umbrella term that includes chronic bronchitis and emphysema ⁽²⁾ .

The pathogenesis of COPD is complex and is generally induced by long term exposure of irritant gases most commonly cigarette smoke which results in initiation of abnormal inflammatory response that leads to airway remodeling and irreversible air flow restriction. ⁽³⁾.COPD is presented by respiratory problems (breathing difficulty and cough), excessive mucous production along with wheezing.Muscle wasting, osteoporosis and cardiovascular diseases are some of the extra pulmonary features worth mentioning.Patients with chronic obstructive pulmonary disease (COPD) exhibit increases in lung volume due to expiratory airflow limitation. Increases in lung volumes may affect upper airway patency and compensatory responses to inspiratory flow limitation (IFL) during sleep.

The severity of COPD is directly proportional to the risk of respiratory infections. The impairment of innate immune system is most likely responsible for both the colonization of respiratory tract with bacteria and for an increased risk of infection with new strains of bacteria causing acute exacerbations (4).Inflammatory responses in COPD includes priming of leukocytes by cytokines such as tumor necrosis factor alpha ⁽⁴⁾.Inflammation causes airway narrowing and secretions which results in premature closure and air trapping in the distal airways and airspaces, which cause decrease in expiratory flow rate, FEV1 and ratio of FEV1 to FVC is also reduced.Other than cigarette smoke etiology could include air pollution, occupational hazards, noxious fumes although genetic predisposition also plays a role.COPD assessment test and clinical questionnaire are also useful tools for the health quality measurements.Pursed lip breathing exercise was explained to the patients by asking them to "breathe in slowly through your nose for two counts, keeping your mouth closed. Take a normal breath. Pucker or "purse" your lips as if you were going to whistle and breathe out." ⁽⁵⁾ Whereas breathing control exercises are explained as:

- Sit comfortably on the floor or in a chair.
- Breathe in through your nose. As you do it, count to five.

- Breathe out through your nose to the count of five.
- Repeat several times.

MATERIAL AND METHODS:

This was a randomized control trial which was conducted in Mayo hospital Lahore -Pakistan over a span of 6 months' time. Total 40 patients were included which were divided into two groups (20 groups A, 20 groups B). This sample size is calculated by using G power 3.1.9.4 software with 95 % confidence level. Effect size d is 1.3333333, power is 0.95, and alpha error is 0.05. Mean of group 1 is 1.2 and mean of group 2 is 2.0. Standard deviation of group 1 is 0.6 and standard deviation of group 2 is 0.6.

- **Study Group:**
 - **Group – A:** In this group patients were treated with Breathing control exercise.
 - **Group – B:** In this group patients were treated with pursed lip breathing exercise.

Treatment duration was 30 minutes each session and data were collected by direct interview method. Non probability purposive technique was used.

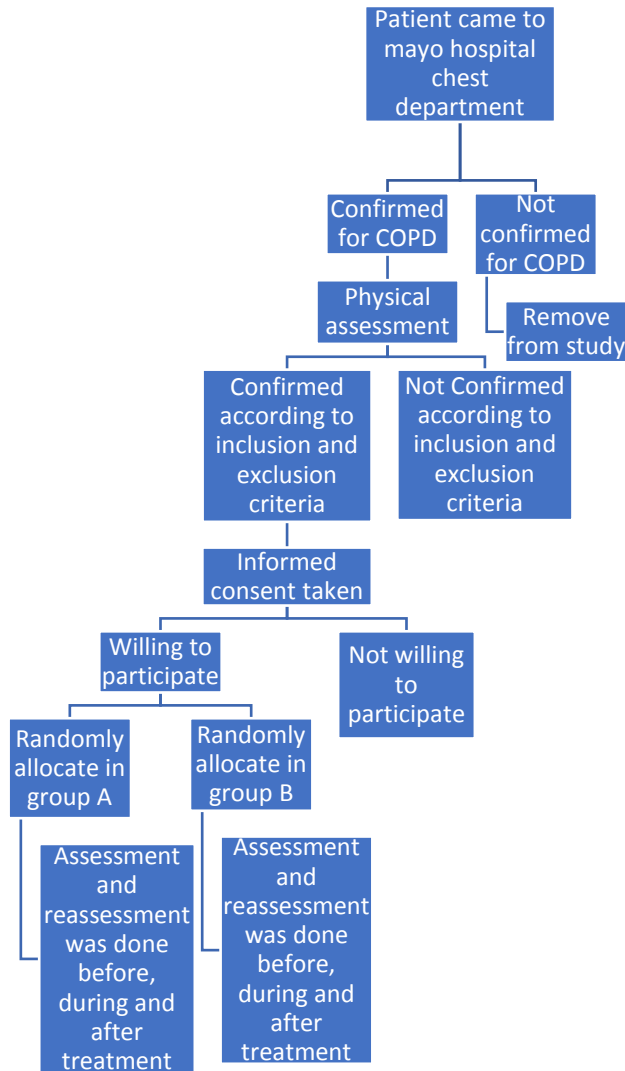
SAMPLE SELECTION:

- **Inclusion Criteria:**

We included COPD patients of both genders with the age ranging from 45 –65 years including the stage 3 and stage 4 patients as per the GOLD guidelines.
- **Exclusion Criteria:**

Patients with co-morbidities like renal and hepatic dysfunction, unstable cardiovascular disease, cancer or history of mental illness were not included

SCHEDULE AND PHASING:



METHODOLOGY:

Following tools were used for data collection

- Clinical assessment
- peak flow meter

CLINICAL ASSESSMENT:

We carefully excluded any active pathology by history taking which included questions of age, gender, past medical history, socioeconomic status, marital status, and educational status, duration of onset, nature and location of symptoms. After the questionnaire filling, clinical examination was done. All the participants were observed for any changes of chest wall alignment and contour. Moreover, chest wall and upper limb was palpated for any tenderness and temperature differences.

- **Group A:**

This group was instructed to perform breathing control exercise. We asked the patient to breath in slowly through nose and count numbers 1,2.... etc. Then ask the patient to exhale out through nose while counting numbers 1,2,3,4.... etc. Count the numbers in ratio of 2:1 (expiration: inspiration). Repeat this for 5-10 cycles.

- **Group B:**

This group was instructed to perform pursed lip breathing exercises. We asked the patient to relax as much as possible. Then patient breath in slowly and deeply through the nose and then breath out gently through pursed lip. Repeat this for 5-10 cycles.

PEAK FLOW METER:

After the exercises peak flow meter was used to check the improvement in expiratory flow rates of the participants

DATA ANALYSIS:

Data was analyzed by SPSS (21).

RESULT:

Mean "age" in group A was 51.95 ± 5.326 and in group B was 52.00 ± 4.942 .

Distribution of cases according to "gender in group A" has showed out of 20 (100%) subjects 12 are male and 8 are female.

Distribution of cases according to "gender in group B" has showed out of 20 (100%) subjects, 10 are male and 10 are female.

Distribution of cases according to "socio-economic status in group A" has showed out of 20 (100%) subjects, 10 % are with upper class, 50% are middle class and 40% are lower class.

Distribution of cases according to "socio-economic status in group B" has showed out of 20 (100%) subjects, 15 % are with upper class, 45 % are middle class and 40% are lower class.

T-TEST:

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretreatment expiratory flow rate of group A	56.0500	20	3.87264	.86595
	post treatment expiratory flow rate of group A	84.3000	20	3.11364	.69623
Pair 2	pretreatment expiratory flow rate of group B	56.4500	20	3.97988	.88993
	post treatment expiratory flow rate of group B	89.6500	20	2.45539	.54904

Paired Samples Test

Paired Differences

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	pretreatment expiratory flow rate of group A - post treatment expiratory flow rate of group A	-28.2500	4.08946	.91443	-30.16393	-26.33607	-30.894	19	.000
	pretreatment expiratory flow rate of group B - post treatment expiratory flow rate of group B	-33.2000	4.53756	1.01463	-35.32364	-31.07636	-32.721	19	.000

RESULT:

Pre and post treatment comparison of peak expiratory flow rate in group A has showed that mean PEFr score before treatment was 56.050 ± 3.87264 which was improved to 84.300 ± 3.1136 with the significant value of 0.000 which is less than 0.05 showing that breathing control exercises are effective in improving expiratory rate in patients with COPD.

Pre and post treatment comparison of peak expiratory flow rate in group B has showed that mean PEFr score before treatment was 56.4500 ± 3.9798 which was improved to 89.6500 ± 2.45539 with the significant value of 0.000 which is less than 0.05 showing that pursed lip breathing exercises are effective in improving expiratory rate in patients with COPD.

T-TEST:**Group Statistics**

	Group	N	Mean	Std. Deviation	Std. Error Mean
post treatment peak expiratory flow rate	Group A	20	84.3000	3.11364	.69623
	Group B	20	89.6500	2.45539	.54904

Independent Samples Test

		<u>Levene's Test for Equality of Variance</u>		<u>t-test for Equality of Means</u>						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
post treatment peak expiratory flow rate	Equal variances assumed	1.956	.170	-6.034	38	.000	5.3500	.88667	7.14497	3.55503
	Equal variances not assumed			-6.034	36.041	.000	5.3500	.88667	7.14818	3.55182

RESULT:

Thus, this shows that peak expiratory flow rate shows marked improvement in patients receiving pursed lip breathing exercise treatment.

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
age in group A	.163	20	.168	.919	20	.093
gender in group A	.387	20	.118	.626	20	.102
marital status of group A	.527	20	.101	.351	20	.201
education level of group A	.463	20	.110	.544	20	.210
socioeconomic status of group A	.276	20	.122	.780	20	.111
pretreatment expiratory flow rate of group A	.146	20	.200*	.951	20	.383
post treatment expiratory flow rate of group A	.120	20	.200*	.971	20	.780

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
age in group B	.178	20	.096	.903	20	.046
gender in group B	.335	20	.102	.641	20	.210
marital status of group B	.527	20	.110	.351	20	.222
education level of group B	.487	20	.210	.495	20	.110
socioeconomic status of group B	.252	20	.120	.795	20	.112
pretreatment expiratory flow rate of group B	.131	20	.200 [*]	.964	20	.632
post treatment expiratory flow rate of group B	.157	20	.200 [*]	.940	20	.237

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

DISCUSSION:

This study proved to be of an immense value in the management of COPD. Pursed lip breathing technique is very effective in controlling the symptoms by clearance of airways secretions. These methods are non-invasive and are more successful in providing the desired results in COPD patients. Both the techniques proved to be satisfactory in the treatment of COPD however, pursed lip breathing exercise proved to be more effective and gave more relief to the patients. During pursed lip breathing exercise staffing of rib cage and accessory muscles was observed by Breslin, that proved valuable in the improvement of dyspnea.⁽⁶⁾

According to a study conducted by Yyang when the pursed lip breathing exercise joined with diaphragmatic breathing, it markedly advanced pneumonic capacity and exercise limit in COPD patients.⁽⁷⁾ Pursed lip breathing exercise improve expiratory flow rate by creating back pressure in air ways resulting in opening of airways, hence increasing the tidal volume⁽⁸⁾. The pursed lip breathing exercise also increases the partial pressure of oxygen along with resp rate, proved by a study conducted by Dr. Mohsen Haibaghary⁽⁹⁾. In the light of all the above researches and along with our research, it has determined that pursed lip breathing exercise is more effective strategy than

CONCLUSION:

Patients in group B who received therapeutic treatment by pursed lip breathing exercise showed more improvement in expiratory flow rate as compared to patients in group A who were treated by breathing exercise technique

REFERENCES:

- 1) Collaborators GBDCRD (2017) Global, Regional, and National Deaths, Prevalence, Disability-Adjusted Life Years, and Years Lived with Disability for Chronic Obstructive Pulmonary Disease and Asthma, 1990-2015: A Systematic Analysis for the Global Burden of Disease Study 2015. The Lancet Respiratory Medicine, 5, 691-706.
[https://doi.org/10.1016/S2213-2600\(17\)30293-X](https://doi.org/10.1016/S2213-2600(17)30293-X)
- 2) [COPD - Symptoms and causes - Mayo Clinic](#)
- 3) [Correlation of Inflammatory Cells in Induced Sputum and Peripheral Blood of Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease \(scirp.org\)](#)
- 4) <http://erj.ersjournals.com/>
- 5) <https://my.clevelandclinic.org/health/articles/9443-pursed-lip-breathing>
- 6) Breslin EH. The pattern of respiratory muscle recruitment during pursed-lip breathing. Chest. 1992;101(1):75-8.
- 7) Yang Y, Wei L, Wang S, Ke L, Zhao H, Mao J, et al. The effects of pursed lip breathing combined with diaphragmatic breathing on pulmonary function and exercise capacity in patients with COPD: a systematic review and meta-analysis. Physiotherapy theory and practice. 2020:1-11.
- 8) Gosselink R. Breathing techniques in patients with chronic obstructive pulmonary disease (COPD). Chronic respiratory disease. 2004;1(3):163-72.
- 9) Izadi-avanji FS, Adib-Hajbaghery M. Effects of pursed lip breathing on ventilation and activities of daily living in patients with COPD. 2011.