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The effect of breathing exercises on the degree of dyspnea and activities of daily living for patients with chronic obstructive pulmonary disease

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***Abstract**: Chronic Obstructive Pulmonary Disease (COPD) is a major cause of morbidity and mortality worldwide, characterized by persistent airflow limitation. Patients with COPD suffer from dyspnea, which is one of the major symptoms that impact their activities of daily living. Breathing exercises has been shown to increase oxygen saturation and improve the degree of dyspnea and the activities of daily living. The aim of the study was to evaluate the effect of breathing exercises on the degree of dyspnea and activities of daily living for patients with chronic obstructive pulmonary disease. This study had been conducted at the inpatient chest department of the Alexandria Main University Hospital, Egypt. The study sample comprised a convenience sample of 60 adult patients with chronic obstructive pulmonary disease; patients were selected and divided randomly and alternatively into two equal groups, control and study groups (30 patients in each group). Three tools were used to collect the necessary data. **Tool I,** sociodemographic and respiratory physical assessment sheet. **Tool II,** Dyspnea assessment. **Tool III,** effect of breathing exercises on the degree of dyspnea and activities of daily living (structured interview schedule). The results of the study showed that, There was no statistical significance difference between both control and study groups concerning degree of dyspnea pre breathing exercise (P= 0.079), on the other hand, there is statistical significance difference between both control and study groups post breathing exercise (P <0.001). Moreover, near half of the study group 46.7% had dyspnea grade 2 post breathing exercise compared to 36.7% of patients in the control group had dyspnea grade 5. There was statistical significance difference pre and post breathing exercise and in the follow up period concerning the total score of activity of daily living (P<0.001). It can be concluded that, breathing exercises have a positive effect on the degree of dyspnea and improve the activity of daily living in patients with COPD.*

***Keywords:** Breathing exercises, degree of dyspnea, activities of daily living, chronic obstructive pulmonary disease.*

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I. Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive irreversible airway disease, leading to breathlessness, cough and sputum [(1)]. The patients with COPD experience increased worsening in all activities of daily living, impairment in ability to work and declining participation in social and physical activities [(2)]. COPD is considered the third cause of death in 2030 by World Health Organization [(3)]. In Egypt at Alexandria, no reports showing the exact number of patients with the diagnosis of COPD, but the medical records of the Main University Hospital show that about 266 male and 35 female patients were hospitalized in the chest unit with the diagnosis of COPD in 2010 [(4)]. While the medical records of Health Insurance Hospital (Gamal Abdel Nasser), show that (1800) COPD patients were hospitalized in 2010 [(5)].

The predisposing factors to COPD include cigarette smoking, recurrent chronic respiratory infections, air pollution, occupational exposure to chemicals, and allergies. Studies support that COPD is a disease of genetic, environmental interaction, familial and hereditary factors (such as deficiency of alpha 1-antitrypsin) may also predispose to COPD [(6)]. Patients with COPD have physiological changes such as a limitation in the shape of the diaphragm and thoracic cage [(7)]. Despite all effort of respiration, the actual respiration volume is decreased, so the

COPD patients complain from dyspnea especially during exercise. Exertional dyspnea is the most reported symptom, it is caused by the demand for respiration is not consistent with the energy ratio supplied by respiratory muscles [(8)]. Exercise intolerance is related to airflow, gas exchange, and systemic limitations [(9,10)].

Exertional dyspnea often causes patients with COPD to have reduction in their activities of daily living (ADLs), it include things we normally do in daily living including any daily activity we perform as self-care (feeding ourselves, bathing, dressing, grooming), work, homemaking, and social or leisure activities. In patients with COPD, the most important factors that affecting activities of daily living are both dyspnea and fatigue. Breathing exercises have a positive effect in decreasing dyspnea; increasing exercise tolerance, decrease both frequency and duration of hospitalization, and improved activities of daily living [(11-14)].

Nurses have a valuable role in rehabilitation of COPD patients. The nurse can assist in the identification of patient's need, help in establishing realistic outcomes expectations and giving health teaching opportunities [(15)]. Pursed-lips breathing (PLB) and diaphragmatic breathing are strategies that frequently adopted spontaneously by patients to relieve dyspnea [(10)], and it is taught in respiratory physical therapy and pulmonary rehabilitation programs to promote exercise tolerance. The American Thoracic Society describes pursed-lips breathing (PLB) as nasal inspiration followed by prolonged expiration with lips partly closed [(16-18)]. Breathing exercises should be taught by qualified nurse to the patients while they are not breathless, and they should be encouraged to practice these exercises regularly [(19)].

1.1 **Aim of the study:** The aim of this study is to evaluate the effect breathing exercise on the degree of dyspnea and activities of daily living for patients with chronic obstructive pulmonary disease.

1.2 **Research hypothesis:**

- Breathing exercises improve the degree of dyspnea for patients with chronic obstructive pulmonary disease.
- Breathing exercises improve the activities of daily living for patients with chronic obstructive pulmonary disease.

II. Materials and Method

Materials

2.1 Study Design: The research design of this study was quasi experimental.

2.2 Setting: The study was conducted at the inpatient chest department of the Alexandria Main University Hospital, Egypt.

Inpatient chest department has a capacity of thirty seven beds for male patients, and twenty six beds for female patients.

2.3 Subject: A convenience sample of 60 adult patients with chronic obstructive pulmonary disease based on Epi-nfo program that estimate the sample size using the following parameters:

1. Total population over one year ago at the above mentioned hospital was 250 patients.
2. Expected frequency = 50%
3. Acceptable error= 10%
4. Confidence coefficient= 95%
5. Estimated sample size= 60

- The study sample was selected and divided randomly and alternatively into two equal groups, control and study groups.
- Control group I: was received only routine hospital care of chest department.
- Study group II: was received instruction about Pursed-lips breathing (PLB) and diaphragmatic breathing.

2.4 Inclusion criteria:

- Adult patients (20-60 years).
- Able to communicate.
- Had chronic obstructive pulmonary disease.
- Following their prescribed medical treatment throughout the study.
- Free from other medical conditions as heart disease, uncontrolled hypertension, rheumatoid arthritis and other inflammatory disease.
- Free from any respiratory disorders such as T.B, Pneumonia or any other associated diseases that affect patient's activities of daily living as anemia, heart diseases, musculoskeletal or neurological disorders.

- Have not been involved in a scheduled program of breathing and coughing exercise within the last 6 months.

2.5 Tools of the study:

Three tools were used in this study to collect the necessary data:

Tool I: Sociodemographic and respiratory physical assessment sheet:

This tool was developed by the researcher based on review of current related literature [20, 21]. It included the following parts:

Part I: This part included the sociodemographic data of the studied patients, including the code number, age, sex, level of education, marital status, economic status, religions and occupation, presence of air pollution source, occupational exposure to any dust, type of dust or vapor during exposure, smoking habits, type of smoking, number of cigarette smoking per day and duration of time since diagnosis.

Part II: Respiratory physical assessment sheet: It included:

(A) Past health history which included, presence of any health problems, presence of any respiratory disease and family history of any respiratory disease.

(B) Current health conditions: which included, symptoms the patient feel when the attack occurs, time of dyspnea during the day, dyspnea episodes, chest clinics visits due to presence of symptoms, number of hospitalization due to disease, months these symptoms exaggerated and treatment that taken.

Tool II: Dyspnea assessment:

This tool was developed by the Bestall in 1999 [22], to assess the degree of dyspnea. It comprised five statements that describe almost the entire range of respiratory disability from none (Grade 1) to almost complete (Grade 5).

Grade	Degree of breathlessness related to activities
1	Not troubled by breathlessness except on strenuous exercise.
2	Shortness of breath when hurrying on the level or walking up on a slight hill.
3	Walk slower than most people on the level, stop after a mile or so stop after 15 minutes walking at own piece.
4	Stop for breath after walking about 100 meters or after few minutes on level ground.
5	Too breathlessness to leave the house or "I am breathless when dressing.

Tool III: Effect of breathing exercises on degree of dyspnea and activities of daily living (structured interview schedule)

This tool was developed by the researcher based on review of current related literature [23]. This tool included data about activities of daily living as **self-care activities** (bathing, dressing, putting shoes/ socks, washing hair, toileting, feeding, combing, shaving, brushing teeth, moving out of bed, climb stairs , walking in home, walking outside home, and travel on public transport. **Home activities** as lift something, prepare meals and perform general house work. **Leisure / social activities** and **work related activities** and other activities as shopping, responsibility for taking his own medication.

Every participant will express his/her degree of limitations due to dyspnea at five point likert scale ranging from zero to four and the activities were scored pre and post breathing exercise.

Scale	**Items**
0	Not done
1	Done with help
2	Done with great help
3	Done alone with difficulty
4	Done alone easily

Methods

- An official letter from the faculty of Nursing, Alexandria University was submitted to the directors of the main university hospital and the head of the chest department for obtaining permission to carry out the study after complete explanation of the study aim.
- Tool I, and III were developed after reviewing of the current related literature [20,21,23].
- Tool II was adopted from Bestall (1999) [22], to assess the degree of dyspnea.

- The study tools were revised by five experts in the field of chest diseases and Medical Surgical Nursing, to test the tools for content validity, completeness and clarity of the items. Accordingly, the necessary modifications were carried out.
- The reliability of the tools was tested using the Cronbach alpha coefficient and it was 0.80.
- A pilot study was initially carried out on 5 patients prior to the actual data collection to assess clarity and applicability of the tools and to identify the difficulties that may be encountered during data collection. These patients were excluded from actual study subjects.
- Following the pilot study, the necessary modifications for all tools were done and a plan to resolve the obstacles were identified and considered during the actual study process and data collection.
- The researcher introduced herself to every patient and explained the purpose of the study.
- Patients who meet the inclusion criteria were assigned and divided alternatively into two equal groups (control and study groups).
  - The first group (control group) were received the routine hospital care.
  - The second group (study group) was received instruction about Pursed-lips breathing (PLB) and diaphragmatic breathing.
- The study was conducted throughout a period of three months from April 2017 to the end of June 2017.
- Patients' interviews were carried out individually at the inpatient chest clinic using tools I, II, II which took approximately 30-40 minutes for each interview.
- The breathing exercises was carried out by the researcher for each patient individually. Clear and simple instructions were offered to each patient, pre breathing exercises. Each patient had an individualized exercise explanation with pictures that contained the goal of the exercise, the frequency of breathing exercises and the duration. Each patient was asked to demonstrate and perform the breathing exercise until the patient gained the skills to perform the exercise, correctly and actively.
- The patients were instructed to perform breathing exercises every day five times, 5 minutes in each time, for 5 weeks.
- The patients were evaluated during the follow up period (5 weeks) for the degree of dyspnea and activities of daily living.

Statistical analysis of the data:

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. Significance of the obtained results was judged at the 5% level .The used tests were:

1- **Chi-square test:** For categorical variables, to compare between different groups.

2- **Fisher's Exact or Monte Carlo correction**: Correction for chi-square when more than 20% of the cells have expected count less than 5

3- **Marginal Homogeneity Test:** Used to analyze the significance between the different stages

Ethical considerations

- 2Patients' written approval to participate was obtained.
- Privacy of the patients was maintained.
- Confidentiality of the collected data was secured.
- Patients' right to withdraw at any time of research participation was considered and respected.

III. Results

Table (1): Percentage distribution of patients in both control and study groups according to socio-demographic data. The results revealed that, no statistical significance difference was existed between both groups regarding age, sex, level of education, marital status, residence area, occupation, medical insurance and duration since diagnosis (P= 0.060, 0.542, 0.127, 0.122, 0.602, 0.079, 0.129, 0.882 respectively). Where the highest percentage of both control and study groups were between 50-60 years (43.3%, 53.3% respectively), male patients (73.3%, 80% respectively), read and write (46.7% for both groups), married (66.7% for both groups), from urban area (60%. 53.3% respectively), had manual work (33.3 for both groups) and diagnosed from 1-3 years (46.7%, 53.3% respectively).

Table (2): Percentage distribution of patients in both control and study groups according to past health history. The results showed that, there was no statistical significance difference between both groups concerning

presence of any health problems, presence of respiratory disease and family history of any respiratory disease (P= 0.739, 0.282, 0.781 respectively).

Table (3): Percentage distribution of patients in both control and study groups according to history of exposure to respiratory irritants and smoking history. The results found that, there was no statistical significance difference between both control and study groups regarding presence of air pollution source, presence of cats, dogs or birds, occupational exposure to any dust, type of dust or vapor during exposure, smoking habits, types of smoking in case of smoker and passive smoker, and number of cigarette per day (P= 0.117, 0.292, 0.382, 0.109, 1.000, 1.000, and 0.748 respectively).

Where more than half of the control and study groups (57.1%, 63.6 % respectively) exposed to chemical dust. In relation to smoking history, about two third of both control and study groups (66.6%, 70% respectively) were smokers either current or passive smokers. The majority of smokers in the control and study groups (80%, 82.9% respectively) were smoking either cigarettes or cigarettes and water pipe, more than one third of both groups were smoking more than two packages per day (37.5% for both groups.

Table (4): Percentage distribution of patients in both control and study groups according to current health conditions. There was no statistical significance difference between both control and study groups concerning symptoms when the attack occur, time of dyspnea during the day, dyspnea episodes, chest clinics visit due to the presence of symptoms, months in which symptoms exaggerated and months in which symptoms exaggerated (P= 0.065, 0.795, 0.0124, 0.138, 0.606 respectively). The time of dyspnea in more than half of patients in the control and study groups (53.3%, 56.7% respectively) was in the night time.

On the other hand, there was statistical significance difference between both control and study groups regarding number of hospitalization due to disease, and treatment taken (P= 0.004 , 0.038 respectively). Where December month was the most month in year in which the symptoms exaggerated in both control and study groups (60%, 80% respectively). Concerning medication taken, corticosteroids had the highest percentage in both control and study groups (P= 46.7%, 66.7% respectively).

Table (5): Comparison between patients in both control and study groups according to degree of dyspnea pre and post breathing exercise. There was no statistical significance difference between both control and study groups concerning degree of dyspnea pre breathing exercise (P= 0.079), on the other hand, there is statistical significance difference between both control and study groups post breathing exercise (P <0.001).

Also, there was statistical significance difference in the degree of dyspnea in the study group post breathing exercise (P <0.001). While there was no statistical significance difference in the degree of dyspnea in the control group post breathing exercise (P= 1.00). Moreover, near half of the study group 46.7% had dyspnea grade 2 post breathing exercise compared to 36.7% of patients in the control group had dyspnea grade 5 post breathing exercise.

Table (6): Percentage distribution of patients in both control and study groups pre and post breathing exercise concerning activities of daily living. In relation to self- care activities pre breathing exercise, no statistical significance difference was found between both control and study groups concerning bathing, dressing, putting shoes/socks, washing hair, toileting, feeding, combing, brushing teeth, moving out of bed, climb stairs, walking in home, walking outside home, and travel on public transport (P= 0.217, 0.520, 0.522, 0.520, 0.681, 0.274, 0.956, 0.132, 0.060, 0.237, 0.162, 0.074, 0.069 respectively).

Nevertheless, the result showed that, there was statistical significance difference post breathing exercise between both control and study groups concerning bathing, dressing, putting shoes/socks, washing hair, toileting, feeding, combing, shaving, brushing teeth, moving out of bed, climb stairs, walking in home, walking outside home, and travel on public transport (P <0.001 in all self-care activities).

Regarding home activities pre breathing exercise, there was no statistical significance difference between both control and study groups concerning lift something off self which is above, prepare meals, take meals from kitchen to other rooms, washing dishes, perform general house work, washing clothes, sweeping and cleaning or dusting (P= 0.056, 0.086, 0.179, 0.289, 0.492, 0.492, 0.582, 0.582 respectively). Nevertheless, the result showed that, there was statistical significance difference post breathing exercise between both control and study groups concerning lift something off self which is above, prepare meals, take meals from kitchen to other rooms, washing dishes, perform general house work, washing clothes, sweeping and cleaning or dusting (P <0.001 in all home activities).

In relation to leisure / social activities pre breathing exercise, there was no statistical significance difference between both control and study groups concerning go out socially, play with children and visit friends or relatives (P= 0.141, 0.182, 0.116 respectively). On the other hand, the result showed that, there is statistical significance

difference post breathing exercise between both control and study groups concerning go out socially, talking and laughing, play with children and visit friends or relatives (P <0.001 in all leisure and social activities).

Concerning work related activities pre breathing exercise, there was no statistical significance difference between both control and study groups (P= 0.062). While, there was statistical significance difference post breathing exercise between both control and study groups (P <0.001).

Table (7): Comparison between patients of both control and study groups pre and post breathing exercise and in follow up periods concerning total score of activities of daily living.

Pre breathing exercise, there was no statistical significance difference between both control and study groups concerning total score of activities of daily living (P= 0.370). While, post breathing exercise, there was statistical significance difference between both control and study groups (P<0.001).

In relation to follow up period, there was statistical significance difference between both control and study groups concerning (P<0.001). Regarding the control group, there was no statistical significance difference pre and post breathing exercise and in the follow up period in the control group (P= 0.989).

Nevertheless, the results found that, there was statistical significance difference pre and post breathing exercise and in the follow up period in the study group (P<0.001).

Table (1):Percentage distribution of patients in the control and study groups according to socio-demographic data:

Patients socio-demographic and clinical data	Control (n = 30)		Study (n = 30)		χ^2	P
	No.	%	No.	%		
Age (years)						
30-	6	20.0	4	13.3		
40 -	11	36.7	10	33.3	5.637	^{MC}p= 0.060
50 – 60	13	43.3	16	53.3		
Sex						
Male	22	73.3	24	80.0	0.373	0.542
Female	8	26.7	6	20.0		
Level of education						
Illiterate	8	26.7	8	26.7		
Read and write	14	46.7	14	46.7		
Primary and preparatory	4	13.3	2	6.7	6.978	^{MC}p= 0.127
Secondary	0	0.0	6	20.0		
University	4	13.3	0.0	0.0		
Material status						
Single	3	10.0	8	26.7		
Married	20	66.7	20	66.7	5.459	^{MC}p= 0.122
Divorced	3	10.0	0.0	0.0		
Widow	4	13.3	2	6.7		
Residence						
Urban	18	60.0	16	53.3	0.271	0.602
Rural	12	40.0	14	46.7		
Occupation						
Not work	3	10.0	2	6.7		
Clerical work	4	13.3	8	26.7		
Retried	4	13.3	4	13.3	3.277	^{MC}p= 0.079
Businesses	4	13.3	0.0	0.0		
Manual work	10	33.3	10	33.3		
House wife	5	16.7	6	20.0		
Medical insurance						
Governmental	4	13.3	2	6.7	5.055	0.129
Private	9	30.0	10	33.3		

Without insurance	17	56.7	18	60.0		
Duration since diagnosis						
1-3 years	14	46.7	16	53.3		
4-6 years	5	16.7	4	13.3	0.362	$^{MC}p=$ 0.882
7 and more	11	36.7	10	33.3		

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the two groups
^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the two groups
*: Statistically significant at $p \leq 0.05$

Table (2): Percentage distribution of patients in the control and study groups according to past health history:

Past health history	Control (n = 30)		Study (n = 30)		χ^2	P
	No.	%	No.	%		
Presence of any health problems:						
None	11	36.7	16	53.3		
Hypertension	2	6.7	2	6.7		
Liver and kidney disease	5	16.7	6	20.0	3.962	0.739
Diabetes	8	26.7	8	26.7		
Heart disease	11	36.7	10	33.3		
Cancer	0	0.0	2	6.7		
Presence of other respiratory disease:						
None	16	53.3	14	46.7		
Acute bronchitis	1	3.3	4	13.3		
Respiratory infection	8	26.7	4	13.3	4.835	0.282
Pneumonia	5	16.7	6	20.0		
Plural effusion	0	0.0	2	6.7		
Family history of any respiratory disease:						
None	17	56.7	18	60.0		
COPD	6	20.0	4	13.3	3.495	0.781
Pneumonia	0	0.0	0	0.0		
Bronchial asthma	7	23.3	8	26.7		

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the two groups
^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the two groups
^{FE}p**:** p value for **Fisher Exact** for Chi square test for comparing between the two groups
*: Statistically significant at $p \leq 0.05$

Table (3): Percentage distribution of patients in the control and study groups according to history of exposure to respiratory irritants and smoking history.

History of exposure to respiratory irritants and smoking history	Control (n = 30)		Study (n = 30)		χ^2	P
	No.	%	No.	%		
Presence of air pollution source						
Yes	15	50	16	53.3	4.711	0.117
No	15	50	14	46.7		
Presence of cats, dogs or birds						
Yes	10	33.3	14	46.7	1.111	0.292
No	20	66.7	16	53.3		
Occupational exposure to any dust						
Yes	21	70.0	22	73.3	4.279	0.382

No	9	30.0	8	26.7		
Type of dust or vapor during exposure	**(n= 21)**		**(n= 22)**			
None Cement and ceramic dust	0	0.0	0	0.0		
Textile and cotton dust	4	19.1	4	18.2		
Grains dust	1	4.8	2	9.1	6.524	$^{MC}p=$ 0.109
Chemical dust	12	57.1	14	63.6		
Wood dust exposure	2	9.5	0	0.0		
Fumes and gases exposure	2	9.5	2	9.1		
Smoking habits						
Current smoker	16	53.3	16	53.3		
None smoker	9	30.0	9	30.0	1.125	$^{MC}p=$ 1.000
Quitter	1	3.3	0	.0		
Passive smoker	4	13.3	5	16.7		
Types of smoking in case of smoker and passive smoker	**(n=20)**		**(n = 21)**			
Cigarette	8	40.0	9	42.9		
Cigarette and water pipe	8	40.0	8	40.0	0.144	$^{MC}p=$ 1.000
Water pipe	4	20.0	4	19.0		
Number of cigarette per (day) in case of smoker	**(n = 16)**		**(n = 17)**			
Less than one package	5	31.3	5	31.3		
1 - 2 packages	5	31.3	6	37.5	0.582	0.748
More than 2 packages	6	37.5	6	37.5		

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the two groups
^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the two groups
*: Statistically significant at $p \leq 0.05$

Table (4):Percentage distribution of patients in the control and study groups according to current health conditions

Current health conditions	Control (n = 30)		Study (n = 30)		χ^2	P
	No.	%	No.	%		
Symptoms when the attack occur:						
Dyspnea	30	100.0	30	100.0		
Productive cough	16	53.3	22	73.3		
Chest wheezing	14	46.7	16	53.3	4.667	0.065
Chest tightness	27	90.0	24	80.0		
Fatigue most of time	30	100.0	27	90.0		
Others	2	6.7	2	6.7		
Time of dyspnea during the day:						
Daytime dyspnea episodes	14	46.7	13	43.3	0.067	0.795
Night time waking due to dyspnea	16	53.3	17	56.7		
Dyspnea episodes:						
Daily including nocturnal episodes	19	63.3	24	80.0		
Daily during the day	0	0.0	0	0.0		
3 - 4 times / per week	8	26.7	6	20.0	5.932	$^{MC}p=$ 0.0124
1 per week	0	0.0	0	0.0		
1 per month	3	10.0	0	0.0		
1 every several months	0	0.0	0	0.0		
Chest clinics visit due to the presence of symptoms:						
2 per month	8	26.7	10	33.3	6.332	$^{MC}p=$ 0.138
1 per month	10	33.3	10	33.3		

6 per years	1	3.3	0	0.0		
3 times per year	0	0.0	4	13.3		
Fewer	11	36.7	6	20.0		
Number of hospitalization due to disease:						
1-	16	53.3	13	43.3		
3-	8	26.7	6	20.0	12.335*	^{MC}p= 0.004*
6-	6	20.0	2	6.7		
>10	0	0.0	9	30.0		
Months in which symptoms exaggerated:						
January	14	46.7	16	53.3		
February	0	0.0	4	13.3		
March	15	50.0	22	73.3		
April	15	50.0	12	40.0		
May	0	0.0	4	13.3		
June	8	26.7	4	13.3		
July	0	0.0	8	26.7	0.267	0.606
August	15	50.0	12	40.0		
September	0	0.0	4	13.3		
October	0	0.0	2	6.7		
November	0	0.0	4	13.3		
December	18	60.0	24	80.0		
Treatment taken:						
Don't know	2	6.7	8	26.7		
Bronchodilators	8	26.7	16	53.3		
Mucolytic &expectorant.	5	16.7	8	26.7	4.320*	0.038*
Corticosteroids	14	46.7	20	66.7		
Antibiotics	5	16.7	14	46.7		

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the two groups
^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the two groups
^{FE}p**:** p value for **Fisher Exact** for Chi square test for comparing between the two groups
*: Statistically significant at $p \leq 0.05$

Table (5):Comparison between patients of both control and study groups according to degree of dyspnea pre and post breathing exercises:

Degree of dyspnea pre and post breathing exercises	Control (n = 30)		Study (n = 30)		χ^2	P
	No.	%	No.	%		
Pre breathing exercises:						
Grade 2	9	30.0	2	6.7		
Grade 3	5	16.7	6	20.0	6.795	0.079
Grade 4	5	16.7	11	36.7		
Grade 5	11	36.7	11	36.7		
Post breathing exercises:						
Grade 1	0	0.0	9	30.0		
Grade 2	9	30.0	14	46.7		
Grade 3	5	16.7	5	16.7	24.557*	^{MC}p <0.001*
Grade 4	5	16.7	2	6.7		
Grade 5	11	36.7	0	0.0		
P	1.000		<0.001*			

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the two groups

^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the two groups
p: p value for **Marginal Homogeneity Test** for comparing between pre and post in each group
*: Statistically significant at $p \leq 0.05$

Table (6): Comparison between patients of both control and study groups pre and post breathing exercises according to activities of daily living:

Self- care activities	Pre breathing exercises										post breathing exercises										p
	Not Done		Don with some help		Don with great help		Done alone with difficulty8		Done alone easily		Not Done		Don with some help		Don with great help		Done alone with difficulty		Done alone easily		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Bathing																					
Control	2	6.7	2	6.7	12	40.0	14	46.7	0	0.0	2	6.7	2	6.7	12	40.0	14	46.7	0	0.0	0.655
Study	2	6.7	8	26.7	8	26.7	12	40.0	0	0.0	0	0.0	4	13.3	0	0.0	4	13.3	22	73.0	<0.001*
χ^2(p)	4.569(^{MC}p=0.217)										49.591* (^{MC}p<0.001*)										
Dressing																					
Control	2	6.7	2	6.7	12	40.0	14	46.7	0	0.0	2	6.7	2	6.7	12	40.0	14	46.7	0	0.0	0.655
Study	2	6.7	6	20.0	10	33.3	12	40.0	0	0.0	0	0.0	2	6.7	0	0.0	6	20.0	22	73.3	<0.001*
χ^2(p)	2.375(^{MC}p=0.520)										46.850*(^{MC}p<0.001*)										
Putting shoes/ socks																					
Control	2	6.7	4	13.3	12	40.0	12	40.0	0	0.0	2	6.7	4	13.3	12	40.0	12	40.0	0	0.0	0.655
Study	2	6.7	8	26.7	8	26.7	12	40.0	0	0.0	0	0.0	2	6.7	0	0.0	6	20.0	22	73.3	<0.001*
χ^2(p)	2.217(^{MC}p=0.522)										46.293*(^{MC}p<0.001*)										
Washing hair																					
Control	2	6.7	2	6.7	12	40.0	14	46.7	0	0.0	2	6.7	4	13.3	12	40.0	12	40.0	0	0.0	1.000
Study	2	6.7	6	20.0	10	33.3	12	40.0	0	0.0	0	0.0	4	13.3	0	0.0	4	13.3	22	73.3	<0.001*
χ^2(p)	2.375(^{MC}p=0.520)										49.591*(^{MC}p<0.001*)										
Toileting																					
Control	2	6.7	2	6.7	12	40.0	14	46.7	0	0.0	2	6.7	2	6.7	12	40.0	14	46.7	0	0.0	1.000
Study	2	6.7	4	13.3	8	26.7	16	53.3	0	0.0	0	0.0	2	6.7	0	0.0	4	13.3	24	80.0	<0.001*
χ^2(p)	1.710(^{MC}p=0.681)										51.742*(^{MC}p<0.001*)										
Feeding																					
Control	0	0.0	4	13.3	12	40.0	14	46.7	0	0.0	0	0.0	4	13.3	12	40.0	14	46.7	0	0.0	1.000
Study	2	6.7	2	6.7	8	26.7	16	53.3	2	6.7	0	0.0	2	6.7	0	0.0	2	6.7	26	86.7	<0.001*
χ^2(p)	4.842((^{MC}p=0.274										57.235*(^{MC}p<0.001*)										
Combing																					
Control	2	6.7	2	6.7	10	33.3	14	46.7	2	6.7	2	6.7	2	6.7	10	33.3	14	46.7	2	6.7	0.655
Study	2	6.7	2	6.7	8	26.7	14	46.7	4	13.3	0	0.0	2	6.7	0	0.0	2	6.7	26	86.7	<0.001*
χ^2(p)	1.154((^{MC}p=0.956)										46.239*(^{MC}p<0.001*)										

Table (6):Comparison between patients of both control and study groups pre and post breathing exercises according to activities of daily living (continue)

Self- care activities	pre breathing exercises										post breathing exercises										P
	Not Done		Don with some help		Don with great help		Done alone with difficulty		Done alone easily		Not Done		Don with some help		Don with great help		Done alone with difficulty		Done alone easily		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Shaving																					
Control	4	13.3	0	0.0	11	36.7	12	40.0	3	10.0	4	13.3	0	0.0	11	36.7	12	40.0	3	10.0	0.655

Study	12	40.0	4	13.3	0	0.0	10	33.3	4	13.3	0	0.0	2	6.7	0	0.0	2	6.7	26	89.7	<0.001*
χ^2(p)	20.435*(MCp=<0.001*)										45.502*(MCp<0.001*)										
Brushing teeth																					
Control	5	16.7	2	6.7	9	30.0	12	40.0	2	6.7	5	16.7	2	6.7	9	30.0	12	40.0	2	6.7	0.317
Study	8	26.7	2	6.7	4	13.3	8	26.8	8	26.8	0	0.0	2	6.7	0	0.0	2	6.7	26	86.7	<0.001*
χ^2(p)	6.948(MCp=0.132)										45.472*(MCp<0.001*)										
Moving out of bed																					
Control	2	6.7	10	33.3	10	33.3	8	26.7	0	0.0	2	6.7	10	33.3	10	33.3	8	26.7	0	0.0	0.317
Study	10	33.3	6	20.0	6	20.0	8	26.7	0	0.0	0	0.0	2	6.7	0	0.0	6	20.0	22	73.0	<0.001*
χ^2(p)	7.333(0.060)										46.086*(MCp<0.001*)										
Climb stairs																					
Control	9	30.0	16	53.3	4	13.3	1	3.3	0	0.0	9	30.0	16	53.3	4	13.3	1	3.3	0	0.0	0.317
Study	8	26.7	10	33.3	8	26.7	4	13.3	0	0.0	0	0.0	4	13.3	4	13.3	6	20.0	16	53.3	<0.001*
χ^2(p)	4.381(MCp=0.237)										40.975*(MCp<0.001*)										
Walking in home																					
Control	2	6.7	10	33.3	11	36.7	7	23.3	0	0.0	2	6.7	10	33.3	11	36.7	7	23.3	0	0.0	0.317
Study	8	26.7	6	20.0	8	26.7	8	26.7	0	0.0	0	0.0	2	6.7	0	0.0	6	20.0	22	73.3	<0.001*
χ^2(p)	5.140(0.162)										47.309*(MCp<0.001*)										
Walking outside home																					
Control	7	23.3	16	53.3	6	20.0	1	3.3	0	0.0	7	23.3	16	53.3	6	20.0	1	3.3	0	0.0	0.317
Study	14	46.7	8	26.7	4	13.3	4	13.3	0	0.0	2	6.7	2	6.7	2	6.7	4	13.3	20	66.7	<0.001*
χ^2(p)	6.971(MCp=0.074)										42.185*(MCp<0.001*)										
Travel on public transport																					
Control	11	36.7	18	60.0	0	0.0	1	3.3	0	0.0	11	36.7	18	60.0	0	0.0	1	3.3	0	0.0	0.317
Study	14	53.3	8	26.7	4	13.3	4	13.3	0	0.0	2	6.7	2	6.7	2	6.7	6	20.0	18	60.0	<0.001*
χ^2(p)	7.505*(MCp=0.069)										44.533*(MCp<0.001*)										

Table (6):Comparison between patients of both control and study groups pre and post breathing exercises according to activities of daily living: (continues)

Home Activities	Pre breathing exercises										Post breathing exercises									
	Not Done		Don with some help		Don with great help		Done alone with difficulty		Done alone easily		Not Done		Don with some help		Don with great help		Done alone with difficulty		Done alone easily	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Lift something off self which is above																				
Control	8	26.7	8	26.7	2	6.7	12	40.0	0	0.0	8	26.7	8	26.7	2	6.7	12	40.0	0	0.0
Study	16	53.3	6	20.0	4	13.3	4	13.3	0	0.0	0	0.0	5	16.7	0	0.0	0	0.0	25	83.3
χ^2(p)	7.521(MCp=0.056)										56.580*(MCp<0.001*)									
Prepare meals																				
Control	12	40.0	10	33.3	8	26.7	0	0.0	0	0.0	12	40.0	10	33.3	8	26.7	0	0.0	0	0.0
Study	16	53.3	2	6.7	10	33.3	2	6.7	0	0.0	0	0.0	5	16.7	0	0.0	2	6.7	23	76.7
χ^2(p)	6.141(MCp=0.086)										48.369*(MCp<0.001*)									

Take meals from kitchen to other rooms																				
Control	20	66.7	10	33.3	0	0.0	0	0.0	0	0.0	20	66.7	10	33.3	0	0.0	0	0.0	0	0.0
Study	26	86.7	4	13.3	0	0.0	0	0.0	0	0.0	0	0.0	5	16.7	0	0.0	0	0.0	25	83.3
χ^2**(p)**	5.122 (^{MC}p=0.179)										69.301*(^{MC}p<0.001*)									
Washing dishes																				
Control	15	50	0	0.0	5	16.7	10	33.3	0	0.0	15	50	0	0.0	5	16.7	10	33.3	0	0.0
Study	20	66.7	0	0.0.	0	0.0	10	33.3	0	0.0	0	0.0	7	23.3	0	0.0	0	0.0	23	76.7
χ^2**(p)**	4.445(^{MC}p=0.289)										69.048*(^{MC}p<0.001*)									

Table (6): Comparison between patients of both control and study groups pre and post breathing exercises according to activities of daily living: (continue)

Home Activities	**Pre breathing exercises**										**Post breathing exercises**										**P**
	Not Done		**Don with some help**		**Don with great help**		**Done alone with difficulty**		**Done alone easily**		**Not Done**		**Don with some help**		**Don with great help**		**Done alone with difficulty**		**Done alone easily**		
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Perform general house work																					
Control	28	93.3	0	0.0	3	6.7	0	0.0	0	0.0	28	93.3	0	0.0	3	6.7	0	0.0	0	0.0	1.000
Study	30	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	7	23.3	0	0.0	0	0.0	23	76.7	<0.001*
χ^2**(p)**	2.069(^{MC}p=0.492)										72.256*(^{MC}p<0.001*)										
Washing clothes																					
Control	28	93.3	0	0.0	2	6.7	0	0.0	0	0.0	28	93.3	0	0.0	2	6.7	0	0.0	0	0.0	1.000
Study	30	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	7	23.3	0	0.0	0	0.0	23	76.7	<0.001*
χ^2**(p)**	2.069(^{MC}p=0.492)										72.256*(^{MC}p<0.001*)										
Sweeping																					
Control	30	100.0	0	0.0	0	0.0	0	0.0.	0	0.0	30	100.0	0	0.0	0	0.0	0	0.0	0	0.0	1.000
Study	30	100.0	0	0.0	0	0.0	0	0.0	0	0.0	2	6.7	5	16.7	0	0.0	2	6.7	21	70.0	<0.001*
χ^2**(p)**	2.00(^{MC}p=0.582)										60.137*(^{MC}p<0.001*)										
Cleaning / dusting																					
Control	30	100.0	0	0.0	0	0.0	0	0.0	0	0.0	30	100.0	0	0.0	0	0.0	0	0.0	0	0.0	1.000
Study	30	100.0	0	0.0	0	0.0	0	0.0	0	0.0	2	6.7	5	16.7	4	13.3	2	6.7	17	56.7	<0.001*
χ^2**(p)**	2.00(^{MC}p=0.582)										58.510*(^{MC}p<0.001*)										

Table (6):Comparison between patients of both control and study groups pre and post breathing exercises according to activities of daily living (continues)

Leisure / social activities	**Pre breathing exercises**										**Post breathing exercises**										**P**
	Not Done		**Don with some help**		**Don with great help**		**Done alone with difficulty**		**Done alone easily**		**Not Done**		**Don with some help**		**Don with great help**		**Done alone with difficulty**		**Done alone easily**		
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Go out socially																					
Control	20	66.7	10	33.3	0	0.0	0	0.0	0	0.0	20	66.7	10	33.3	0	0.0	0	0.0	0	0.0	0.317
Study	18	60.0	8	26.7	2	6.7	2	6.8	0	0.0	2	6.7	0	0.0	2	6.7	14	46.7	12	40.0	<0.001*
χ^2**(p)**	5.652 (^{MC}p=0.141)										43.200*(<0.001*)										
Talking and laughing																					
Control	3	10.0	9	30.0	15	50.0	3	10.0	0	0.0	4	13.3	8	26.7	15	50.0	3	10.0	0	0.0	0.317

Study	10	33.3	16	53.3	0	0.0	4	13.3	0	0.0	0	0.0	2	6.7	2	6.7	8	26.7	18	60.0	<0.001*
χ^2(p)	23.443* (MCp=<0.001*)										37.814* (<0.001*)										
Play with children																					
Control	12	40.0	10	33.3	0	0.0	0	0.0	8	26.7	12	40.0	10	33.3	0	0.0	0	0.0	8	26.7	1.000
Study	14	46.7	14	46.7	2	6.7	0	0.0	0	0.0	0	0.0	2	6.7	0	0.0	10	33.3	18	60.0	<0.001*
χ^2(p)	4.652 (MCp=0.182)										50.462* (MCp<0.001*)										
Visit friends / relatives																					
Control	23	76.7	0	0.0	6	20.0	1	3.3	0	0.0	23	76.7	0	0.0	6	20.0	1	3.3	0	0.0	1.000
Study	22	73.3	8	26.7	0	0.0	0	0.0	0	0.0	2	6.7	2	6.7	0	0.0	14	46.7	12	40.0	<0.001*
χ^2(p)	5.843 (MCp=0.116)										42.721* (<0.001*)										

Table (6):Comparison between patients of both control and study groups pre and post breathing exercises according to activities of daily living: (continues)

Work related activities	**Pre breathing exercises**										**Post breathing exercises**										**p**
	Not Done		**Don with some help**		**Don with great help**		**Done alone with difficulty**		**Done alone easily**		**Not Done**		**Don with some help**		**Don with great help**		**Done alone with difficulty**		**Done alone easily**		
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Perform Activities in work																					
Control	9	30.0	16	53.3	5	16.7	0	0.0	0	0.0	9	30.0	16	53.3	5	16.7	0	0.0	0	0.0	0.317
Study	18	60.0	10	33.3	2	6.7	0	0.0	0	0.0	2	6.7	7	23.3	0	0.0	13	43.3	8	26.7	<0.001*
χ^2(p)	5.534(MCp=0.062)										36.609* (MCp<0.001*)										

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the two groups
MCp: p value for **Monte Carlo** for Chi square test for comparing between the two groups
p: p value for **Marginal Homogeneity Test** for comparing between pre and post in each group
*: Statistically significant at $p \leq 0.05$

Table (7):Comparison between patients of both control and study groups pre and post breathing exercises and in follow up periods according to total score of activities of daily living.

Total score of activities of daily living	**Control**			**Study**			**p_1**	**p_2**	**P3**
	Pre breathing exercises	**Post breathing exercises**	**Follow up**	**Pre breathing exercises**	**Post breathing exercises**	**Follow up**			
Min. – Max.	22.76 –59.31	28.24 – 59.31	23.76 –59.31	20.69 – 57.93	35.17 –100.0	64.14 – 100.0	0.370	<0.001*	<0.001*
Mean ± SD.	43.90 ± 9.31	43.93 ± 9.50	43.90 ± 9.31	41.47 ± 11.43	87.26 ± 16.53	93.44 ±8.89			
P_4	tp=0.989			Fp<0.001*					

p_1: p value for **Student t-test** for comparing between the two studied groups pre breathing exercise
p_2: p value for **Student t-test** for comparing between the two studied groups post breathing exercise

P3: p value for **Student t-test** for comparing between the two studied groups in follow up period
P_4: p value for comparing between studied periods in each group
t: **Paired t-test**
F: F test (**ANOVA**) with repeated measures
*: Statistically significant at $p \leq 0.05$

III. Discussion

According to World Health Organization in 2014, there were 210 million patients with Chronic Obstructive Pulmonary Disease (COPD) over the world [24]. Chronic obstructive pulmonary disease is a common, preventable and treatable disease, which is manifested by a progressive and persistent respiratory symptoms and airflow limitation, caused by airway and/or alveolar abnormalities, usually occurs due to exposure to noxious particles or gases [25, 26].

Dyspnea is 8a major symptom in patients with COPD. It typically starts with exercise, and as the disease progresses, it occurs during rest. Dyspnea is one of the common symptoms which affect the activities of daily living in patients. Patients with COPD experience reduced activities of daily living even in mild stages of the disease [27-29].

Breathing exercises can decrease dyspnea and improve the activities of daily living for COPD patients, as it helps to strengthen the breathing muscles, improve oxygenation, help in decreasing effort during breathing and promote relaxation. The most effective breathing exercises that can be used, pursed lip breathing (PLB) and diaphragmatic breathing [30].

This study shows that, the highest percentage of both groups were in age group 50-60 years. This was in line with Badway et al (2016) [31],they reported that, the age of patients with COPD who included in their study was

between 40-59 years and they represent approximately three quarters of study subjects. This finding interpreted by Lewis et al (2014) [32], they stated that the number of functional alveoli decreases by age, the thoracic cage becomes stiff and rigid, the elasticity of the lungs reduces and ability to clear secretions decreases with age.

As regards gender, nearly three quarters of both control and study groups were male patients. This may be due to the higher prevalence of smoking among males and the frequent occupational exposures to irritating dust and chemicals in their work. This comes in agreement with Zamzam et al (2012) [33], they reported that, the majority of patients were males in their study entitled "Quality of Life in COPD Patients". While the result is contradicted with Center of Disease Control and Prevention (2013) [34], who reported that females have chronic obstructive pulmonary disease more than males.

One of the noticeable result of this study was that, one third of studied patients were manual workers and more than two third of studied patients had occupational exposure in their work environment, as chemical dust, textile and cotton dust, wood dust exposure, fumes and gases exposure. This was supported by Mohamed et al (2107) [35], they reported that, less than three fifths of the studied subjects exposed to irritating work.

The result of the current study revealed that, about two third of the studied patients were smokers, the highest percentage of smokers were cigarette smokers and smoke more than 2 packages daily. This was supported by the findings of Mohamed et al (2017) [35], they reported that, less than half of the studied subjects were smokers. This finding coincides with the fact that, smoking is a major risk factor for COPD.

The current study illustrated that, there was statistically significant difference between both groups regarding degree of dyspnea post breathing exercises. Where the patients in the study group had significant decrease in the degree of dyspnea post breathing exercises. This finding is congruent with the finding of Mohamed et al (2017) [35] and Damaris (2012) [36], they reported that, there was decrease in the dyspnea severity after rehabilitation program including breathing exercise. This may explained by, the effective continuous practicing of breathing exercises has a positive effect on increasing gas exchange, lowering respiratory rate, increasing tidal volume, and activity of inspiratory and expiratory muscles.

Regarding activities of daily living; there was statistically significant difference between both groups post breathing exercise. Where, there was an improvement in total score of all activities of daily living post breathing exercises in the study group. This result comes hand in hand with Salem (2015) [37] and Jingjuan et al (2017) [38], they reported that, there was improvement in all physical activities for COPD patients who practiced exercises including breathing exercises. This finding may be explained by, breathing exercises increases gas exchange and arterial SaO_2, so improve oxygenation in body cells, helping the patient to tolerate activities and perform it more easily than patients in control group.

IV. Conclusion

Based on the current study finding, it can be concluded that:

- Breathing exercises have a positive effect on the degree of dyspnea and improve the activities of daily living in patients with COPD.

Recommendation:

- Greater emphasis should be placed on teaching the patients with COPD about the importance and practicing of breathing exercises.

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