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## Abstract

**Background:** Pulmonary Rehabilitation (PR) is corner stone in management of chronic obstructive pulmonary disease (COPD). PR is an effective therapy in the integrated care of the patient with chronic respiratory disease. Exercise-based pulmonary rehabilitation has proven to reduce subjective dyspnea, fatigue, exacerbations and frequency for re-hospitalization. **Aim of the study:** evaluate the effect of rehabilitation protocol on reducing dyspnea and fatigue for Patients with COPD. **Research Design:** Quasi-experimental research design was utilized in the current study. **Setting:** The current study was carried out in Inpatient Chest Department and follow up in the Chest Outpatient Clinic at Cardiothoracic Hospital. **Sample:** A Purposive sample of (66) patients (male and female adult) were assigned in the current study, they classified in two equal groups (n= 33) for a control group and (n= 33) for study group. **Tool:** Three tools were utilized to collect to current study, First tool: Interview Questioner and Medical Data Sheet, Second tool: COPD Assessment Test (CAT) and Third tool: Respiratory Assessment Sheet. **Results:** There were highly statistically significant differences among both study and control group regarding Modified Medical Research Council Dyspnea Scale MMRC in 6th and 8th week observations. **Conclusions:** The study findings concluded that dyspnea and fatigue have negatively effect on patient with COPD. Short term pulmonary rehabilitation program has improved exercise capacity, pulmonary function in COPD patients. **Recommendation:** Increased patient understanding about COPD risk parameters. Booklet of comprehensive health education program for patients with COPD. Home-based pulmonary rehabilitation follow up, including regular contact to facilitate exercise participation and progression.

**Key Words:** Chronic Obstructive Pulmonary Disease, Modified Medical Research Council Dyspnea Scale, COPD Assessment Test.

## Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable and treatable disease characterized by persistent respiratory symptoms and airflow limitation (Polverino, E et al., 2017). It is a heterogeneous disease with multiple phenotypes, thus different COPD phenotypes could be associated with different clinical features, prognostic and therapeutic ramification ( Gao, J, 2018).

COPD is projected to be the 3rd leading cause of death in the world By 2020, Global Initiative for Chronic Obstructive Lung Disease (Gao, J2018). About 3.17 million people died from COPD by the year of 2015 accounting for 6% of all deaths globally (Vozoris et al., 2017).

Patients with COPD frequently experience multiple symptoms in addition to airflow limitation including dyspnea, cough, sputum production, fatigue, pain, and sleeplessness (Miravittles& Ribera (2017). Dyspnea is the most frequently reported symptom in patients with moderate and severe COPD (Miravittles, et al 2018). Dyspnea is a subjective experiences that can only be measured from the patient's perceptions, because every person have different thresholds for noticing, reporting, and rating the severity of these symptoms (Mi, E., Ewing, G. et al 2018).

COPD diagnosis should be considered in any patient who has shortness of breath, chronic cough or phlegm, and history of exposure to the risk factors of the disease ( Vogelmeier, etal 2017).

Pulmonary rehabilitation is defined as a "comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies, which include, but are not limited to, exercise training, education and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors( Vitacca.,etal,2018).

Pulmonary rehabilitation PR is designed to reduce the symptoms of COPD, improve health related quality

of life (HRQoL), improve and re-establish functional ability, enhance participation in everyday life and promote patient autonomy. The exercise component of pulmonary rehabilitation increases inspiratory volume and reduces dynamic hyperinflation, both of which reduce dyspnea when a person is performing tasks. Exercise also increases muscle function, which delays fatigue and results in increased exercise tolerance (Casey,etal., (2018).

The respiratory nurse has an important role in the assessment and delivery of pulmonary rehabilitation. The training, expert knowledge, and skills of respiratory nurses allow them undertake multidimensional assessment and to work with patients to tailor specific therapeutic interventions and to coordinate the delivery of person centered care. Respiratory nurses in particular have an important role in the provision of patient education and self-management, symptom management and monitoring, and primary and secondary prevention strategies to improve health and prevent deterioration (Yawn, B. B., et al 2017).

## Aim of the Study:

To evaluate the effect of rehabilitation protocol on dyspnea and fatigue level for patients with chronic obstructive pulmonary disease.

## Research Hypothesis:

Application of rehabilitation protocol will be reduce dyspnea and fatigue level for patients with chronic obstructive pulmonary disease.

## Research Design:

A quasi-experimental research design was utilized in the current study.

**Setting:**

The current study was carried out in inpatient Chest Department and follow up in the Chest Outpatient Clinic at Cardiothoracic Hospital.

The inpatient chest department is located at the first floor. It consists of four rooms each room contains of 8-10 beds, two for adult male and two for the adult female. The chest outpatient clinic is located at the first floor, it includes one room for examination.

**Sample:**

A purposive sample of (66) patients (male and female adult) were assigned in the current study, they classified in two equal groups (n= 33) for a control group and (n= 33) for study group.

**Study Duration:**

The study data collections were collected over a period of eight months starting from July 2017 to February 2018.

**Data Collection Tools:**

Data were collected through three tools:

**First Tool: Interview Questioner and Medical Data Sheet: It includes two parts:**

- First Part: Covers patient socio-demographic data as (age, marital status, occupation).
- Second Part: Patient medical history sheet covers (past and present history, family history, and smoking).

**Second Tool: COPD Assessment Test (CAT)**

This test used to assess the effect of COPD on patient's wellbeing and activity level. Adopted from Paul W. Jones (2009). It includes 8 simple questions. The total scoring system for each question ranged from (0) to (5). The CAT has a total scoring ranged from 0-40, scores below 5 indicate low effect of COPD on patient's wellbeing and activity of daily living, but when it was higher than 30 it indicated very high impact of COPD on patient's wellbeing and daily level of activity.

It was applied on both groups (study & control) through three observations carried out at the 2nd week, 6th week, and finally 8th week

**Third Tool: Respiratory Assessment Sheet: included three parts.**

**1<sup>st</sup> Part: Pulmonary function test (Yawn, B. B., et al 2017)**

These classification based on post-bronchodilator Forced Expiratory Volume FEV1. The severity rank from mild FEV1  $\geq$  80% predicted to very severe Forced Expiratory Volume FEV1 <30 % predicted.

**2<sup>nd</sup> Part:- The Modified Medical Research Council Dyspnea Scale (MMRC).**

This scale is a simple grading system used to assess a patient's dyspnea level (shortness of breath). Adopted from Fletcher et al (1959). (MMRC) scale total score ranked from 0 to 4, score (0) indicates (breathless with strenuous exercise.) but score (4) indicates (breathless when dressing) (Bagade, A. A., et al 2017).

**3<sup>rd</sup> Part:- Six-Minute Walk Test (6MWT) (Andrianopoulos, V., et al 2015)**

The test used to assesses the submaximal level of functional capacity for COPD patient for both groups. This

test measures the distance that a patient can quickly walk on a flat, hard surface in a period of 6 minutes (the 6MWD). The following parameters Modified Medical Research Council Dyspnea Scale Dyspnea scale (MMRC), Blood Oxygen Saturation (SPO2) and Heart rate recorded at the starting and ending of the test. Patient can stop the test if he has these manifestation (dyspnea, fatigue, increase heart rate, chest pain or angina-like symptoms, Persistent SPO2 <85%. This test also applied on both groups (study & control) through three observations at (2nd week on in patient department, and 6th week, 8th week during follow up at outpatient clinic.

The rehabilitation protocol includes the following (Breathing and Physical Exercise) that used for reducing dyspnea and fatigue level for COPD patient.

**Validity**

The developed tools content were examined by a panel of five experts, four in the field of Medical Surgical Nursing Department in Nursing Faculty at Minia University for testing validity.

**Reliability**

The tools were designed in final format and tested for reliability by using, cronbach's alpha coefficient test (0.96, 0.71 and 0.68) respectively.

**Pilot Study**

A pilot study was carried out on approximately (10 %) of the study sample in a selecting setting to evaluate the applicability & clarity and feasibility of the study tool and to estimate the time needed for filling the tool. The pilot study sample was included in the study sample because no modification done in the study tools.

**Ethical Consideration:**

An official permission to conduct the study was obtained from the ethical committee of the Faculty of Nursing, Dean of Nursing Faculty, Minia University Hospital Director, Research Center Affiliated to Egypt Ministry of Health and agreement from Egypt Academic for Research Center and Technology. subject's participation in this study were voluntary, patients were informed about the purpose, procedure, benefits, nature of the study, follow up, and he /she has the right to withdraw from the study at any time without any rationale. Confidentiality and anonymity of each subject were ensured through coding of all data and protecting the obtained data. Oral consents were obtained from subjects.

**Procedure (Techniques for Data Collection):**

The current study was conducted after preparing of the different data collection tools, in addition obtaining formal paper agreement which was taken induration one month before conducting the study. Collection of study data was done through daily basis every day at first two weeks after patients admission and after their condition become stable during morning and evening shift at inpatient chest department, each patient follow up once per week after discharge from hospital (during follow up) at outpatient chest clinics.

Patient who was scheduled for rehabilitation exercise was informed by the investigator individually about purpose and nature of the study, then investigator obtained oral consent from those who accepted to participate in this

study. The investigator has started data collection from control group firstly in four months by using the first, second and third tool then data collection from the study group was carried out after finishing the control group using the first, second, third tool and educational exercise boucher.

The total number of sessions for data collection & training patient of the study group was 2-3 sessions per week. Duration of each session was ranged from 20 to 30 minutes .

The rehabilitation protocol included education about breathing and physical exercises .these applied to the study group patients at the chest department. The investigator performed both group of exercise firstly and lets the patient to apply it. Evaluated patients to ensure their competence in this practice at outpatient clinic (during follow up). The rehabilitation protocol was started from the first day after admission and patient’s condition become stable using the specific exercises ,breathing exercise (pursed lip breathing ,diaphragmatic breathing) and physical exercise includes (anaerobic strength and stretch exercise) .patients was given a photo brochure prepared by investigator after extensive literature review . The photo brochure included both groups of exercises; breathing exercise and physical exercise. Also, instructions regard

duration and frequency. To ensure that the patients perform these exercises accurately after their hospital discharge and at home.

Follow-up for all patients (study & control) started at the week 6th, and 8th) through face to face interview to evaluate the dyspnea and fatigue level. Also, investigator encouraged patients of the study group to attend follow-up through offered a free medication as doctor order without any payment from them.

**Statistical Analysis:**

Data were organized, tabulated, and presented using descriptive statistics in the form of frequency distribution, percentages, means and the standard deviations as a measure of dispersion. A statistical package for the social science (SPSS) version (20) was used for statistical analysis of the data). Numerical data were expressed as mean and SD. Data were collected, tabulated and statistically analyzed using Chi-square & Fisher test. Probability (P-value) is the degree of significance, less than 0.05 was considered significant. The smaller the P-value obtained, the more significant is the result (\*), less than 0.001 was considered highly significant (\*\*). Correlation coefficient (r) was calculated between continuous variables.

**Results**

**Table (1): Distribution of The Study and Control Groups Regarding their Socio-demographic Characteristics (n= 66).**

Socio-demographic Data	Groups				χ <sup>2</sup>	P – value
	Study (n=33)		Control (n=33)			
	No.	%	No.	%		
<b>Age / Years</b>						
18:29	1	3.1	2	6.1	t=1.4	.14 NS
30:49	11	33.3	10	30.3		
50:59	12	36.4	15	45.4		
60:65	9	27.2	6	18.2		
Mean ± SD	40.6 ± 12.6		41.1 ± 11.7			
<b>Marital Status</b>						
Single	4	12.1	1	3.1	4.60	0.213 NS
Married	21	63.6	27	81.7		
Widow	5	15.1	3	9.1		
Divorce	3	9.1	2	6.1		
<b>Residence</b>						
Rural	19	57.5	21	63.6	1.43	.16 NS
Urban	14	42.5	12	36.4		
<b>Gender</b>						
Male	25	75.8	22	66.7	1.30	.20 NS
Female	8	24.2	11	33.3		
<b>Occupation Status</b>						
Risk Work	18	54.6	19	57.6	1.43	.16 NS
Employee	11	33.3	8	24.2		
Not Working	4	12.1	6	18.2		
<b>Main Cause of Pollution</b>						
Air pollution	14	42.5	10	30.3	1.21	.532 NS
Smoke	15	45.4	21	63.6		
Dust	4	12.1	2	6.1		
<b>Education Level</b>						
Illiterate	23	69.7	26	78.8	.82	.4
Literate	10	30.3	7	21.2		
Mean ± SD	1.3+ .46		1.2+ .41			

NS= not significant

The table (1) Showed that, the mean age among study and control groups was nearly similar (40.6 ± 12.6 years, and 41.1 ± 11.7 years) respectively. In respect to residence; the results revealed that more than half of the study and control group were lived in rural area constituted (57.5% & 63.7 %) respectively. In respect to gender; the results revealed that (75.8%) of the study groups

were male while (66.7%) of control group were male. Concerning to occupation; the study data demonstrated that, about half of study and control groups were occupied as risk employee (54.6% & 57.6%) respectively. Concerning to educational level; the study data demonstrated that, (69.7%,78.8% ) respectively among study group and control group were illiterate and (30.3%,21.2%) respectively among study group and control group were literate.

**Table (2 ) Distribution of the Study and Control Groups Related to Medical History (n= 66)**

Past Medical History	Groups				χ <sup>2</sup>	P – value
	Study (n=33)		Control (n=33)			
	No.	%	No.	%		
<b>History of Pervious Chest Infection</b>						
Pneumonia	15	45.4	11	33.3	1.13	.26 NS
Bronchitis	16	48.5	22	66.7		
Others	2	6.1	0	0.0		
<b>Presence of Chronic Disease</b>						
Diabetes	21	63.6	15	45.4	-2.66	0.012 NS
Liver cirrhosis	12	36.4	18	54.6		
<b>Family History of COPD</b>						
Yes	21	63.6	20	60.6	1.6	0.21 Ns
No	12	36.4	13	39.4		
<b>Smoking</b>						
Non smoke	9	27.2	10	30.3	1.450	0.845 NS
Former smoke	14	42.5	12	36.4		
Never smoke	4	12.1	2	6.1		
Current smoke	6	18.2	9	27.2		

NS= not significant

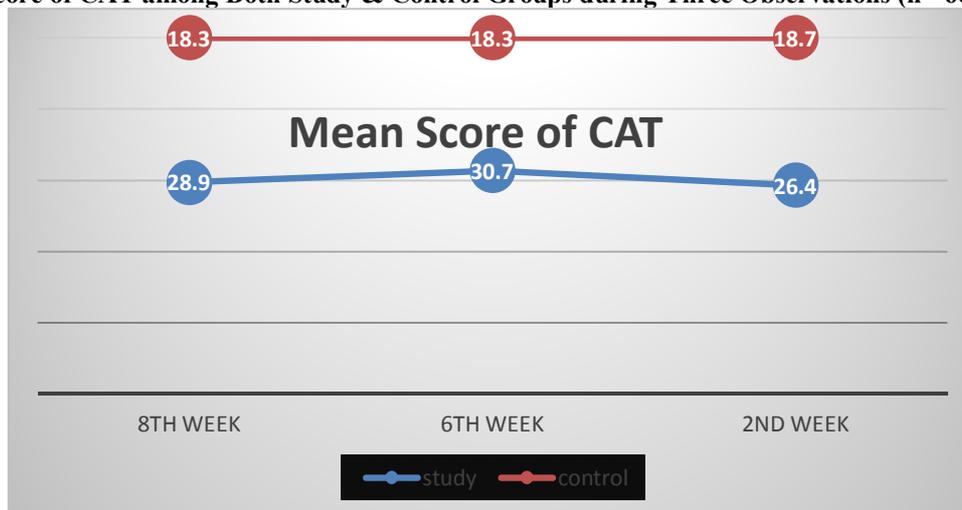
Table (2) Reflected that (48.5% and 66.7%) respectively among the study and control groups had bronchitis. About (63.6%) of study group had diabetes, while (54.4%) of control group had liver cirrhosis. In respect to family history of COPD about (63.6% and 60.6%) respectively among the study and control groups had positive family history. Moreover, the table represented that (27.3%, 30.3%) respectively among the study and control groups were nonsmoker, the current results showed that (42.5%,36.4%) respectively of the study and control groups were former smoker, while (12.1%, 6.1%) respectively among the study and control groups were never smoker, as well as (18.2%, 27.2% ) respectively among both groups were current smoker.

**Table (3): Mean Score of COPD Assessment Test among Study & Control Groups during Three Observations (n= 66).**

COPD Assessment Test	2nd Week)( 1st Observation				6th Week) ( 2nd Observation				8th Week)(3rd Oservation				F	P
	Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
I never cough	2.9	.63	1.7	1.15	4.3	.42	2.6	1.17	4.1	.52	2.4	1.23	-3.70	.00*
I have no phlegm (mucus) in my chest at all	2.8	.63	1.7	.76	4.1	.54	2.6	1.05	3.9	.58	2.8	.73	3.03	.00*
My chest does not feel tight at all	3.1	.56	2.2	1.22	3.7	.52	1.7	.67	2.8	.63	1.3	.65	-1.51	.14
When I walk up a hill or one flight of stairs I am not breathless	3.2	.69	2.6	1.17	3.9	.58	1.3	.54	3.7	.52	2.6	1.05	-2.73	.01
I am not limited doing any activities at home	3.4	.66	2.6	1.05	4.0	.41	2.4	1.22	3.7	.52	2.8	.73	3.03	.00*
I am confident leaving my home despite my lung condition	3.4	.56	2.4	1.00	3.7	.52	2.8	.63	3.9	.54	2.5	1.22	-1.35	.18
I sleep soundly	3.7	.52	2.5	0.83	2.8	.63	2.4	1.00	2.8	.63	3.0	.86	.79	.43
I have lots of energy	3.9	.58	3.0	0.82	4.2	.62	2.5	.94	4.0	.69	2.4	1.00	-2.93	*.00
Total mean score	26.4+ 4.8		18.7+ 8		30.7+ 4.24		18.3+ 7.2		28.9+ 4.6		18.3+ 7.4			

The table(3) Illustrated that mean score of COPD Assessment Test was (26.4+ 4.8, 30.7+ 4.24, 28.9+ 4.6 ) respectively among study group at three observations. While the mean score of CAT was (18.7+ 18.3+ 7.2, 18.3+ 7.4) respectively among control group through three observations.

Figure (1) Mean Score of CAT among Both Study & Control Groups during Three Observations (n= 66).



The figure (1) Illustrated that mean score of COPD Assessment Test was (26.4%) among study group at 2nd week then mean score improved to (30.7%) among study group at 6th week, finally mean score decline to (28.9%) among study at 8th week. Mean score of CAT was (18.7,18.3,18.3) respectively among control group through three observations.

Table (4): Respiratory Assessment Sheet Regarding Forced Expiratory Volume among Both Study & Control Groups During Three Observations (n= 66).

Forced Expiratory Volume FEV1(	1st Observation(2nd Week)				2nd Observation (6th Week)				3rd Observation(8th Week)			
	Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
FEV1 (>80)	0	0	0	0	2	6.1	0	0	0	0	0	0
FEV1 (50-79)	33	100	33	100	31	93.9	31	93.9	32	96.9	28	84.7
FEV1 (30-49)	0	0	0	0	0	0	2	6.1	1	3.1	5	15.3
FEV1 (<30)	0	0	0	0	0	0	0	0	0	0	0	0
Test of Significance	$\chi^2=.68$		P – value =.50		$\chi^2 =1.9$		P – value =.04*		$\chi^2 =2.10$		P – value =.09	
Mean $\pm$ SD	65.7 $\pm$ 8.64		64.5 $\pm$ 8.6		66.3 $\pm$ 11.5		63.6 $\pm$ 8.1		65.6 $\pm$ 9.1		60.5 $\pm$ 6.8	

\* p =  $\leq$ .05 (Statistical significance) \*\* p =  $\leq$ .01 (Highly statistical significance)

The table (4) Reflected that 100% of both study and control group had FEV1(50-79) at 2nd week while (6.1%) of study group have FEV1(>80) while (6.1%) of control group have FEV1 (30-49) at 6th week and (3.1%,15.3%) respectively among study and control group were had FEV1(30-49) at 8th week. There was the statistically significant difference regarding forced expiratory volume among study and control group at 2nd observation

Table (5): Distribution of Both Study & Control Groups Regarding Modified Medical Research Council Dyspnea Scale (MMRC) During Three Observations (N= 66).

MMRC	1st Observation(2nd Week)				2nd Observation(6th Week)				8th Week) 3rd Observation(			
	Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Grade 0	1	3.1	1	3.1	9	27.2	1	3.1	6	18.2	1	3.1
Grade 1	3	9.1	3	9.1	19	57.5	1	3.1	17	51.5	1	3.1
Grade 2	7	21.2	8	24.2	3	9.1	2	6.1	9	27.2	4	12.1
Grade 3	7	21.2	5	15.1	1	3.1	15	45.4	1	3.1	20	60.6
Grade 4	15	45.4	16	48.5	1	3.1	14	42.2	-	-	7	21.1
Test of Significance	Fisher exact = 45.245		P – value = 0.000		$\chi^2 = 46.400$		P – value = 0.000**		$\chi^2 = 45.491$		P – value = 0.000**	
Mean $\pm$ SD	3.9 $\pm$ 1.15		4.0 $\pm$ 1.07		16.9 $\pm$ 2.5		9.1 $\pm$ 1.9		7.4 $\pm$ 1.9		4.0 $\pm$ .69	

NS= not significant \* p =  $\leq$ .05 (statistical significance) \*\* p =  $\leq$ .01 (highly statistical significance)

The table (5) Represented that (3.1%) of study group have grade 0 dyspnea at the 2nd week increase to (27.2%) at 6th week while decline to (18.2%) at 8th week. Comparing with control group have grade 0 dyspnea 3.1% along the three observation. In addition (45.4%) of study group have grade (4) dyspnea at 2nd week while decline to (3.1%) at 6th week. While study group

haven't grade (4) dyspnea at 8th week. The results revealed that (48.5%, 42.2 %, 21.1%) respectively among control group have grade 4 dyspnea along three observation. There was highly statistical significance at 6th and 8th week (P – value = 0.000\*\*)

**Table (6) Distribution of Both Study & Control Groups Regarding to the Total Distance Walked (N= 66)**

Total Distance walked/Meter	2nd Week) 1st Observation(				2nd Observation(6th Week)				3rd Observation(8th Week)			
	Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 100 Meter	18	54.5	20	60.7	2	6.1	24	72.7	6	18.2	30	90.9
100<200 Meter	12	36.4	9	27.2	16	48.4	8	24.2	16	48.4	3	9.1
200<300 Meter	4	12.1	3	9.1	10	30.3	1	3.1	8	24.2	0	0
300<400 Meter	0	0	0	0	4	12.1	0	0	3	9.1	0	0
400<500 Meter	0	0	0	0	1	3.1	0	0	0	0	0	0
Test of Significance	$\chi^2 = 0.04$		P – value = .9		$\chi^2 = 11.9$		P – value = 0.000**		$\chi^2 = 10$		P – value = 0.000**	
Mean ± SD	120.9± 69		120.4 ± 67		242.6± 93.2		127.4± 86.5		204± 84.1		70± 31.1	

NS= not significant \* p = ≤.05 (statistical significance) \*\* p = ≤.01 (highly statistical significance)

The table (6) Summarized that, (54.5%, 6.1%, 18.2%) respectively of the study group were walked less than 100 meter along three observation, comparing with control group( 60.7 %, 72.7 %,90.9%) respectively were walked less than 100 meter along three observation. The findings displayed that (36.4%, 48.4%, 48.4%) respectively among the study group walked 100<200 Meter. Comparing with control group (27.2%, 24.2%, 9.1%) respectively were walked 100<200 Meter along three observation. the results revealed that the study group walked 200<300 Meter (9.1%, 30.3%, 24.2%) respectively along three observation. While 12.1 % of control group walked 200 <300 Meter at 2nd week decline to 3.1 % at 6th week. 12.1% of Study group walked 300<400 Meter at 6th week while this percent decline to 9.1 at 8th week. There were highly statistically significant differences among study and control groups during second and third observation

**Table (7) Distribution of Both Study & Control Groups in Relation to Reason for Stopping Six-Minute Walk Test (N= 66):**

Reason for Stopping Six-Minute Walk Test	1st Observation(2nd Week)				6th Week) 2nd Observation(				3rd Observation(8th Week)			
	Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)		Study (n=33)		Control (n=33)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chest pain	11	33.3	20	60.6	8	24.2	20	60.6	11	33.3	25	75.8
Increase Heart rate	18	54.6	20	60.6	10	30.3	21	63.6	15	45.4	18	54.5
Mental confusion	3	9.1	3	9.1	1	3.1	5	15.5	1	3.1	5	15.5
Fatigue	25	75.8	25	75.8	12	36.4	25	75.8	14	42.5	25	75.8
Dyspnea	20	60.6	23	69.6	11	33.3	25	75.8	11	33.3	27	81.8
SpO2 <85%	20	60.6	26	78.8	12	36.4	28	84.9	12	36.4	28	84.9
Abnormal gait	2	6.1	5	12.2	2	6.1	5	12.2	2	6.1	5	12.2
other reasons	2	6.1	2	6.0	1	3.1	1	3.1	1	3.1	1	3.1
Test of Significance	$\chi^2 = 1.13$		P – value =.13		$\chi^2 = 3.18$		P – value =.000**		$\chi^2 = 2.26$		P – value =.03*	
Mean ± SD	3.5±.50		2.1±.70		2.7±.43		2.3±.85		2.5±.50		2.1±.70	

NS= not significant \* p = ≤.05 (statistical significance) \*\* p = ≤.01 (highly statistical significance)

Table(7) Reflected that (75.8%) of study group had fatigue at 2nd week then improved to (36.4%) at 6th week then decline to (42.5%) at 8th week ,and (75.8%) of control group had fatigue along three observation ,while (60.6%) of study group had dyspnea at 2nd week and then improved to (33.3%) at 6th week and 8th week. While (69.6%) of control group had dyspnea at 2nd week and then decline to (75.8 %) at 6th week and while increased to (81.8 %) at 8th week. There were highly statistically significant difference regarding Reason for Stopping Six-Minute Walk Test among study and control group at 2nd observation and There were statistically significant difference regarding Reason for Stopping Six-Minute Walk Test at third observation among study and control group, evidenced by P – value =.000\*\*, .03\*) respectively at second and third observation

**Table (8): Correlation Between Patient's Socio- demographic Data and ( CAT ,6 MWT and MMRC)**

Variables	CAT				6Walk				MMRC			
	Study		Control		Study		Control		Study		Control	
	r	p	r	p	r	p	r	p	r	p	R	p
Age	0.2	-0.3*	0.7	0.37	0.01	-0.4*	0.8	0.6	0.9	.8	0.8	.73
Sex	0.5	1.1	0.3	1.72	0.3	1.65	0.2	2.01	0.8	4.2	0.7	5.0
Marital Status	0.3	1.6	0.8	2.4	0.2	2.21	.003	4.98	.000	6.17	0.7	5.20
Residence	0.7	5.3	.06	1.98	0.9	.8	0.6	3.29	0.7	8.5	0.9	1.81
Occupation	0.7	.04*	0.8	.151	0.1	.2*	0.8	3.1	0.8	.03*	0.6	2.72
Main Cause of Pollution	0.8	.02*	0.6	1.19	0.9	1.6	0.6	8.4	0.4	.4*	0.7	5.6

Table (8) showed that there was statistical significant correlation was noticed between age and CAT, 6 walk minute test evidenced by p (-.03\*, -0.4\*) respectively. Statistical significant correlation was found between occupation and (CAT, 6 Walk

minutes test, and MMRC) evidenced by P (0.4\* -0.2\*, & 0.3\*) respectively. Finally there were Statistical significant correlation between main cause of pollution and (CAT – MMRC) evidenced P = (.2\* - .4\*) respectively

**Table (9): Correlation Between Patient’s Past Medical History and (CAT, 6 Walk Minutes Test and MMRC)**

Variables	CAT				6MWT				MMRC			
	Study		Control		Study		Control		Study		Control	
	r	p	r	p	r	p	r	p	r	p	r	p
History of Pervious Chest Infection	1.8	0.2*	2.1	0.4*	3.1	0.5*	1.1	0.9	2.4	1.1	1.9	2.4
Presence of Chronic Disease	0.5	0.10	0.9	0.01	0.7	0.05	0.19	0.22	.84	.124	.18	.237
Family History of COPD	0.8	.03*	.4	.12	.7	.5*	.5	1.1	.8	.44	.7	.23
Smoking	.09	.29	.23	.21	.6	.87	.7	.31	.17	.24	.6	.47

The table (9) represented that there were statistical significant correlation between history of pervious chest infection and (CAT&6 minutes walk test), evidenced by p (.2\* , .4\* , .5\*) respectively. Finally there were Statistical significant correlation between family history and (CAT & 6 walk minute test), evidence by P (0.3\*, 0.5\*) respectively.

**Discussion**

The findings of present study showed that the majority of studied patients were in age group 30 to 59 years old. The finding matched with Mohamed, D. M., et al (2016) whom reported that, patients age in study and control group were ranged from 40to 60 years old, and Nugmanova, D., et al. (2018), Wehieda .S., et al (2017) whom stated that, the age of studied sample were slightly above 40 years old. While present study contradicting with Lal, D., et al, (2015) whom reported that, the age of patients with COPD were over 70 years. Also Yin, H. L. et al (2017), and Tel, H., et al (2012) concluded that age of the COPD patients was above 65 years old. The present study illustrated that, more than half of the study and control were lived in rural area .This comes in accordance with Sharma, S., & Sharma, P. (2019) whom mentioned that the urban residence is associated with higher incidence of COPD While the result of current study disagree with Pati, S.,et al (2018) and Damaris, A. (2012) whom reported that more than half of studied sample were come from urbane area.

In the current study, it has been noticed, that most of study and control group were males. This result in line with Lee, J.,etal(2018), and Soler, X.etal (2017), and Kwon, H. Y., and Kim, E. (2016) whom stated that, majority of studied sample were males. Similarly finding were reported by with Ghada, S. K. M. (2018) & Jonkman, and N. H.,et al(2016) and Tabet, R., (2016) whom mentioned that that more than half of both groups were males.

While this result contradicted with Bhatt, S. P., (2018), Nugmanova, D. et al (2018) and Al-shair, K., et al (2016) whom mentioned that the majority of study populations were females.

In regard to occupational status result of the present study showed that about half of study and control groups were join with risk occupation. The findings supported by Mohamed.D,M., et al (2016), Tagiyeva, N., et al (2017) and Hagstad, S., et al (2015 ) whom illustrated that about half of the subjects exposed to irritating work. Similarly, whom reported that occupational exposure of studied sample to gas, dust or fumes (GDF) were lead to COPD disease.

Concerning to educational level; the present study findings demonstrated that, more than two third of both groups were illiterate. The result is in contrast with Ramirez-Venegas, De Miguel-Diez, J., et al (2018), Jayasheela, H. (2018), Abd-Elsalam, F. G.,etal 2015 and A., et al (2018), whom stated that more than half of study subject was illiterate.

In the current study, it has been noticed that, about half of both groups were have bronchitis. This finding come in accordance with Mejza, F., et al (2018) whom reported that COPD patient had a history of bronchitis. Concerning family history, the finding of present study illustrated that more than half of study and control group had positive family history for COPD. This finding supported by Sharifi, H., et al(2019), and Ilic, A. D., et al (2016) whom stated that, there were appositive family history among COPD patient. While this finding not in the same line with Hersh, C. P., et al (2011) whom reported that Family history is a risk factor for COPD patient.

Regarding smoking study results represented that, about one third of study and control group were current smoker. Is in agree with Nugmanova, D., et al (2018) whom stated that, about one-third of COPD patient were current smokers. While nearly half of study and control group were former smoker this result was in consistent with Sharma, S., Sharma, P. (2019) and Bhatt, S. P., et al (2018) whom reported that about half of COPD patients were former smokers.

As regard CAT the current study showed that that positive correlation between Patient’s Past Medical History and CAT. This results were in accordance with, Mishra, R. S., , Parauha, D. (2018), Falschlehner, S., et al (2015), Dubé, B. P., et al (2017) and Tanner, R. J., et al(2013) whom evaluated the effect of outpatient pulmonary rehabilitation on COPD assessment test (CAT) and GOLD classification they were concluded that CAT score was improved after implementing pulmonary rehabilitation in addition to statistically significant improvement in general well-being. While this finding disagreed with Jácome, (2016) who reported that no significantly difference after Pulmonary rehabilitation.

More over the present study results displayed that, There was the statistically significant difference regarding forced expiratory volume FEV1 among study group at 6th week after implementing rehabilitation protocol. This result was supported by Alosaimi, S. (2018) who revealed that breathing exercise leads to a significant improvement in FEV1 and dyspnea score. As well as Elkhateeb, N.B., et al (2015), and Moezy, A., etal(2018) whom founded that, there was a statistically significant improvement in FEV1% after 6–8 weeks of pulmonary rehabilitation. While the present finding not in the same line with Daabis, R., (2017), Engel, R. M., et al(2017), and Engel, R. M., et al(2017) whom mentioned that at the end of PR, there was no statistically significant improvement in lung function.

The present study summarized that, there were highly statistically significant differences between the study and control groups regarding the MMRC after implementing rehabilitation protocol. This can be explained by breathing exercise decreases the effort required for breathing and improved breathing pattern. This result is consistent with Charususin, N., et al (2018), Daabis, R., et al(2017) and Wehieda, S. M., et al.(2017) whom concluded that there was a statistically significant improvement in dyspnea score in the intervention group after PR.

Regarding Modified Medical Research Council Dyspnea Scale the finding of the present study showed that highly statistically significant improvement of dyspnea level post pulmonary rehabilitation protocol this result is in agreement with Bavarsad, M. B, et al., Elkhateeb, N. B et al.(2015) (2015), Klijn, P., Legemaat, et al., (2015), Lingner, H., et al., (2018), and Katajisto, M., & Laitinen, T. (2017). whom stated that there was statistically significant decrease in dyspnea level in the study group than the control following individualized pulmonary rehabilitation program.

Findings of the present study summarized that, there was a highly statistical significant improvement in the distance walked at 6WMT, the present study also come in agreement with De Roos, P., (2018), Alosaimi, S. (2018), Chuang, H. Y., (2017), Naseer, B. A., (2017), Broderick, J., et al (2018), El Hoshy, M. S., et al (2017), and Daabis, R.,etal.(2017), whom reported that there was a statistically significant increase in 6MWD after rehabilitation.

The present study results founded that, there was statistical significant correlation was noticed between age and CAT, 6 walk minute test ), This finding comes in accordance with Dilek ,et al,2018, and Shehata, S. M.,et al (2018) whom illustrated that, there was statistical significant correlation was noticed between age and CAT, 6 walk minute test ), more over the present study result showed that statistical significant correlation was found between occupation and ( CAT, 6 Walk minutes test, and MMRC) these result were in agreement with Izquierdo, (2009), HuyNH, T. P., and Nguyen, T. D. (2018) whom confirmed that there was statistically significant correlation between patients' occupation and CAT, 6 walk minutes test and MMRC. In addition to, the finding presented that there was positive statistical significant correlation between presence of pervious disease and CAT, 6 walk minutes test in agreement with Seyed., (2008) who reported that, there was positive statistical significant correlation between presence of pervious disease and CAT, 6 walk minutes test.

#### Conclusions:

The current study seeks the effect of rehabilitation protocol on dyspnea and fatigue for patients with chronic obstructive pulmonary disease. From the results of this study, it can be concluded that:

- The incidence of COPD is not equally in male and female. It occurred on age group 30 to 59 years old. The present study also illustrated that more than half of studied patients had positive family history for COPD. Moreover the incidence of disease increased in rural area. Present study showed that about half of study patient were join with risk occupation
- Highly statistically significant improvement of dyspnea level were found post pulmonary rehabilitation protocol. On the other hand, there is

positive correlation were found between patient's past medical history and CAT.

#### Recommendations:

Based on the finding of current study the following recommendations are derived and suggested:

##### Recommendations for Patients:

- Educational programs should be developed and implemented for patients, particularly individuals with young age group regarding to increase their knowledge and update them with most information about disease for (definitions, causes, risk factors, signs and symptoms, treatment options, diagnosis, complication, exercise, diet, rest, and smoking cession).

##### Recommendations for Nurses:

- Nurses should know more information about disease and update their knowledge through participating in educational programs, attending seminars, workshops and reviewing researches.

##### Recommendations for Administrators:

- Colored illustrated booklet should be available and distributed to each patients with COPD about pulmonary rehabilitation protocol to reduce dyspnea and fatigue and other complication.
- Nurses should receive updated educational program about pulmonary rehabilitation protocol and its effect on COPD patient.

#### Acknowledgment

The researchers would like to acknowledge the contribution of all participants who kindly agreed to take part in the study. They generously gave their time and attention to conduct this study. This study would have been impossible without their generosity.

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