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Efficacy of Breathing Exercises on daily living activities of patients with Chronic Obstructive Pulmonary Disease

Hoda Esmat Mahmoud 1, Soheir Bader EL-Din 2, Mona Sadek 3 , Labiba Abd-El kader 4

1 Assistant Lecturer of Nursing,, faculty of applied medical sciences, MUST ,
2 Professor of Community Health Nursing, Faculty of nursing, Cairo University,
3 Professor of Community Health Nursing, Faculty of nursing, Cairo University,
4professor of medical-surgical Nursing, Faculty of nursing, Cairo University

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Abstract: Improving breathing pattern and reducing disease progression including exacerbation frequency is a target goal for all COPD patients. ***Aim*** of the present study to assess efficacy of breathing exercises on daily living activities of patients with Chronic Obstructive Pulmonary Disease**.** ***Research design:*** A quasi experimental design. ***Sample****:* A convenience sample of 70 patients with COPD. ***Tool*** consists of three ***Part I****:* Interviewing questionnaire to assess the socio-demographic data. ***Part II****:* Physical examination sheet. ***Part III:*** An assessment of patient's difficulty of breathing during daily living activities (DLA). **Results**: Revealed statistical significant difference of the total mean scores before breathing exercise and after 3 months of breathing exercises training. ***Conclusion****:* There was positive efficacy of exercises on respiratory patient's outcomes with chronic obstructive pulmonary disease as evident with improvement in performing the daily living activities. ***The study recommended*** that government officials as well as nongovernmental organizations should encourage and support home-based training especially for patients with insufficient income. Further experimental study is suggested to compare between two groups of COPD one apply breathing exercises and another take antibiotic to demonstrate effect of exercises intervention on of purulent sputum.

Key words: COPD, breathing exercise, home –based training.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a major cause of chronic morbidity and mortality. Patients with COPD usually have progressive persistent airflow limitation that is not fully reversible, which leads to a history of progressive, worsening, breathlessness that can impact on health-related quality of life, activity of daily living (DLA) is an important predictor of mortality in patients with COPD. Increasing DLA is important in patients with COPD and assessment of DLA is one of the best ways to evaluate the status of COPD patients (Monjazebi et al., 2016).

COPD is an umbrella term that includes both emphysema and chronic bronchitis. In a healthy person, the tiny air sacs in the lungs are like balloons. As the person breathes in and out, they get bigger and smaller to move air through lungs, these air sacs are damaged and lose their ability to stretch. Less air gets in and out of the lungs. Patients with emphysema are referred to as "pink puffers" and experience shortness of breath due to a loss of elasticity and eventual damage to the air sac walls, leading to impaired exhalation and a buildup of gas in the lungs. These patients are typically thin, often exhibiting significant weight loss due to the increased energy requirements associated with labored breathing (Dirkje et al., 2015 & Hodson, 2016).

Disease limited exercise capacity, and its impact on the ability to perform DLA, is a common and debilitating problem for patients with COPD. Clinical data show that patients with COPD are generally less active compared with healthy age-matched peers, and that lower activity is associated with adverse clinical outcomes, including increased exacerbations, hospital admissions, and mortality. Thus, therapies or methods that can effectively increase daily activity levels and reduce the incidence of hospital admissions and exacerbations are a focal point of COPD disease management, as they may yield substantial economic and social benefits (Carlin et al., 2015).

The major symptoms of COPD are breathing difficulty, chronic cough, wheezing, and sputum production, recurrent respiratory infection may be associated with some of the following systematic effects such as undernourishment, weight loss, exercise limitation and muscle weakness. Knowledge regarding the disturbance of muscle function that occurs in patients with COPD is continuously increasing. Initially muscular dysfunction was considered to be a self-limiting disease resulting from inactivity and lack of exercise (GOLD, 2013).

Various breathing control exercises and respiratory muscle training are used to be capable of inducing positive effects on patients' respiratory muscles through diaphragm breathing (DB) exercise and pursed-lip breathing (PLB) exercise. Their aim is to decrease the effort required for breathing and assist relaxation by deeper breathing, which may result in an improved breathing pattern through decreased respiratory rate and reduced breathlessness (Seo et al., 2017). The Respiratory Muscle Training (RMT) activating inspiratory muscle and increase of exhalation time significantly improves respiratory muscle strength resulting in a decrease in the respiratory rate, functional capacity,

lung function and quality of life (de Medeiros et al., 2017 and Ozmen et al., 2017).

There are, as well as breathing control, certain positions, which can help to relieve breathlessness. These positions optimize the use of the diaphragm and encourage relaxation of the shoulders, arms and upper chest. The breathing control technique can be used in one of these positions to help relieve shortness of breath. Breathing at an increased rate will be necessary, but by maintaining the pattern, breathing will slow and control will be gained. Therefore, exercise itself cannot reverse COPD, but it can improve breathing pattern and ability to perform self-care (Cabral et al., 2015).

AIM OF THE STUDY

The study aimed to assess Efficacy of Breathing Exercises on daily living activities of patients with Chronic Obstructive Pulmonary Disease

Hypotheses

Breathing exercises will improve daily living activities of patient with COPD

SUBJECTS AND METHODS

Research Design:

A quasi- experimental design was used in this study.

Setting:

The initial study settings were the outpatient clinics of chest medicine at El Abassyia Hospital. Then, the training exercises were implemented through home visits located in different geographical areas at Great Cairo at Bulaq Abu Elaa, Shoubra, El-Zawia El Hamra, Hadayek El-Qobba, Roud El-Farag, El-Sharabeya, EL-Sahel, El-Zaytoun, Miser El-Kadema, El-Khalifa, Hadayek Helwan and Hadayek El-Maadi.

Sample:

A convenience sampling technique was used to recruit patients to participate in the study. By using the sample size equation for the difference between two means (Schlesselman, 1981), the required sample size was 64 patients which increased to 70 patients to account for an expected dropout rate of approximately 10%. Patients diagnosed as having a mild or moderate degree of COPD; willing to participate in the study intervention; living in Cairo governorate for accessibility of home visits, have not other comorbidities or debilitating disease as heart failure, hypertension, and diabetes were included in the study

Tool of data collection:

A self-administrative structured interviewing questionnaire was developed by the researchers based on recent and related literatures (Hffman, Rouse and Brin, 2013 & Massof and Rubin, 2011). It was designed to fit the Egyptian culture. It was written in English language and translated to Arabic language to fit the participant criteria. It consists of three parts.

Part I: The Socio-demographic data of the patient: It was covering 12 items such as age, gender, marital status, education, job status, residence, income and number of rooms and the medical history of patient's disease such as duration of illness, and severity of the disease, history of previous hospitalization, smoking, and action taking during the feeling of dyspnea.

Part II*:* An assessment of patient's difficulty of breathing during daily living activities (DLA): it was adapted from (Yoza, et al., 2009& Brody and Lawton, 1969). It consisted of 27 statement categorized into seven areas of DLA. These were namely moving, eating, clothing, elimination, personal hygiene, recreation, and home chores. The response was on a 4-point Likert scale ranging from "not at all" to "severe". These were scored from "4" to "1" respectively so that a higher score meant more difficulty in the performance of DLA.

Part III*:* Physical examination sheet to record data about patient's respiratory rate, duration of dyspnea, measurement of chest expansion using a measuring tape, chest auscultation for assessment of wheezing, and assessment of expectoration (amount and color).

CONTENT VALIDITY

The content validated through the opinion of a panel of eight experts. Two Nursing Faculty members from community health, two medical-surgical nursing, in addition to two chest disease specialists and two physiotherapists. Modifications of content were done according to the panel judgment on the clarity of sentences, appropriateness of content and logical sequence and comprehensives of items.

Ethical and administrative considerations:

A written approval was obtained from ministry of health in Egypt training and research sector of Ministry of Health on 8, July 2014 to collect data from outpatient clinics of chest medicine at El Abassyia Hospital. Written consent obtained from COPD patients who met the criteria for inclusion in the study after explaining the aim of the study. Participants were informed about their right to withdraw from the study at any time without giving any reason. Data were considered confidential and not to be used outside this study without patient's approval. The researcher phone number and all possible communicating methods were identified to the participants to return at any time for any explanation.

Method:

Upon securing official approvals, the researcher visited the settings of the study, met with the directors to explain the aim and procedure of study to get their cooperation in fieldwork then, the patients fulfilling the criteria of eligibility were invited to participate, those who gave their consent were interviewed individually to collect sociodemographic data using part I of the tool, and to assess patient's difficulty of breathing during daily living activities **(**DLA) part II of the tool was used. The researcher used physical examination sheet part III of the tool to assess patient's respiratory rate, duration of dyspnea, and measurement of chest expansion using a measuring tape, chest auscultation for assessment of wheezing, and assessment of expectoration (amount and color).

The work was done at the outpatient clinic three days per week (Sunday, Monday and Thursday). Data collection lasted from August 2014 to 2015. After the recruitment of the sample, each patient was appointed to the first home visit to implement breathing exercises. Breathing exercises were prepared based on literature review in order to provide the COPD patient with knowledge and demonstration. The training was implemented through two home visits per week for one month. Duration of each visit lasted for 20-25 minutes, followed by 10-15mn for summary and re-demonstration. Evaluation of training was carried out after three months from the last home visit to assess the effectiveness of training. The training was conducted by a variety of teaching methods including: demonstration and re-demonstration. Also the researcher used laptop and pictures. It includes Pursed lip breathing Technique, and Diaphragmatic breathing (American Lung Association, 2014 and Cleveland Clinic Foundation, 2014).

Demonstration of Pursed lip breathing Technique was done as follow: while keeping patient mouth closed, take a deep breath in through your nose, counting to two, and follow this pattern by repeating in patient head "inhale, 1, 2." The breath does not have to be deep. A typical inhale will do. Put patient lips together as if patient is starting to whistle or blow out candles. While continuing to keep patient lips pursed, slowly breathe out by counting to 4. Repeat the exercise 4 to 5 times daily.

Than Diaphragmatic breathing technique was done as follow**:** While sitting or lying down with patient shoulders relaxed, put a hand on patient chest and place the other hand on patient stomach. Take a breath in through patient nose for 2 seconds, feeling patient stomach move outward. Patient is doing the activity correctly if patient stomach moves more than patient chest. Purse patient lips and breathe out slowly through patient mouth, pressing lightly on patient stomach. This will enhance patient diaphragm's ability to release air. Repeat the exercise as patient is able to.

The data collected during the assessment phase were analyzed and used in two purposes. Firstly, they were considered as baseline for further comparison with the post-training to be done.

Statistical analysis:

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. Cronbach alpha coefficient was calculated to assess the reliability of the DLA scale through its internal consistency. Quantitative continuous data were compared using the non-parametric Mann-Whitney or Kruskel-Wallis tests.

RESULTS AND DATA ANALYSIS

Table 1: Socio-demographic characteristics of the study sample (n=70)

Socio-demographic characteristics	Frequency	Percent
Age		
30 - < 40	**30**	**42.9**
40 ≥ 62	**40**	**57.1**
	Mean ±SD	
	44±7.6	
Gender		
Male	**49**	**70.0**
Female	**21**	**30.0**
Formal education		
No	**50**	**71.4**
Yes	**20**	**28.6**
Job status		
Unemployed	**31**	**44.3**
Working	**39**	**55.7**
Income		
Sufficient	**17**	**24.3**
Insufficient	**53**	**75.7**
Residence		
Urban	**52**	**74.3**
Slum	**18**	**20.7**
No of rooms		
1	**15**	**21.4**
2	**39**	**55.7**
3	**16**	**22.9**
	Mean ±SD	
	1±0.4	

Table (1) revealed that (57.1%) of the patients were 40 years or older and with more preponderance of males (70.0%). The majority had no education (71.4%) lived in urban areas (74.3%) and had insufficient income (75.7%), slightly than half of them was working (55.7%)

Table 2: Medical history distribution of the study sample (n=70)

Medical history	Frequency	Percent
Duration of illness (years):		
<1	**10**	**14.3**
1-<3	**19**	**27.1**
3-<5	**16**	**22.9**
5-7	**25**	**35.7**
	SD	
	Mean ±SD	
	3.6 ±1.5	
Severity of illness:		
Mild	**44**	**62.6**
Moderate	**26**	**37.1**
No. of previous hospitalizations:		
1-2	**24**	**34.3**
3-6	**20**	**28.6**
>6	**26**	**37.1**
	Mean ±SD	
	4.2±1.7	
Smoking cigarettes):	**68**	**96.6**
No. of cigarettes/day:		
<10	**16**	**23.5**
10-15	**15**	**22,1**
>15	**37**	**54.4**
	Mean ±SD	
	12.4±1.4	
Action taken in case of dyspnea:		
Taken medication	**18**	**25.7**
Inspire water vapor	**4**	**5.7**
Use spray	**48**	**68.6**

Table (2) shows that the duration of illness among the patients in the study sample was mostly five years or more (35.7%) and it was mild in (62.9%), all of them had previous hospitalizations, with (37.1%) having six or more admissions. (96.6%) were smokers, mostly more than 15 cigarettes per day (54.4%).As regards the action taken by patients when they feel dyspneic,

(68.6%) use spray, whereas only 5.7% inspire water vapor.

Table 3: Comparison before & follow up after three month related to clinical disease characteristics of the study sample (n=70)

Clinical disease characteristics	Breathing exercises				X Test	p-value
	Before (n=70)		Follow up (n=70)			
	No	%	No	%		
Respiratory rate:						
23-26	**15**	**21.4**	**38**	**54.3**		
27-32	**49**	**70.0**	**28**	**40.4**	--	--
> 32	**6**	**8.6**	**4**	**5.7**		
Duration of dyspnea: (minutes)						
<15	**0**	**0.0**	**11**	**15.7**		
20-15	**39**	**55.7**	**32**	**45**	--	--
30-20	**31**	**44.3**	**26**	**37.1**		
> 30	**0**	**0.0**	**1**	**1.4**		
Wheezes:						
Inspiratory	**21**	**30.0**	**30**	**42.9**		
Expiratory	**35**	**50.0**	**33**	**47.1**	**3.98**	**0.14**
Both	**14**	**20.0**	**7**	**10.0**		
Chest expansion :						
Zero (baseline measures)	**70**	**100.0**	**00**	**000**		
1	**00**	**0.00**	**55**	**78.6**	**16.80**	**< 0.0001 ***
2	**00**	**0.00**	**15**	**21.4**		
Expectoration amount:						
Little	**5**	**7.1**	**29**	**41.4**		
Usual	**45**	**64.3**	**28**	**40.0**	**22.38**	**< 0.0001***
More than usual	**20**	**28.6**	**13**	**18.6**		
Color of sputum:						
White	**16**	**22.9**	**41**	**58.6**		
Yellow	**43**	**61.4**	**22**	**31.4**	**18.64**	**<0.0001***
Green	**11**	**15.7**	**4**	**10.0**		

(*) statistically significant at p≤0.005

Table (3) revealed highly statistically significance in their chest expansion (p=<0.0001), amount of expectoration (p= <0.0001), and their sputum color (p= <0.0001) before and after 3 months of breathing exercises training.

Table 4: Distribution of the study sample regarding their respiratory function changes (n=70).

Respiratory function	Breathing exercises				Mann Whitney test	p-value
	Before		after 3 months			
	mean± SD	median	mean± SD	Median		
Respiratory rate	29.2±3.2	30.00	27.1±3.6	24.00	13.95	0.001*
Duration of dyspnea (min)	20.5±4.0	17.00	18.7±6.5	17.00	2.49	0.11
Chest expansion (cm)	1.0±0.0	1.00	1.2±0.4	1.00	16.68	0.001*

(*) statistically significant at p≤0.005

Table (4) displayed that there were statistically significant difference in respiratory rate, and chest expansion (p=<0.001) before and after 3 months of breathing exercises training

Table 5: Difficulty of breathing during DLA scores before and after 3 months of breathing exercises training among the study sample (n=70).

Activities Daily living (DLA)	difficulty of breathing during daily living activities (DLA) scores				Mann Whitney test	p-value
	Before		after 3 months			
	mean± SD	Median	mean± SD	median		
Moving	3.4±0.4	3.50	3.1±0.6	3.20	7.55	0.006
Eating	3.0±0.5	3.00	2.6±0.5	3.00	18.80	0.001*
Clothing	3.2±0.4	3.00	3.0±0.5	3.00	9.00	0.003*
Defecation	3.3±0.5	3.00	3.0±0.6	3.00	7.49	0.006
Personal hygiene	3.4±0.4	3.40	3.1±0.6	3.20	5.93	0.01*
Recreation	2.9±0.5	2.80	2.6±0.5	2.50	9.23	0.002*
Home chores	2.5±0.7	2.50	2.3±0.6	2.20	2.91	0.09
Total DLA	3.1±0.3	3.10	2.8±0.5	2.80	10.49	0.001*

(*) statistically significant at p≤0.005

Table (5): showed that there was statistically significance differences related to DLA before and after 3 months of breathing exercises training regarding eating, clothing, personal hygiene, and recreation

DISCUSSION

The ultimate goal of nursing and treatment of patients with chronic pulmonary disease is to help the patients actively manage their health to minimize the symptoms, prevent complications, and maintain their functions for daily activities under the given circumstances. The COPD patients in all stages can increase their functions for physical activities through an exercise program that can attain partial respiratory rehabilitation, and can relieve their symptoms including dyspnea and fatigue.

COPD is not curable, but treatment can relieve symptoms, improve quality of life and reduce the risk of death. Meanwhile more than 90% of COPD deaths occur in low and middle income countries, where effective strategies for prevention and control are not always implemented or accessible ***(*WHO, 2016).***Therefore, Home nursing intervention program was constructed by the researcher who focused on respiratory exercise for mild and moderate cases of COPD. The exercise program parameters were based on theAmerican Lung Association,(2014) and Cleveland Clinic Foundation,(2014).

The findings of the current study showed that the disease was common in men than women. The majority of them were living in urban areas. ***Sobeih (2012)*** revealed that the mean age was 47.2±7.0 years and more than two thirds of the study sample was males.

WHO fact sheet, (2016) acknowledged that previously COPD was more common in men, but because of comparably high levels of tobacco smoking among women in high-income countries, and the higher risk of exposure to indoor air pollution (such as solid fuel used for cooking and heating) for women in low income countries, the disease now affects men and women almost equally and becomes apparent after 40 or 50 years of age. ***Ahmed et al., (2016*)** reported males were slightly higher than females and two third were from rural areas.

As regard to the participants' education, the results showed that two third of them had no education in both gender. ***Ahmed et al., (2016*)** revealed that the majority of his study subjects were illiterate. ***(Hetlevik et al., 2016)*** reported that 44% had only basic education, 47% had intermediate education and 7% had higher education.

Concerning the percentage of participants' working condition, more than half of them were working. ***Kourlaba et al., (2016)*** reported that one third of the sample of COPD patients were currently employed during his study.

The duration of illness among the current patient's was between one to three years and more than one third exceeded five years, with mean duration of 2.5 years. Almost all of the current study patients have had previous

hospitalizations from 1-2 times to more than 6 times, due to exacerbations of COPD.

Indications for hospital admission in patients with COPD had been reported by ***Khajotia (2016)*** to occur for more reasons, 1. Inadequate response related to outpatient management. 2. Patient is unable to cope with day-to-day household activities. 3. Insufficient home support. 4. Marked increase in intensity of breathlessness. 5. Deteriorating general condition of the patient with development of tachycardia, cyanosis, peripheral oedema, acute confusion, drowsiness, flapping tremors, bounding pulse, conjunctival oedema, tachyarrhythmia's. 6. Fall in SaO2<90%, H+ >45, PaO2<50 mmHg. 7. Significant comorbidities such as cardiac failure, diabetes mellitus, malignancy, pneumonia.

Almost all of the study sample were smokers. ***Sobeih (2012)*** reported that the majority of her studied group of patients was smokers. While, ***Ahmed et al., (2016)*** reported that 65.5% were either current or past smokers with a mean pack years of smoking.
As the disease progresses, the intensity of dyspnea increases and leads to an anxiety state and a deterioration in quality of life. Throughout the study phases there were changes distribution of disease clinical characteristics related respiratory rate, duration of dyspnea and chest expansion among studied patients. These changes in respiratory rate, and chest expansion, were improved, between before breathing exercises and follow up visit.

Corhay et al., (2014) demonstrated that pulmonary rehabilitation (PR) has provided beneficial effects on dyspnea, improvement in muscle strength and endurance, improvement of psychological status, reduction of hospital admissions, and improvement of HR QOL in COPD patients, with a gradual increase in daily physical activity and autonomy. ***Ahmed et al., (2016*)** sated that duration of illness impact negatively on the quality of life (QOL), furthermore longer duration of the disease worsening the QOL.

The clinical disease characteristics of the studied patients have been assessed before and after 3 months of breathing exercises training and the results in both phases had demonstrated positive effects of exercises on the respiratory functions as related respectively to the respiratory rate, chest expansion, wheezes, amount and color of expectoration (sputum). The percentage of patients with respiratory rate 23-26 have improved and increased by almost trebling, as well as the percentage of patients who were breathing faster than 32 b/m was decreased. Likewise, the chest expansion as more than three quarters of the studied patients had increased one centimeter in the diameter of the chest, while the other quarter had increased by two centimeter length.

Rekha et al., (2016) had proven a significant difference between pre and posttests mean values in two groups of patients, as, the first group was being highly significant with a greater difference in pre and post-tests values for measurements of chest expansion. Also, ***bin Song& cho Park, (2015)*** showed significant improvement in pulmonary function, dyspnea, and the degree of chest expansion. These findings were also congruent with ***Kim & Choi (2015)*** who reported that the degree of chest expansion is closely related to pulmonary function and vital element in representing pulmonary function.

Wheezes are always associated with airflow limitation in COPD patients, the researcher used a stethoscope to examine the chest condition of the studied patients and the examination revealed very little improvement related only to both phases of respiration as the percentage of patients with biphasic wheezes was decreased which indicated to a comparable improvement. ***Wang et al., (2015)*** applied Global Initiative for Chronic Obstructive Lung Disease 2011 guidelines on patients' maintenance, the study concluded that the wheezes still the worse symptoms scores associated with more exacerbation.

As regard to the estimation of the sputum volume before breathing exercises, the majority of the present study sample produced spontaneous sputum that graded as little amount (7%), usual (64%), to more than usual amount of sputum (28%). ***Kessler et al., (2011)*** stated that around 30% of his studied patients reported a low frequency of sputum production in the past 7 days; ~20% reported moderate and ~10% severe or extreme production. While, ***Braeken et al., (2017)*** in a study about sputum microbiology and health status in COPD, the results estimated that almost one-third of patients spontaneously produced sputum.

In the follow up visit after 3 months of training, significance differences were markedly detected in the color of sputum that changed to better outcome as more than half of the studied patients produced whitish sputum were increased compared to the before breathing exercises as well as the percentage of yellow and green color were diminished for the same patients. In prospective studies ***(Miravitlles et al., 2012),*** mucoid sputum is usually described as colorless white, and purulence as ranging from pale yellow to dark green. Also, ***Soler*** *and* ***Torres (2013)***, reported that there is a significant and consistent relationship between purulence and the presence of a pathogenic bacteria in sputum. According to ***(Putcha et al., 2014)*** various pathophysiologic responses to smoking and their coexistence may represent chronic cough and chronic sputum expectoration, which is accompanied with higher respiratory-cause mortality. ***Kim et al., (2015)*** reported that changes which occur to the appearance, persistence, and disappearance of sputum are indicators to therapeutic interventions which have been validated against daily sputum volume production.

As regard to the amount of sputum there were proportional decreases in the production of sputum as a result of breathing exercises with highly significance outcome as nearby half of the studied patients produced little amount of sputum compared to before breathing exercises. ***Allinson et al., (2016)*** in studying the presence of chronic mucous hyper secretion in COPD development across adult life, found that chronic sputum expectoration is a concurrent symptom with chronic cough for less than half of his studied patients while cough is out of the scope of the present study. Moreover, many studies reported that chronic sputum volume correlates with a worse quality of life ***(Oca et al., 2012).*** It is also known that a dramatic degradation of COPD symptoms

such as the quantity and the color of phlegm or shortness of breath last for a couple of days in acute exacerbation of COPD ***(Schulz et al.2010).***

Related to the color of the sputum, around one quarter of the studied patients had whitish coloration and, this percentage had increased to more than two third of the patients after intervention. On the opposite side, the percentage of patients with green color sputum was noticeably decreased. Wherever any changes in amount or quality of sputum along day-to-day variation may indicates an exacerbation ***(Vestbo et al., 2013).*** Monitoring the use of antibiotics was not assessed for those patients with yellow and green coloration of sputum. Therefore, the improvement related to the color changes may be due to the effect of the breathing exercises or the use of antibiotics treatment which could be intervene by the patients and was not covered through the current study

In this context ***(GOLD, 2014)*** documented that patients with increased sputum purulence and either increased dyspnea or increased sputum production should be started on antibiotics. ***Bruce et al., (2015)*** analyzed that bacterial culture was significantly less likely to be positive in the absence of purulent sputum, and all patients with mucoid sputum improved clinically without antibiotic therapy, where patients with white or mucoid therapy were not treated with antibiotics, and those with green, purulent sputum were provided with antibiotic therapy.

Generally, there were statistically significance differences between before breathing exercise and after 3 months of breathing exercises in the clinical disease characteristics such as respiratory rate chest expansion, the usual amount of sputum and the changes of the yellow color of sputum. The respiration rate may be a potential indicator of change in clinical status ***(Ballal et al. 2014)and (Nakagawa et al., 2014)*** induced that, increased respiratory rates, were correlated with severity of dyspnea in COPD patients during their daily lives.

The present study findings revealed that the effect of breathing exercise have statistically significance differences between before breathing exercises and after 3 months of breathing exercises concerning eating, defecation, home chores and clothing. In performing Daily Living Activities like moving, there were statistical significances in all tasks of moving such as walking on plane and non-plane ground; use of public transportation and cross road; walk from home to hospital and go upstairs.

Fouad et al., (2016) pointed that the majority of patients with COPD improved in performing DLA in post and follow up phases of the programs intervention. In addition, ***Wilson et al., (2011)*** said that COPD patients comply with living in their own homes and complete daily tasks, such as showering, dressing, cooking, grocery shopping, managing finances, and getting around in the community. Also, other perspectives studies have shown that COPD patients experience restricted ability to perform DLAs and this fear of dyspnea leads to avoidance of activities ***(Zoeckler et al., 2014).***

Other perspectives studies evaluated five daily living activities like sweeping the floor and storing groceries in shelves, bathing, putting on and taking off clothes, all of these DLA which associated with upper and lower limbs movements were mostly enhanced ventilator and oxygen consumption in COPD patients ***(Vaes et al., 2011 and Castro et al., 2013).*** Also, a study conducted by ***Damaris (2012)*** to assess the effect of respiratory rehabilitation on improving the COPD patient's symptomatology and their quality of life, as the findings concluded that there was decrease in the dyspnea severity after rehabilitation.

In addition, ***Thomas, Decramer & O'Donnell, (2013)*** induced that individuals with COPD avoid activities such as social events, engaging in physical activity or DLAs, or even leaving their home are potentially contributing factors for further physical deconditioning and reduced QOL, which therefore, leads to social isolation. The limitation of activity as reported by ***Corhay et al., (2014)*** also promotes a sedentary lifestyle and the social isolation of COPD patients, with an increased risk of depression and anxiety, leading to further inactivity due to fear of breathlessness and consecutively further physical deconditioning as physical activity levels determine the survival in COPD patients.

There were improvement in the difficulty of doing Daily living Activities (DLA) among the studied patients related to respectively, moving; eating; clothing, elimination; personal hygiene and recreation except for the home chores. The results revealed decreases in patients' total means scores in the difficulty of performing Activities of Daily Life (DLA) after 3 months of breathing exercises training as compared to pre-intervention phase. ***McCarthy, et. al, 2015)*** showed improvement for all included outcomes with statistically significance on implementing pulmonary rehabilitation for chronic obstructive pulmonary disease. ***Mohamed et al., (2016)*** reported that there were highly statistically significant differences between mean scores of the pre and posttests scores as regard to diaphragmatic breathing, pursed lip breathing, coughing exercise, use of inhaler, and total practice.

From other side of a study between control group, respiratory training group and aerobic training group of 45 participants, after training program the outcome revealed more than half of study subjects improved their dyspnea level with higher percentage of improvement within respiratory training group than aerobic training group and control group ***(Elkhateeba et al.,, 2015).*** While, in a study by ***Kruis et al., (2014)*** no additional benefit of breathing exercises compared to usual care was reported, except a higher degree of self-reported daily activities and an improved level of integrated care.

CONCLUSION

The present study concluded that there was positive efficacy of breathing exercises on patients outcomes with chronic obstructive pulmonary disease as evident with improvement in the scores means of knowledge related COPD, practicing of breathing exercise, and improving in performing the daily living activities without worsening symptoms of the disease. It is also induced that the conduction of nursing intervention

home program is helpful for patients with mild and moderate COPD illness.

RECOMMENDATIONS

- A home-based program should be greatly encouraged and supported by government officials as well as nongovernmental organizations.
- Mass media programs targeting COPD patients with messages to enhance healthy life style.
- Raise the awareness of dangerous effect of smoking.
- Patient's education needs to be incorporated into the standard healthcare practice through which the patients can improve their self-management skills and quality of life.
- Initiation of national program for the provision of affordable care for elderly cases is imperative especially for those with insufficient income.

Further researches:

- Study is required with behavioral interventions parallel to physical intervention program for COPD patients, because poor care-seeking attitude of the patients may lead to mal-compliance with treatment. Furthermore, COPD requires regular and costly treatment.
- Research is required to detect the long-term effect of home intervention program.
- Experimental study is suggested to compare between two groups of COPD one apply breathing exercises and another take antibiotic to demonstrate effect of exercises intervention on of purulent sputum.

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