The Effect of Breathing Exercises on The Fatigue Levels of Patients with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Aim: *to assess the effect of breathing exercises on fatigue level of the patients with COPD.*

Methods: *this quasi-experimental research was conducted on 60 COPD patients hospitalized at hospitals affiliated to Tehran University of Medical Sciences. The subjects were randomized into "experience" and "control" groups. Data were gathered by interview and data registration from the files. The data gathering tools were questionnaires, fatigue severity scale (FSS) and respiratory exercise usage checklist. The data were analyzed using SPSS software with the descriptive and deductive statistical methods (Paired-T, Chi-Square and Pearson correlation tests).*

Results: *the average fatigue severity before (55.766) and after (40.166) using the respiratory exercises in the experience group (p=0%) was significantly different. While in the control group (p=0.002) before (54.166) and after (52.200) the study has a slight difference. There was a significant inverse correlation between using respiratory exercises and fatigue severity (r=-0.593, p=0.001). Mean fatigue intensity for the experience and control groups decreased to 40.916± 14.4 and 52.20± 8.539 after the study, respectively (p=0.001). There was a significant difference in fatigue severity between experience and control groups after the study.*

Conclusion: *respiratory exercise is effective in reducing the fatigue in the patients with COPD.*

Key words: *chronic obstructive pulmonary disease, respiratory exercises, fatigue.*

INTRODUCTION

The chronic obstructive pulmonary diseases (COPD), include chronic bronchitis and emphysema in which the air flow is obstructed through air ways.[1] There are 210 million people with COPD worldwide.[2] COPD is the4thgreatest cause of death in the United States and according to the World Health Organization (WHO), for 2030, COPD will probably shift to 3rd rank common factor for death in the world.[3] In Iran, in 18 provinces in the year 2001, 105 out of every 100,000 individuals aging from 15 to 49 and 1057 out of every 100,000 individuals above 50 were estimated to suffer from COPD. Most of the suffered were males who resided in urban areas.[4] Genetic factors such as lack of the Alpha-Antitrypsin enzyme and tobacco smoking, passive smoking, air pollution, old age, exposure to dust and chemical in operational environment may cause COPD.[5] Two significant symptoms of COPD frequently complained by the patients are dyspnea and fatigue.[6] Any patient who feels tired for more than 1 month is considered as affected by chronic fatigue.[7] Chronic fatigue is important and common sensation in patients with COPD that interferes with the quality of life but almost neglected.[8,9] As the disease advances, hard breathing followed by dyspnea and increasing limitation of the patient's ability to perform daily activities are worsened, and even for doing simple work during the day, the patient gets out of breath and is affected with early fatigue.[10] North American Nursing Diagnosis Association has accepted fatigue as a nursing diagnosis and has defined it as the feeling of weakness and exhaustion of ability for performing mental and physical activities.[11] The fatigued individuals do not have their previous energy and activities. Fatigue deeply

influence on different aspects of the individual's life. Through affecting the individual's ability in performing activities and playing valuable roles in life, fatigue exerts negative influences on the individual's quality of life and their confidence.[12]

There is no cure for COPD, thus treatment focuses on managing the disease and control the symptoms.[13] Pulmonary Rehabilitation programs are standard treatment that leads to alleviate symptom and increase performance.[14] Pulmonary rehabilitation uses a multidimensional method combining education and exercise in order to influence the levels of activity, symptoms and complaints made by COPD patients. Evidence has shown that, to this day, pulmonary rehabilitation has led to a reduction in complaints (mainly of dyspnea and fatigue)[14,15] and an increased tolerability to activities.[16]

Respiratory exercises such as lip-pursing or diaphragm respiration, are considered as a part of pulmonary rehabilitation programs, which could lead to an improvement in gas exchange, exercise tolerance and quality of life.[17] The goal of respiratory exercises in patients with COPD is for the patients to replace their ineffective respiratory techniques with effective ones and to discharge the lungs from secretions through deep respiratory exercises and effective coughing.[18]

Since the changes due to a chronic disease affect the patient's quality of life, it is very important that the medical staff pay special attention to such disease. Nurses, who take care of the individuals suffering from chronic diseases, must be considered to improving their quality of life by applying pulmonary rehabilitation program.[19]

Therefore, with respect to the fact that fatigue is an unavoidable phenomenon in patients with COPD and, if not controlled, will affect their health status and life quality, the researcher decided to perform a study on the influence of respiratory exercises on fatigue intensity in patients with COPD.

METHODS

This research is a semi-experimental study based on clinical work assessment, which has been done in Imam and Shariati hospital wards in 2006. The study was a part of master thesis study which approved by Tehran university of medical sciences (TUMS). Permission, as written informed consent and assured of anonymity and confidentiality. Using preliminary study, 60 individuals affected with COPD were selected as available samples and were divided randomly into experience and control groups to be studied. Entrance criterion were including certain diagnosis COPD by specialist physician, being in mild or moderate stage and did not have other chronic diseases and had not recognized psychotic confusion and did not consume drug in this instance. The data gathering tools for this research were a two-part questionnaire (demographic characteristics and patient info), the fatigue severity scale (FSS), and the respiratory exercise usage check list. The fatigue severity scale includes 9 questions with visual diagrams scaled from 0 (lack of fatigue) to 4 (severe fatigue). The respiratory exercise usage check list includes three items, namely, lip-pursing respiration, diaphragm respiration and effective coughing, scaled from 0 to 40. Grade 0 was given to a failure in performing respiratory exercises; while, grade 40 was given to a maximum performance of respiratory exercises (4 times a day for 10 days). In this study fatigue levels for the patients were rated to mild (0-21), moderate (21/01-42) and severe (42/01-63). The scientific validity of the tools was ensured through the validity of contents. In other words, using scientific books and articles the questionnaire and the respiratory exercise usage check list were developed and were provided to 10 members of scientific board of the faculty of nursery and midwifery of Tehran University of Medical Sciences. Then, these were confirmed through the guidance provided by clear-sighted professors in this field. The fatigue severity scale is a standard tool with high internal stability, reliability and validity for assessment of fatigue.[20] This tool has also been used in the past in other researches in Iran and has not needed any adjustment.[21] In this research the Alpha kronbach examination method has been used to determine the dynamics of the tool. Study was done on 20 qualified patients and the score was calculated. Using alpha kronbach factor, the dynamics of the tool was obtained as much as 91%, which was acceptable. The data gathering in this research are done through interview (question and answer) and data registration from the files. The researcher has referred to the research environment and selected the samples based on necessary qualifications. Then, the researcher introduced himself to units under research and persuaded them to participate in the research. The questionnaire and assessment scale in both experience and control groups were completed, and after training the respiratory exercises to the experience group through face to face procedure, was performed 4 times a day for 10 days. The control group only received the

routine treatments of the ward. After 10 days, the questionnaire was again asked to be completed together with the fatigue severity scale by both groups. The gathered data were studied by SPSS software and the descriptive and deductive statistical methods (paired t-test, chi-square and Pearson correlation) were used to achieve the research goals.

RESULTS

Our findings showed that there was no significant statistical difference between the experience and control groups regarding demographic variables. The majority of subjects were men (70% male - 30% female) aging over 70. Also, most of the samples were married, illiterate, retired with insufficient income and with 10 to 20 years of smoking record. Findings also showed that there was no significant statistical difference between the two groups regarding patient's information (**Table 1**).

Also, determined for comparison, was the average fatigue intensity for the experience and control groups before and after studying **Table 2**. Findings showed that the average fatigue intensity before study was 55.77% for the experience group with a standard deviation of 7.126; while it was 54.166% for the control group with a standard deviation of 8.372. Most of the patients in both groups showed a 90% fatigue severity. While, a slight fatigue control was not reported by any group. The "T" statistical exam showed that there was no meaningful statistical difference between the experience and control groups regarding the fatigue intensity before study, and the groups were equal on fatigue severity. The findings also showed that the average fatigue intensity for the experience group after study was 40.916% with a standard deviation of 14.403; while, for the control group after study, it was 52.20% with a standard deviation of 8.539. The "T" statistical exam (p=0.001) showed a meaningful statistical difference between the experience and control groups regarding the fatigue intensity after study (**Table 2**). **Table 3** was developed to compare the fatigue intensity between the experience and control groups before and after respiratory exercises. Findings for the experience group showed a meaningful statistical difference (p=0.00) between the fatigue intensity before and after interference. In other words, the fatigue intensity in patients has been reduced after respiratory exercises and medical treatments. For the control group, findings showed a meaningful statistical difference (p=0.002) in the average fatigue intensity before and after study. This was a slight difference which could only be resulted from medical treatments and careful supervisions in the ward. In **Table 4**, the level of correlation between the rate of respiratory exercises and changes in fatigue severity was shown for the experience group of the patients with COPD under study. Findings showed a meaningful reverse statistical difference (p=0.001) between the rate of

Table 1. Relative and absolute frequency distribution of COPD patients hospitalized in the internal wards of hospitals affiliated to Tehran University of Medical Sciences, according to the both control and experience groups (2006)

Variables	Statistical indicator	Frequency	Percent
Disease	Emphysema and Chronic bronchitis	47	78/3
Stage	stage II	46	76/7
Duration COPD	< 5	33	55
Drug usage (bronchodilator and corticosteroid)	both	48	80
Oxygen usage duration	5-10 h/24	39	65

Table 2. Relative and absolute frequency distribution of the units under research according to fatigue severity of COPD patients hospitalized in the internal wards of hospitals affiliated to Tehran University of Medical Sciences, in both control and experience groups, before and after study

Group / Fatigue ratio	Before Study				After Study			
	Experience		Control		Experience		Control	
	numerous	%	numerous	%	numerous	%	numerous	%
Severe	27	90	27	90	16	53/3	26	86/7
Moderate	3	10	3	10	11	36/7	4	13/3
Mild	0	0	0	0	3	10	0	0
Total	30	100	30	100	30	100	30	100
Average	55.766		54.166		40.916		52.2	
Standard Deviation	7.126		8.372		14.403		8.539	
Result	p = 0.429 t = 0.797 no significant				p = 0.001 t = -3.691 significant			

Table 3. Relative and absolute frequency distribution of the units under research according to fatigue severity of COPD patients hospitalized in the internal wards of hospitals affiliated to Tehran University of Medical Sciences, in the experience group, before and after study (2006)

Group	Experience				Control			
	Before Study		After Study		Before Study		After Study	
Fatigue ratio	numerous	percent	numerous	percent	numerous	percent	numerous	percent
Severe	27	90	16	53/3	27	90	26	86/7
Moderate	3	10	11	36/7	3	10	4	13/3
Mild	0	0	3	10	0	0	0	0
Total	30	100	30	100	30	100	30	100
Average	55.766		40.916		54.166		52.200	
Standard deviation	7.126		14.403		8.372		8.539	
Result	p = 0.00 t = 7.156 significant				p = 0.002 t = 3.314 significant			

Table 4. Level of correlation between the rate of respiratory exercises and changes in fatigue severity, for the experience group of COPD patients hospitalized in the internal wards of hospitals affiliated to Tehran University of Medical Sciences (2006)

Breathing exercises applied	Fatigue ratio	
Pressed lip breathing	p= 0.001	r= -0.593
Diaphragmatic breathing	p= 0.001	r= -0.584
Effective cough	p= 0.006	r= -0.493

respiratory exercises and the fatigue severity. In other words, the more performance of respiratory exercises, the more reduction in fatigue severity was obtained.

DISCUSSION

Fatigue, in the chronic obstructive pulmonary disease due to the hypoxia resulting from an obstruction of the air ways and an increase of respiratory activities, is an unavoidable problem related to the type and quality of respiration.[8] A research made by Theander and Unosson (2004) showed that the fatigue severity was higher in patients with COPD than in healthy individuals studied.[15] Another research made by Breslin et.al (1998) also showed a strong relationship between fatigue and the quality of life in patients with COPD, i.e. an increase in fatigue severity leads to an increased disorder in pulmonary performance, reduced tolerability, and spoiled quality of life in COPD patients.[4] Pulmonary rehabilitation is an action taken to control the symptoms and to improve the patients' performance. In his research, Katsura (2004) remarks, "pulmonary rehabilitation has positive effects on the quality of life among patients with COPD".[22] Respiratory exercises are a part of the pulmonary rehabilitation program aiming at improvement and control of the disease symptoms, especially dyspnea, in COPD patients.[1] In this regard, a research made by Woo (2004) showed that the three parameters of dyspnea, fatigue and physical activities are interrelated; whereas, in patients suffering from dyspnea to a higher extent, the fatigue intensity was higher and the level of physical activity was lower.[7] Results of the present research showed a reduction in the fatigue intensity among COPD patients under interference as well as a meaningful reverse relationship between the fatigue intensity and the rate of respiratory exercises. In other words, the higher the rate of respiratory exercise applied, the less the fatigue intensity among the samples under interference. The present research also showed that it was the change of respiratory pattern that caused the reduction of fatigue intensity in COPD patients. Patients with COPD have a shallow, fast and insufficient breathing. Through exercises, this type of respiration has improved to diaphragm respiration in which the breathing speed is reduced leading to an increase of alembic aeration.

By lip-pursing respiration also, the breathing depth is increased in patients. Therefore, since the nurses are directly responsible for taking care of the patients, and, spend more time with the patients than other treatment staff, it is expected that they try more than others to apply what they learn in training and encouraging the patients. Training of respiratory exercises through face to face procedure while implementing treatment procedures may have significant effects on controlling and improving the symptoms, raising the level of awareness and finally, upgrading their quality of life.

As we approach the 21st century, more nursing attention may be needed for patients affected with COPD, because the number of both old people and chronic diseases is increasing proportionately. By using the patient important behaviors as patterns and training such behaviors, and also, by helping the

patients to acquire and apply such behaviors, nurses can effectively help the patients. They can also help patients to a great extent from physical, sentimental, psychological and mental aspects. Taylor (2001) says, "Nursing is a science which provides care for the individual through application of special knowledge and skills, and performance of trainings and researches".[23] Considering the prevalence of COPD and its effects on the quality of life, nurses will play a significant role in controlling the symptoms and improving the patients' condition to counter and come up with the disease. Nurses and other people should encourage the patients to perform activities as much as they can. Controlling the symptoms, increasing the level of confidence and feeling of domination and improvement should be emphasized, since continuous fatigue, inability to perform activities, trying hard for breathing, and the fact that the disease is a long-term disease, may reduce the level of confidence and life expectancy among the patients.[2] This will be achieved by the efforts and perseverance of nurses and members of the treatment team and through supervision on the implementation of training programs for patients, especially those affected with chronic diseases needing long-term care.

CONCLUSION

Since this research has shown the desirable effects of respiratory exercises on the reduction of fatigue intensity in COPD patients, it helps those nurses who are in closer contact with the COPD patients to take an effective step for reduction of fatigue, improvement of symptoms, and as a result, upgrading of the level of health and quality of life among such patients, through introducing this low-cost, inoffensive, and non-medical procedure and encouraging its application. Since the findings of any research can be used as bases for future researches, it is suggested that researches be done in order to study the effects of other pulmonary rehabilitation techniques, such as lung physiotherapy and exercises, on the fatigue intensity and quality of life among COPD patients.

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