



Original Research Article

Effectiveness of Breathing Exercises on Pulmonary Function Parameters and Quality of Life of Patients with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is a progressive irreversible airway disease characterized by emphysema and chronic bronchitis, resulting in breathlessness, cough and sputum. Though medications are used to control the symptoms of COPD, but it will not give permanent cure. Performing breathing exercises reduces the frequent dyspnea and improves relaxation and pulmonary function. Limited empirical documentation exists to support the effectiveness of a nurse managed rehabilitation programme for older patients with COPD.

Aims & Objectives: To assess the effectiveness of breathing exercises among COPD patients in reduction of dyspnea, improvement of pulmonary functional parameters and Quality of life.

Materials & Methods: Pretest post test control group design was used in this study. The study includes 100 COPD patients in experimental group and 100 patients in control group.

Results: After undergoing breathing exercises, in the experimental group the level of dyspnea was significantly reduced ($P < 0.001$) and there was significant improvement in the Quality Of Life (QOL) and pulmonary functional parameters such as FEV1 (Forced Expiratory Volume), FVC (Forced Vital Capacity), FEV1/ FVC ratio, and PEFR (Peak Expiratory Flow Rate) ($P < 0.001$). However in the control group there were no significant changes in dyspnea, QOL and pulmonary function.

Conclusion: There was a significant reduction in dyspnea, improvement in pulmonary function, and QOL of COPD patients after pulmonary rehabilitation exercises. So deep breathing exercises is an effective and economical method for improving the physical capacity and general wellbeing of patients with COPD.

Key words: Breathing exercises, Pulmonary function parameters, Quality of life, COPD

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a progressive irreversible

airway disease characterized by emphysema and chronic bronchitis, resulting in breathlessness, cough and sputum.^[1] As the

disease progresses, subjects with COPD experience increasing deterioration of their health-related quality of life (HRQOL), with greater impairment in their ability to work and declining participation in social and physical activities.^[2]

The global burden of Diseases (GBD) study showed that approximately 2.7 million deaths from COPD occurred in 2000, half of them in the Western Pacific Region. About 400000 deaths occur each year from COPD in industrialized countries and this can be expected to rise unless urgent action is taken to control leading risk factors, particularly tobacco. (Laura Cinobanu, et al., 2007).^[3] In India, smoking association with COPD was reported in 82.3 percent of male patients on an average in an analysis of several population studies.^[4]

Exertional dyspnea often causes patients with chronic obstructive pulmonary disease (COPD) to unconsciously reduce their activities of daily living (ADLs) to reduce the intensity of their distress. The reduction in ADLs leads to deconditioning which, in turn, further increases dyspnea. Both dyspnea and fatigue are important factors affecting health-related quality of life (HRQOL).^[5] Though medications are used to control the symptoms of COPD, but it will not give permanent cure. Performing breathing exercises reduces the frequent dyspnea and improves relaxation and pulmonary function. Limited empirical documentation exists to support the effectiveness of a nurse managed rehabilitation programme for older patients with COPD. Pulmonary rehabilitation programs help to reduce shortness of breath, increasing exercise tolerance, decrease the frequency and duration of hospital admissions, socio economic gains from reduced hospitalizations, a reduction in anxiety, depression and somatic concern, the return of patients to employment and the establishment of a better quality of life.^[3,6,7]

Objectives

1. To assess the perceived severity of dyspnea, pulmonary function, and QOL of COPD patients.
2. To assess the effectiveness of breathing exercises among COPD patients in reduction of dyspnea.
3. To assess the influence of breathing exercises on QOL of COPD patients
4. To assess the effectiveness of breathing exercises among the COPD patients on pulmonary functional parameters such as FEV1, FVC, FEV1/ FVC ratio, and PEFR.
5. To associate the QOL of the COPD clients with their selected demographic variables.

Research Hypothesis

1. The mean post-test scores of dyspnea level of the experimental group will be significantly lower than their mean pre-test measurement.
2. The mean post-test scores of pulmonary function of the experimental group will be significantly higher than their mean pre-test measurement values in terms of FEV1, FVC, FEV1/FVC ratio, and PEFR.
3. The mean post-test scores of QOL of the experimental group will be significantly higher than their mean pre-test measurement.
4. There will be a significant mean difference in dyspnea level between the experimental group and control group.
5. There will be a significant difference between the gains in pulmonary measurement values in experimental group and control group in terms of FEV1, FVC, FEV1/FVC ratio, and PEFR.
6. There will be a significant mean difference in QOL between the

experimental group and control group.

7. There will be a significant association between QOL of COPD patients with their selected demographic variables.

METHODOLOGY

Research Approach: Experimental approach

Research design: Pretest post test control group design

Setting of the study: The study was conducted in a Government Medical college Hospital in India

Population: All the patients with COPD who attend the OPD and admitted in the hospital

Sample: It consists of 200 patients with COPD, 100 patients in experimental group and 100 in control group.

Sampling technique: Subjects were selected by using simple random sampling technique with random assignment for each group.

Criteria for the selection of sample:

Inclusion criteria:

1. Clinically diagnosed moderate to severe COPD patients by the pulmonologists
2. Only males with the habit of smoking were included
3. Age group between 31 – 80 years.
4. Those who are able to understand and speak Tamil.

Exclusion criteria:

1. Patients who had acute breathing difficulty
2. Those who were performing regular breathing exercises or yoga
3. Patients who had recent abdominal surgeries
4. Patients who were not willing to participate

Description of the tool

Part I: Demographic variables such as age, education, occupation, marital status, smoking habit, alcohol use and duration of illness

Part II: Assessment of Dyspnoea

Borg Dyspnoea scale was used to assess the level of dyspnea among COPD patients. It is a standardized scale to assess the level of dyspnea among patients with respiratory problems. In this scale dyspnoea is assessed by patient's verbal description as mild, moderate or severe. It starts at score 0 – 10, from minimum to maximum breathing difficulty.

Part III: Questionnaire on Quality of Life

WHO Quality Of Life Questionnaire was modified and translated into Tamil language and used for quality of life assessment. It consists of 40 questions under 4 sections. Physical domain consisted of 16 questions, psychological domain had 16 questions, social domain had 6 questions and spiritual domain had 2 questions. A score of '4' was assigned to no symptoms or low severity of symptoms and a score of '1' was assigned to maximum severity of symptoms. The total QOL score of all the domains was = 160.

Measurement of Pulmonary Function

Pulmonary function was tested with a spirometer. It measures lung function, specifically the measurement of the volume and/ or speed (flow) of air that can be inhaled and exhaled.¹ Results are given in both raw data (liters per second) and percent of the "predicted values" for the patients of similar characteristics (height, age, sex and sometimes race and weight).

Data collection procedure:

Permission was obtained from concerned hospital authorities. The samples were selected by simple random sampling. After explaining the nature and objective of the study, the samples were asked to give necessary background information through

interview. After that the severity of dyspnea and the QOL were assessed using Borg dyspnea scale and WHO Quality Of Life questionnaire.

Subjects in the study group were asked to do breathing exercises daily, each session consists of at least 10 minutes for 3 times a day. The instruction booklets regarding the performance of the exercises were given to each of the samples and they were supervised by the investigator for 10 full minutes every day for 30 days. Patients in the control group were allowed to continue with their usual physical activity.

RESULTS AND DISCUSSION

Demographic data showed that most of them were between 61 and 70 years (41%) both in experimental and control group and majority of them were smoking 21 to 30 times per day in experimental group (53%) and control group (62%) respectively. Majority of them were illiterate in both experimental (81%) and control group and 39% of them were doing moderate work. Moreover 86% of them were married and had the habit of alcoholism in both groups. Regarding the duration of illness, majority of them (73%) of them had COPD from 3 to 5 years in experimental and control group respectively. Statistically no significant difference was found in the distribution of demographic variables among the patients with COPD in experimental and control groups.

In both groups more than 60% of them had Family H/O diabetes mellitus from 1st degree relatives and 86% and 84% of them didn't have any other systemic illness in experimental and control group respectively. Only 3 to 4% of them were doing exercises regularly and about 94% of them didn't have the habit of either

alcoholism or smoking in both groups. In experimental group 28% and in control group 36% of them didn't follow any dietary restrictions.

Perceived severity of dyspnea, pulmonary function, and QOL of COPD patients

In the pretest (before breathing exercises) QOL was assessed using WHO Quality Of Life Questionnaire. The overall mean score of QOL in experimental group was 89.97 and its standard deviation was 11.9 whereas the mean score of control group was 84.98 and the S.D was 13.9.

In the pretest (before breathing exercises) severity of dyspnea was assessed using Borg Dyspnea scale. The overall mean dyspnea score was almost same for both experimental and control group, ie 6.29 and its standard deviation was 1.0.

In the pretest (before breathing exercises) pulmonary function was assessed using spirometer. The overall mean FEV1 value was almost same for both experimental (1.28) and control group (1.23) and its standard deviation was 0.49 and 0.52 respectively. In the pretest, the mean FVC value was 1.60 and the standard deviation was 0.49 in Experimental group and the mean FVC was 1.67 with the standard deviation of 0.61 for the control group. However the PEFr mean was 156.49 with the standard deviation of 63.4 for the Experimental group whereas in the control group the mean was 164.23 and the standard deviation was 91.7.

In the pretest, there was no statistically significant difference was found in the mean and standard deviation of QOL, dyspnea score, FEV1, FVC and PEFr score among patients with COPD in experimental and control groups.

1. Comparison of pre and posttest level of mean and standard deviation of QOL, Dyspnea, FEV1, FVC and PEFr among patients with COPD in experimental and control groups.

Physiological functions	Period	Experimental		Control		Mean Difference	‘t’ value	P value
		Mean	SD	mean	SD			
Dyspnea	Before	6.29	1.0	6.32	1.0	0.03	0.212	0.0832
	After	4.54	0.7	6.50	0.8	1.96	1.75	0.00
Quality Of Life	Before	86.97	11.9	84.98	13.1	2.0	1.124	0.262
	After	94.95	11.2	80.9	10.9	14.05	8.987	0.00
FEV1	Before	1.28	0.49	1.23	0.52	0.05	0.770	0.442
	After	1.42	0.46	1.18	0.51	0.24	3.524	0.001
FVC	Before	1.60	0.49	1.67	0.61	0.07	0.863	0.389
	After	1.75	0.48	1.59	0.59	0.16	2.118	0.035
FEV1/FVC	Before	79.1	13.2	73.5	13.8	5.6	2.963	0.003
	After	81.0	12.9	74.0	14.1	9.0	3.674	0.00
PEFR	Before	156.49	63.4	164.23	91.7	7.7	0.694	0.488
	After	207.39	76.8	164.35	92.5	43.3	3.579	0.00

The results reveal that after undergoing breathing exercises, in the experimental group the dyspnea was significantly reduced and there was significant improvement in the QOL and pulmonary functional parameters. However in the control group there were no significant changes in dyspnea, QOL and pulmonary function.

2. Relationship between FEV1 and FVC before and after intervention

Before intervention the correlation coefficients of experimental and control groups were 0.901 and 0.886 respectively. After intervention the relationship of the experimental and control group were 0.878 and 0.885 respectively. The above correlation coefficients were statistically significant ($P < 0.01$).

3. Association between QOL of patients with COPD in experimental and control group with their selected demographic variables

Results revealed that there was a significant relationship between the QOL and occupation, smoking habit, marital status and duration of illness at $P < 0.05$ level among the COPD patients in experimental group. However there was highly significant relationship between the QOL and occupation, smoking habit and

duration illness at $P < 0.001$ level among the patients with COPD in control group.

DISCUSSION

Findings of the study revealed that after undergoing breathing exercises there was a significant improvement ($P < 0.001$) in the pulmonary functional parameters. This finding is consistent with the studies conducted by Holland AE (2012)^[8] and Gosselink R (2004)^[9] on breathing exercises for COPD patients. Moreover the current study also revealed that there is a highly significant reduction in the dyspnea level and improvement in the QOL of COPD patients after undergoing breathing exercises. However the study conducted by Holland AE (2012)^[8] reported that there are no consistent effects on dyspnea and Health Related Quality Of Life after breathing exercises which is not supporting to the present study.

CONCLUSION

COPD is a common disease and a common cause of mortality and morbidity. Dyspnea is a characteristic and a troubling manifestation of this disease. Loss of physical capacity and the adverse psychological effects of COPD contribute greatly to morbidity. Medicines have limited role in improving physical capacity of these

patients. People suffering from severe forms of this disease, usually spend their remaining years of life in bed and have declining quality of life.

In the present study, there was a significant reduction in dyspnea, improvement in pulmonary function, and QOL of COPD patients after pulmonary rehabilitation exercises. It can be concluded that deep breathing exercises is an effective and economical method for improving the physical capacity and general wellbeing of patients with COPD

REFERENCES

1. Brunner, Suddarth. Textbook of Medical – Surgical Nursing. 10th edn: 2007, p.571 – 580.
2. Elisabeth Stahl, Anne Lindberg, Sven-Arne Jansson, et al. Health-related quality of life is related to COPD disease severity. Health Quality Life Outcomes. 2005; 3: 56.
3. Laura Ciobanu, Dragica Pesut, Vladana Miloskovie. Current opinion on the importance of pulmonary rehabilitation. Chinese Medical Journal. 2007; 120 (17): 1539 – 1543.
4. Jindal S.K., Gupta and Aggarwal A.N. (2004). Guidelines for management of Chronic Obstructive Pulmonary Disease in India. A Guide for Physicians, Indian Journal of Chest Diseases Allied Sciences, 46, 137 – 153
5. Reardon JZ, Lareau SC, Zuwallack R. Functional status and QOL in COPD. American Journal of Medicine. 2006; 119 (10 suppl 1): 32-37.
6. Wong K W, Wong F K, Chan M F. Effects of nurse-initiated telephone follow up on self-efficacy among patients with chronic obstructive pulmonary disease. Journal of Advanced Nursing. 2005; 49: 210 – 222.
7. Stavem K, Lossius ML, Kvein TK. et al. The health-related quality of life of patients with epilepsy compared with angina pectoris, rheumatoid arthritis, asthma and chronic obstructive pulmonary disease. Qual Life Res. 2005; 14: 2315-2321.
8. Holland AE, Hill CJ, Jones AJ. et al. Breathing exercises for Chronic Obstructive Pulmonary Disease. Cochrane Database of Systematic Reviews. 2012; (10).
9. Gosselink R. Breathing techniques in patients with COPD. Chronic Respiratory Diseases. 2004; 1(3): 163 – 72.

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