

Effectiveness of breathing exercises in patients with chronic obstructive pulmonary disease

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Abstract

Introduction: Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality. **Aim:** The present study was undertaken to assess the effectiveness of breathing exercises in the reduction of dyspnoea among the COPD patients. **Methods:** A quantitative research approach, quasi experimental pre-test and post-test control group design was used in the study. The study was theoretically supported by the frame work based on goal attainment theory of Imogen King. The study was conducted in pulmonology wards of a teaching institute in South India. A total of 60 subjects were selected. The samples were selected by using convenient sampling technique. BODE index was used to grade dyspnoea. The data collected were analysed using descriptive and inferential statistics. **Results:** 63% of patients were having BODE index score between 4 and 7. In the experimental group the mean pre-test value was 6.13 and the mean post-test value was 2.96 and significant at p value 0.001 level. The post interventional level of dyspnoea of both groups was analysed by using Mann Whitney test, and showed a p value of 0.001. There is significant reduction in the level of dyspnoea after practising breathing exercises compared with control group. **Conclusion:** There is significant reduction in the level of dyspnoea among COPD patients with breathing exercises.

Keywords: Breathing exercises, BODE index, dyspnoea, COPD.

Introduction

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality and is expected to be the third leading cause of mortality by 2020.¹ It is characterised by poorly reversible airflow limitation and systemic inflammation affecting the lungs and impaired quality of life. The treatment of COPD should focus both on pharmacological and nonpharmacological measures.

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The nonpharmacological measures have been neglected until recently. Breathing exercises are an inexpensive non pharmacological method that helps them to cope with the disease condition. The present study was conducted to assess the effectiveness of breathing exercises in the reduction of dyspnoea among patients with COPD in a teaching hospital in South India.

Methodology

This was a quasi-experimental of pre-test, post-test design. It was conducted between January 2013 to March 2013 in the outpatient unit of Department of Pulmonology in a teaching hospital in South India. Sixty patients (30 COPD patients in the experimental group and 30 COPD patients in the control group) with stage 2 and 3 COPD who were stable with inhaled medications were enrolled. Convenient sampling technique was used. Random assignment was adopted while assigning the subjects

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to experimental group and control group. Bed ridden patients, those who were unable to perform spirometry/six minute walking test, patients with acute exacerbation, with history of myocardial infarction and unstable angina on previous month, oxygen saturation < 88%, significant pulmonary disease other than COPD such as lung cancer, significant neurological disease and those who refused consent were excluded. Baseline information of the patient such as age, sex, religion, education, occupation, place of residence, duration of illness, previous history of hospitalisation due to respiratory illness, history of smoking and smoking in pack years (number of packs of cigarettes smoked per day by the number of years the person has smoked) were noted.

BODE index is a standardised tool used to assess the dyspnoea level of a patient in response to an intervention.² It includes **B** – Body mass index (BMI) = weight in kilogram / height in m²; **O** – Airway obstruction assessed by checking FEV₁ (forced expiratory volume in one second); **D** – Dyspnoea rating scale as assessed by using Modified Medical Research Council dyspnoea rating scale (*Table 1*) and **E** – Exercise tolerance is assessed by conducting six minute walk test (6 MWD) in metres (*Table 2*).

Data collection process

Formal administrative permission to conduct the study was obtained from the hospital authorities. The investigator contacted all the subjects in the study individually and the purpose of the study was explained to them. Confidentiality was assured to all the subjects and informed consent was obtained. Subjects were selected as per the sampling criteria and divided into experimental and control group by random assignment. The investigator ensured that the data collection process did not affect the routine care received by the patients. Pre-test level of dyspnoea was assessed by using BODE index for experimental and control group. The breathing exercises included pursed lip breathing, diaphragmatic exercises, 6 min walk training and upper arm exercises. They were demonstrated to each individual in the experimental group by the investigator and their performance was observed using a checklist for 30 minutes in the morning and 30 minutes in the evening continuously for 14 consecutive days, while control group did not get the intervention other than routine medications. All exercises were trained and supervised by MSc nursing student at each visit. Then the post-test level of dyspnoea was assessed by using BODE index in experimental and control group. After post-test assessment breathing exercises were taught to control group also.

Table 1: MMRC Scale for dyspnoea.

Grade	Description of breathlessness
0	I only get breathless with strenuous exercise
1	I get short of breath when hurrying on level ground or walking up a slight hill
2	On level ground, I walk slower than people of the same age because of breathlessness or have to stop for breath when walking at my own pace
3	I stop for breath after walking about 100 yards or after a few min on level ground
4	I am too breathless to leave the house or I am breathless when dressing

Grade 0-1 Score : 0; Grade 2 Score : 1; Grade 3 Score : 2; Grade 4 Score : 3

Table 2: BODE index

Variable	Points on BODE index			
	0	1	2	3
% FEV ₁ (%)	≥ 65	50 - 64	36-49	≤ 35
6MWT	≥350	250 - 350	150-250	≤150
MMRC	0-1	2	3	4
BMI (kg/m ²)	> 21	≤ 21		

Scoring: 0 -10. As the score increases the dyspnoea level increases and the condition of the patient deteriorates. If the score decreases to zero, the patient is free of dyspnoea.

Analysis and Interpretation

In data analysis, the data was divided in to appropriate parts to obtain answers to the research questions and to test the hypothesis. The purpose of interpreting the data was to reduce it into an interpretable form and to draw conclusions from it. This section presents the analysis and interpretation of data collected from 60 COPD patients in order to assess the effectiveness of breathing exercises in the reduction of dyspnoea. Data was tabulated and analysed using descriptive and inferential statistics and described with the help of tables.

Results

Sixty patients were enrolled in the study, 30 in each group. The majority (80%) of patients were ≥ 61 years, 16.6% were 51-60 years, 1.7% belonged to 41-50 years and 1.7% belonged to 30 – 40 years age group. 78.3% of them were males. 70% of the subjects had primary education, 11.7% had SSLC, 6.6% had plus two level education and 11.7% had diploma/degree level education. 38.3% were drivers, 18.3% were doing agriculture, 16.7% were industrial workers, 16.7% were house hold workers, and 10% were other job holders (teachers and drivers). 91.7% were from rural areas and 8.3% from urban areas. With respect to duration of illness, most of them (61.7 %) had ≥ 5 years, 15 % had 3-4 years, 13.3 % had 1-2 years and 10 % had ≤ 1 year duration. 58.3 % had been hospitalised before, 1-3 times in a year, 33.4% were hospitalised ≥ 3 times in a year and 8.3% were not yet hospitalised. 73.3% were smokers. 61.36% had a pack year of ≥ 50 years, 18.18% had 30-50 years and 20.46% had a pack year of ≤ 30 years.

Comparison of pre and post-interventional scores of level of dyspnoea of experimental group showed that the mean and standard deviation in pre-test was 6.13 and 1.43 and that of post-test was 2.96 and 1.67 respectively showing that there was a significant reduction in level of dyspnoea after the practice of breathing exercises (*Table 3*). In the control group, the mean and standard deviation in pre-test BODE score was 6.13 and 2.33 and that of post-test was 5.76 and 2.02 respectively showing that there was a reduction in level of dyspnoea with routine care

and medications. Comparison of post-test level of dyspnoea between the experimental and control group showed that the mean post-interventional dyspnoea level of experimental group was 2.96 with a standard deviation of 1.67 and of control group was 5.76 with a standard deviation of 2.02. The differences in the level of dyspnoea of the two groups were analysed using Mann Whitney test. The calculated value 14.15 was statistically significant at p value 0.01 level which showed that breathing exercises were very effective in the reduction of dyspnoea among COPD patients.

Table 3: Pre-test and Post-test values of BODE index in patients of both groups

Group	Mean \pm SD
Experimental group (n = 30)	
Pre-test	6.13 \pm 1.43
Post-test	2.96 \pm 1.67
Control Group (n = 30)	
Pre-test	6.13 \pm 2.33
Post-test	5.76 \pm 2.02

There was no association between pre and post-interventional level of dyspnoea and selected baseline variables such as duration of illness, previous history of hospitalisation and smoking in pack years.

Discussion

Chronic obstructive pulmonary disease is a chronic illness and once it occurs, it cannot be cured but it can be controlled. COPD is a debilitating illness which affects the day today activities. They have to adopt certain non pharmacological methods along with pharmacological measures to adjust with the disease. From the study it is evident that breathing exercises are an effective and inexpensive nonpharmacological intervention that helps them to reduce the dyspnoea and also helps them to adjust with the disease condition.

The first objective of this study was to assess the level of dyspnoea of COPD patients. The findings of the present study showed that majority had a pre BODE index score between 4 and 7, more than quarter (30%) had a score between 8 and 10 and 6.67% had score between 0 and 3. The study findings revealed that majority of the patients had a BODE

index score between 4 and 7. The increased score in BODE index indicates that there is a high level of dyspnoea and it was the major problem of COPD patients. This finding was consistent with a cross sectional observational study by Polatlı M, Bilgin C, *et al* on the influence of COPD on activities of daily living, lifestyle needs in patients. They found that dyspnoea was the most common (83.1%) symptom. The study concluded that the top three COPD treatment expectations of the patients were being able to breathe (24.1%), walk (17.1%), and walk up stairs (11.7%), while shortness of breath (43.3%) was the first priority treatment need.³

The second objective of the study was to determine the effect of breathing exercises on dyspnoea. Our study indicates that breathing exercises are effective in reducing dyspnoea among COPD patients. This was supported by a study where the findings suggest that breathing exercises were an effective intervention for reducing dyspnoea. A study was conducted by Jyothy M and P D'Silva to evaluate the effect of deep breathing exercises on the pulmonary function of patients with chronic airflow limitation. Findings showed that the mean effectiveness score of experimental group was 26.80 and that of control group was found to be 6.9 ($p < 0.05$). Thus deep breathing exercises were found statistically significant in improving the pulmonary function of patients with chronic airflow limitation.⁴

The third objective was to find the association between level of dyspnoea of COPD patients and selected baseline variables. We found no such significant association. The above findings of the study was supported by a study on the emergence of COPD as an epidemic in India showed that the smoking associations with COPD were high from most countries: The odds ratio was 2.65 in India, 2.57 in China and 2.12 in Japan. Almost all forms of smoking products such as cigarettes and 'bidis' used in different states were found to be significantly associated with COPD.⁵ There were no similar studies conducted on effectiveness of breathing exercises and various variables that influence COPD.

Further studies can be conducted regarding the effectiveness of breathing exercise in reducing dyspnoea among patients with COPD in the community set up and patients receiving different complementary therapies. The study can also be replicated on a large sample there by findings can be generalised for a larger population. A similar study can be replicated with random sampling technique.

Conclusion

Breathing exercises were effective in reducing dyspnoea among COPD patients. Patient education and training programs should be systematically planned and regularly conducted for patients to update their knowledge. Further research is needed to explore more complementary therapies to reduce dyspnoea among COPD patients.

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