Original Article

Can Pulmonary Rehabilitation Improve the Well-being of COPD Patients: Experience at a Tertiary Care Hospital in Ahmedabad, Gujarat, India

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Abstract

Background. Chronic obstructive pulmonary disease (COPD) is a major cause of disease burden worldwide. Patients with COPD have impaired quality-of-life due to dyspnoea, frequent exacerbations, limitation of exercise capacity, muscle dysfunction, and malnutrition. Hence, pulmonary rehabilitation should be considered as a part of management of patients with COPD. Present study emphasises on the efficacy of pulmonary rehabilitation in improving the long-term well-being of patients with COPD.

Methods. Fifty patients with COPD were included and were followed up at 8, 24, 48 and 96 weeks. Patients were taught exercises to strengthen the lower limb muscles, breathing exercises along with upper limb exercises.

Results. The outcomes recorded after 96th week of rehabilitation programme were as follows: dyspnoea grade at (4.1±1.06 *versus* 1.6±0.6 with paired 't' test of 20.8328, p<0.0001), health-related quality-of-life (HRQoL) (57.7±11.6 *versus* 38.7±10.6, 't' test 75.9631, p<0.0001), forced expiratory volume in one second (FEV_1) (43.1±16.0 *versus* 40.3±16.0, 't' test 19.1064, p<0.0001) FEV_1/forced vital capacity (FVC) (0.86±0.11 *versus* 0.80±0.12, 't' test 17.0750, p<0.0001).

Conclusion. Pulmonary rehabilitation reduces dyspnoea, increases the exercise capacity and improves quality-of-life, reduces frequent exacerbations, thus, improves overall well-being of patients with COPD, resulting in reduction of significant cost of health burden on society indirectly. **[Indian J Chest Dis Allied Sci 2017;59:131-134]**

Key words: Pulmonary rehabilitation, Dyspnoea, HRQoL, COPD.

Introduction

Chronic obstructive pulmonary disease (COPD) is a major cause of disease burden worldwide, and is a leading cause of death. Its prevalence is increasing worldwide.[1] Globally, by the year 2020, COPD is expected to rise to the 3rd position as a cause of death and to 5th position as the cause of loss of disability adjusted life years according to the Global Burden of Disease Study.[2] Very few studies are available on the prevalence of COPD in India based on spirometric findings. According to the Indian Council of Medical Research, prevalence of COPD in India is 3.5% (4.3% in males and 2.7% in females).[3]

Chronic obstructive pulmonary disease is a complex and devastating disease.[4] Patients with COPD have impaired quality-of-life due to its symptoms, such as, dyspnoea, frequent exacerbations, limitation of exercise capacity, muscle dysfunction, cardiac impairment, skeleton and sensory deficits and malnutrition. Exacerbations in COPD are an important cause of morbidity and mortality, with frequent exacerbations COPD progresses rapidly. This leads to short-term as well long-term impairment of quality-of-life.[5,6]

Pulmonary rehabilitation may be considered as an essential part of clinical management and health maintenance of patients with COPD along with pharmacotherapy.

The present study emphasises on the role and effect of pulmonary rehabilitation in long-term well-being of COPD patients and reduction in exacerbations.

Subjects and Methods

This study was carried out at the Department of Pulmonary Medicine, B.J. Medical College and Civil Hospital, Ahmedabad, Gujarat. Fifty patients from the out-patient department who were already diagnosed to have COPD were enrolled during the period November 2010 to November 2012 and were followed up for a period of two years.

All the 50 patients with COPD as per GOLD guidelines who were eligible to participate in the study were assessed by a detailed history and clinical examination. The grade of dyspnoea according to

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modified Medical Research Council (mMRC)[7] scale, health-related quality-of-life (HRQoL) according to St. George Respiratory questionnaire[8] and spirometry parameters were recorded at enrollment and at each follow-up visit. At baseline, chest radiograph, electrocardiogram, blood counts and chemistries were done. Patients were followed up at 8, 24, 48, 96 weeks. Patients were told to visit the hospital during exacerbations, even before the date of scheduled visits.

Following interventions were done during each hospital visit (at enrolment as well as at follow up visit). Patients were advised to attend two sessions of pulmonary rehabilitation twice weekly for eight weeks. Each session lasted for 90 minutes. Each session had the following interventions: (i) education: in this 30-minute session, patients were educated about their disease, correct use of medication (inhalers), role of continuation of medications, role of exercise and also about smoking cessation and (ii) breathing exercises for 15 minutes (pursed lip breathing, diaphragmatic exercises, butterfly posture and postural drainage) (Figure 1 A,B,C) and upper limb and lower limb exercises for 45 minutes to strengthen upper and lower limb muscles. Each exercise was repeated 8–10 times (Figure 2 A,B). Intensity of exercise was determined by Borg's scale of pain perception[8].

After eight weeks, patients were instructed to do the exercises at home daily for at least 30 minutes. A home-based programme (walking for 20 minutes daily, pursed lip breathing, diaphragmatic breathing and postural drainage) was given to each patient.

Statistical Analysis

Data entry and data analysis was done by using MS Excel 10 and EPI info 7.2 version. The tests used for analysis were percentage (%), paired "t" test and interquartile range.

Results

In the present study, a total of 50 patients with COPD (33 males and 17 females) were enrolled and followed-up for a period of two years. Age-wise distribution of patients is given in table 1. Mean age of the patients was 56.1±10.6 years.

All patients presented with dyspnoea, 22 (44%) patients had grade 5 dyspnoea, 19 (38%) had grade 4, 4 (8%) had grade 3, 3 (6%) and 2 (4%) had grade 2 and grade 1 dyspnoea, respectively. Patients presented with other symptoms also, such as, cough 44 (88%), 34 (68%) sputum production, 15 (30%) patients complained of chest tightness, (28%) had fever and 29 (58%) had wheezing.

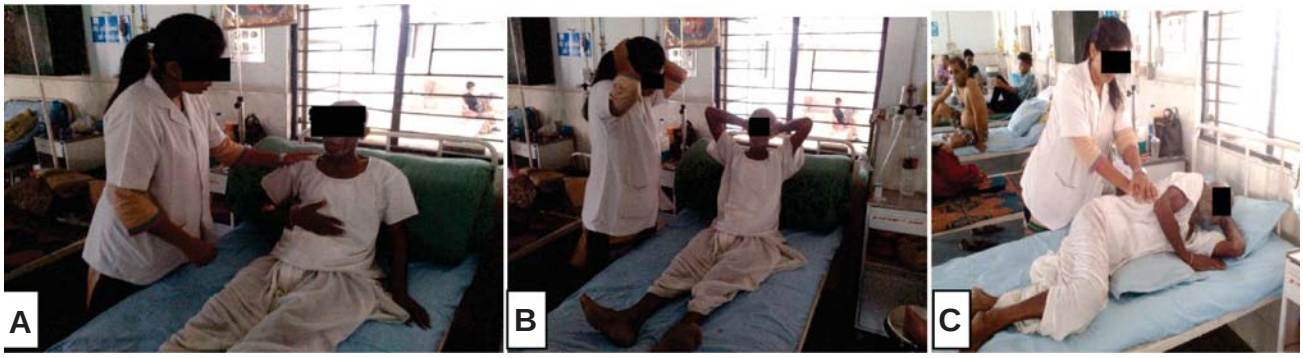

Figure 1. Photograph during pulmonary rehabilitation programme showing (A) diaphragmatic exercise; (B) butterfly posture and (C) postural drainage.

Figure 2. Photograph during pulmonary rehabilitation programme showing (A) upper limb strengthening exercises and (B) lower limb strengthening exercise.

Table 1. Age-wise distribution of patients with COPD

Age (Years)	Number of Patients		Total Number of Patients (%)
	Male	Female	
40-49	7	3	10 (20)
50-59	14	6	20 (40)
60-69	9	4	13 (26)
≥70	3	4	7 (14)
Total	33	17	50 (100)

Thirty of 33 male patients and 7 of 17 female patients were smokers. Of 50 patients, 11 (22%) patients had moderate COPD, 22 (44%) had severe COPD and 17 (34%) had very severe COPD (Table 2). None of the patients had mild COPD. A total of 17 events of acute exacerbation of COPD were recorded during follow-up period — 4 exacerbations in moderate COPD group, 7 in severe COPD, and 5 in the very severe COPD group (Table 3).

Dyspnoea score and HRQoL were improved significantly after pulmonary rehabilitation exercise in patients with COPD in our study, despite a significant reduction in FEV_1 and FEV_1/FVC ratio (Table 4).

Discussion

In the present study, after eight weeks of pulmonary rehabilitation programme, there was a significant improvement in perception of dyspnoea and HRQoL as well as a possible reduction in exacerbations of COPD, i.e. 2 patients with severe and 2 patients with very severe COPD presented with exacerbation only after one year till two years of follow-up, none of the patients with moderate COPD presented with exacerbation after one year to two years of follow-up. The rate of decline of FEV_1 after pulmonary rehabilitation programme was lower than the expected. According to studies done outside India, rate of decline of FEV_1 is high in Global Initiative for Chronic obstructive lung disease (GOLD) stage II and III of COPD patients.[9,10] The reason for reduced exacerbation can be lesser decline in FEV_1 values with pulmonary rehabilitation excercises.

A Cochrane systematic review[11] reported that pulmonary rehabilitation is a highly effective and safe intervention to reduce hospital admissions and mortality and to improve health-related quality-of-life in COPD patients who have recently suffered an exacerbation. Dyspnoea is one of the main symptoms in patients with COPD that limits the day-to-day activities of the patient. According to Cochrane review[12] evidence for unequivocal reduction in dyspnoea following pulmonary rehabilitation programme.

In the same study, quality-of-life according to SGRQ showed an improvement. Supervised exercised training also lead to small but significant effect on physical activity.[13] Pande *et al* found that pulmonary rehabilitation programme appears to be effective in improving exercise endurance, sensation of dyspnoea, and quality-of-life in patients with COPD.[14]

Table 2. Severity of COPD according to spirometric parameters

Severity of COPD	1ST QTR	2ND QTR	3RD QTR	4TH QTR	5TH QTR	6TH QTR	7TH QTR	8TH QTR	Number of Patients (%)
Moderate	2	1	3	2	3	–	–	–	11 (22)
Severe	3	2	1	5	7	–	2	2	22 (44)
Very severe	1	2	1	–	2	2	5	4	17 (34)
Total	6	5	5	7	12	2	7	6	50 (100)

Definition of abbreviations: COPD=Chronic obstructive pulmonary disease; QTR=Quarter

Table 3. Frequency of exacerbations.

Severity of Airflow Obstruction	Number of Patients		
	6 Months	6-12 Months	1-2 Year
Mild	Nil	Nil	Nil
Moderate	3	1	Nil
Severe	4	2	1
Very severe	2	2	1

Table 4. Effect of pulmonary rehabilitation

	Dyspnoea Score	HRQoL	FEV_1	FEV_1/FVC
At 0 Week	4.1±1.0	57.7±11.6	43.0±16.0	0.9±0.1
At 8 Week	3.2±0.9	50.7±10.6	42.8±16.0	0.9±0.1
At 24 Week	2.74±1.0	46.7±10.6	42.0±16.0	0.8±0.1
At 48 Week	2.3±0.9	42.7±10.6	40.8±16.0	0.8±0.1
At 96 Week	1.6±0.6	38.7±10.6	40.3±16.0	0.8±0.1
Paired 't' Test	20.8	76.0	17.1	19.1
p Value	<0.0001	<0.0001	<0.0001	<0.0001

Data presented as mean±SD

Definition of abbreviations: HRQoL=Health-related quality-of-life; FEV_1=Forced expiratory volume in one second; FVC=Forced vital capacity; SD=Standard deviation

Results of the present study showed that pulmonary rehabilitation has a definite role in the management of patients with COPD. Pulmonary rehabilitation exercises results in significant improvement in HRQoL score, dyspnoea perception and reduction in exacerbations, thus improving long-term well-being of the patients suffering from COPD.

Even though present study was conducted with smaller number of patients, a large scale study is required with pulmonary rehabilitation programme as one of the core component in the management of patients with COPD to further strengthen the role of pulmonary rehabilitation programme in these patients.

Conclusions

Pulmonary rehabilitation is an effective method to reduce dyspnoea, improves quality-of-life, reduces long-term exacerbations in patients with COPD. Pulmonary rehabilitation programme may be included in the management of patients with COPD besides the regular therapeutic interventions.

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