Original Research Article

To compare Pulmonary function test at base line (on conventional medical treatment) and after 6 weeks of home based pulmonary rehabilitation program

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Abstract

Background &Method: This study was conducted at GMC, Bhopal with aim to compare Pulmonary function test at base line (on conventional medical treatment) and after 6 weeks of home based pulmonary rehabilitation program. This consisted of inhaled salbutamol (100-200g 04-06 times per day) and inhaled ipratropium bromide 02 inhalations 03-04 times per day. Patients were also advised to take additional inhalations of salbutamol as and when they felt the need. **Result:** The 6 MWD increased from 380.30±22.9 at the first baseline evaluation to 406.92±95.62 at the time of second evolution. These changes were statistically significant. The VAS rating decreased from 30±16.31 at the first baseline evaluation to 20±13.82 at the time of second evaluation. This change was statistically significant. FVCex changed increased from 2.3±0.92 to 2.3±0.9 at the time of the second evaluation after 6 weeks of the exercise training program. This change was not statistically significant. The FVCex % increased from 67.92±12.25 at the first baseline evaluation to 70.41±5.36 at the time of second evaluation after 6 weeks of exercise training program. This change was statistically significant. FEVI increased from 1.890±0.87 to 1.97±0.61 at the time of the second evaluation after 6 weeks of the exercise training program. This change was statistically significant. The FEVI % decreased from 68.04±16.32 at the first baseline evaluation to 70.86± 19.18 at the time of second evaluation. This change was statistically significant. The FEV1/ FVCex decreased from 0.86 ± 0.09to 0.85 ± 0.6 at second evaluation. The change was not significant statistically. **Conclusion:** A six week home based pulmonary rehabilitation program consisting of exercise training and patient education was effective significantly in increasing exercise endurance and reducing the severity of dyspnoea and improving the quality of life in patients with stable COPD and bronchial asthma.

Keywords: Pulmonary function test, medical & rehabilitation.

Study Designed: Cohort Study.

Introduction

The principal goals of pulmonary rehabilitation are to reduce symptoms, decrease disability, increase participation in physical and social activities, and improve the overall quality of life for individuals with chronic respiratory disease[1]. These goals are achieved through several processes, including exercise training, patient and family education, psychosocial and behavioral intervention, and outcome assessment. The rehabilitation intervention is geared toward the unique problems and needs of each patient and is implemented by a multidisciplinary team of health care professionals[2].

Pulmonary rehabilitation reduces symptoms, increases functional ability, and improves quality of life in individuals with chronic respiratory disease, even in the face of irreversible abnormalities of lung architecture. These benefits are possible since often much of the disability and handicap result not only from the respiratory disorder per se, but also from secondary morbidities that are often treatable if recognized. For example, although the degree of airway obstruction or hyperinflation of chronic obstructive pulmonary disease does not change appreciably with pulmonary rehabilitation, reversal of muscle deconditioning and better pacing enable patients to walk farther with less breathlessness[3].

Significant increases in maximal exercise capacity measured during incremental exercise testing have been observed after pulmonary rehabilitation.

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For example, a 1.5 metabolic equivalent increase (33% increase over baseline) in maximal treadmill work rate and a 0.11 L/min increase (9% increase over baseline) in maximal oxygen consumption was demonstrated in a clinical trial at the completion of 8 wk of outpatient pulmonary rehabilitation6. Similarly, an eight watt increase in maximal work rate on cycle ergometry (11% increase over baseline) resulted after 12 wk of home-based pulmonary rehabilitation[4]. In a study comparing outpatient, hospital-based rehabilitation and home-based rehabilitation with a control group receiving standard medical therapy, the outpatient program showed an initial 20% increase in maximal work rate after rehabilitation, but this improvement gradually decreased in the 18-mo follow-up period9. The home-based rehabilitation program, on the other hand, showed a gradual increase in maximal work rate, peaking at 21% above baseline at 18 mo.

Steady-state exercise endurance also improves substantially after pulmonary rehabilitation. In an 8-wk study of inpatient pulmonary rehabilitation followed by 16 wk of outpatient supervision, stationary cycle ergometer endurance time at 60% of the symptom-limited maximal power output increased 4.7 min over that in a control group 4. This represented a 38% increase over the baseline measurement of the treatment group. Even more impressively, the controlled study evaluating outpatient rehabilitation described earlier6 demonstrated a 10.5-min increase in treadmill endurance time in the treatment group, an 85% increase over baseline[5].

Material & Method

The study has greater power than randomized controlled clinical trial for the same number of subject as each subject acts as its own control was conducted at GMC, Bhopal from Feb 2019 to Jan 2020. This study design was therefore chosen because of its efficiency in small sample size.

This consisted of inhaled salbutamol (100-200µg 04-06 times per day) and inhaled ipratropium bromide 02 inhalations 03-04 times per day. Patients were also advised to take additional inhalations of salbutamol as and when they felt the need. Oral theophylline was prescribed for all patients as a long acting preparation administered twice daily. Patients were advised to refrain from smoking. On suspicion of bronchial infection as indicated by increase in severity of cough, increase in the quantity of sputum or increased purulence sputum, a course of broad spectrum antibiotics was prescribed (usually Ciprofiloxacin). All incidental illnesses during the follow up were treated on their own merits.

Inclusion criteria

1. Patients with diagnosed COPD / Bronchial asthma (by history, clinical examination and investigations including PFTs).
2. Patient willing to participate in the study and come for regular follow-up.
3. On regular treatment with conventional therapy at GMC, Bhopal OPD for at least 1 month.

Exclusion criteria

1. Presence of orthopedic or musculoskeletal disorders interfering with exercise training program.
2. Presence of associated cardiopulmonary disease (including cor-pulmonale, myocardial infarction, uncontrolled hypertension).
3. Acute exacerbation of illness.
4. Current smokers who are not willing to quit smoking.

* Pulmonary function test were not included as inclusion or exclusion criteria but were use to define the illness and as a parameters to assess the change from the baseline, as according to ATS guidelines patients with even early stage of COPD other chronic respiratory diseases can be offered pulmonary rehabilitation and symptoms and disability rather than pulmonary function test should be the inclusion criteria for seeking benefits.

Results

Table 1: The Physical and social characteristics of the patients studied have been summarized.

	No of Observations	Minimum	Maximum	Mean	Stander deviation
Age (yrs)	13	17	64	39.46	11.48
Height (mtrs)	13	1.46	1.76	1.62	0.12
Weight (kgs)	13	37	77	56	12.24
BMI (kg/M^2)	13	15.49	26.02	21.19	3.94
Education (yrs)	13	0	15	9	4.39

Table 2: Results of evaluation 1 and 2 in 12 patients studied

Variable	First Evaluation measurement	Second Evaluation measurement
6 MWD (m)	380.30±22.9	406.92±95.62
VAS	30±16.31	20±13.82
FVCex (I)	2.3±0.92	2.3±0.9
FVCex (% predicted)	67.92±12.25	70.41±5.36
FEVI (I)	1.89±0.87	1.97±0.61
FEV 1 (% predicted)	68.04±16.32	70.86±19.18
FEV_1 / FVCex	0.86±0.09	0.85±0.06

6 MWD (m)

The 6 MWD increased from 380.30±22.9 at the first baseline evaluation to 406.92±95.62 at the time of second evolution. These changes were statistically significant.

VAS

The VAS rating decreased from 30±16.31 at the first baseline evaluation to 20±13.82 at the time of second evaluation. This change was statistically significant.

FVCex (I)

FVCex changed increased from 2.3±0.92 to 2.3±0.9 at the time of the second evaluation after 6 weeks of the exercise training program. This change was not statistically significant.

FVCex (% of predicted)

The FVCex % increased from 67.92±12.25 at the first baseline evaluation to 70.41±5.36 at the time of second evaluation after 6 weeks of exercise training program. This change was statistically significant.

FEVI (I)

FEVI increased from 1.890±0.87 to 1.97±0.61 at the time of the second evaluation after 6 weeks of the exercise training program. This change was statistically significant.

FEVI (% of predicted)

The FEVI % decreased from 68.04±16.32 at the first baseline evaluation to 70.86± 19.18 at the time of second evaluation. This change was statistically significant.

FEV1/ FVCex

The FEV1/ FVCex decreased from 0.86 ± 0.09to 0.85 ± 0.6 at second evaluation. The change was not significant statistically.

Discussion

The present study was undertaken with the objective of evaluating home based pulmonary rehabilitation program on respiratory muscle strength, severity of dyspnea, quality of life and PFT in patients with moderately advanced COPD & bronchial asthma[6]. The study was taken up as a pilot project on a small number of patients to ascertain the efficacy, acceptability and feasibility of the program so that it is were found effective, necessary inputs could be provided and the program implemental no a regular basis. In the present study, the training, supervision and counseling was provided by us only.

This is a functional measure of the exercise capacity of an individual. The test is simple to perform and requires no special equipment. Several variants of walking tests have been described (see review of literature), but the 6- minute test has been most useful in subject with moderate to severe disability [7]. The test does give variable results depending upon the degree of patient motivation, and the encouragement from the investigator 95. It may have a learning component as well, so that repeat testing may produce somewhat better results. Moreover, this test is one which to a certain extent reproduces the most important component of the rehabilitation program, namely the exercise training.

The present study showed no significant improvement in 6 minute walking distance after 6 weeks of the exercise training program. This increases amounted to 27 meters in COPD group and 26.6 meters in Bronchial asthma group which compares favorably with the result in which a mean increment of 38 meters was observed [8]. This finding

reflects a genuine effect of exercise training and pulmonary rehabilitation on work capacity of patients with COPD & Bronchial asthma. It is consistent with the results reported in COPD by several other investigators 125. For Bronchial asthma only few data are available so comparison could not be done with previous results. We believe it to be one of the most important findings of this study which affirms the value of a home based unsupervised exercise training program with limited facilities [9].

Conclusion

A six week home based pulmonary rehabilitation program consisting of exercise training and patient education was effective significantly in increasing exercise endurance and reducing the severity of dyspnoea and improving the quality of life in patients with stable COPD and bronchial asthma.

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