Ilkogretim Online - Elementary Education Online, 2020; Vol 19 (Issue 4): pp.3697-3703
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2020.04.764775

Impact of weekly once contact class for pulmonary rehabilitation program for improving the quality of life in chronic respiratory disease patients

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Abstract

Background: Pulmonary Rehabilitation is one of the method we could use to improve their Quality of life and for a better livelihood. But since the possibility of attending the training daily or weekly thrice was not possible by our patients since most of them are from villages at distant places from our hospital, we planned for weekly once session for Rehabilitation therapy and study the impact

Method: Forty two patients of various chronic respiratory diseases under medical treatment were taken for the study. Patients Pulmonary function test and six minute walk test were assessed at the beginning of the study and reassessed at every week on the scheduled day during subsequent visits for eight weeks that is the period of the study. Patients were educated in the first week of the study about breathing exercises, upper limb and lower limb strengthening exercises that can be done at home, dietary advice, and psychiatric councelling along with a questionnaire to detect any depression if present which is expected in chronic illnesses . The note was given to the patient, with the order of the exercises written in their native language and the patients made entry at home after they performed the exercises.

Results: Changes in the degree of dyspnoea according to Bogh scale came to 1-4 compared to 8-10 at the start of the therapy in almost all patients. Though changes in the FEV1 (Forced Exspiratory volume at 1st second) was not statistically significant, but few patients had increase in FEV1.

Conclusion: Weekly once contact sessions with good motivation , education and councelling with dietatory management could make a difference in the quality of life of chronic respiratory disease patients where daily or weekly thrice visits to the hospital/the center for the therapy could not be possible.

Keywords - Chronic respiratory disease, quality of life, oxygen consumption

I. INTRODUCTION

Chronic respiratory disease (CRD) is one of the leading causes of morbidity and mortality in the industrialized and the developing countries. During 1997, COPD, one of the cause for CRD has been estimated to be the number four cause of death after cardiovascular diseases, tumors and cerebrovascular diseases in the world wide. In 2020 COPD will probably become the third leading cause of death all over the world, following the trend of increasing prevalence of lung cancer. The impact of this respiratory disease worldwide is expected to increase with a heavy economic burden on individuals and society [1]. On the other hand CRD is a progressive, disabling pathology that can severely affect a person's quality of life (QOL)

Other CRD like Bronchiectasis, Interstitial lung diseases, Post pulmonary tuberculosis sequalae fibrosis have a high impact on patients' wellbeing, healthcare utilization, and mortality. Pulmonary rehabilitation is an intervention that can combine exercise, education, and behavior modification strategies in an effort to minimize symptoms and improve QOL. Previously, pulmonary rehabilitation has been evaluated using mainly physiologic quantitative measures, such as exercise tolerance, oxygen consumption, and workload

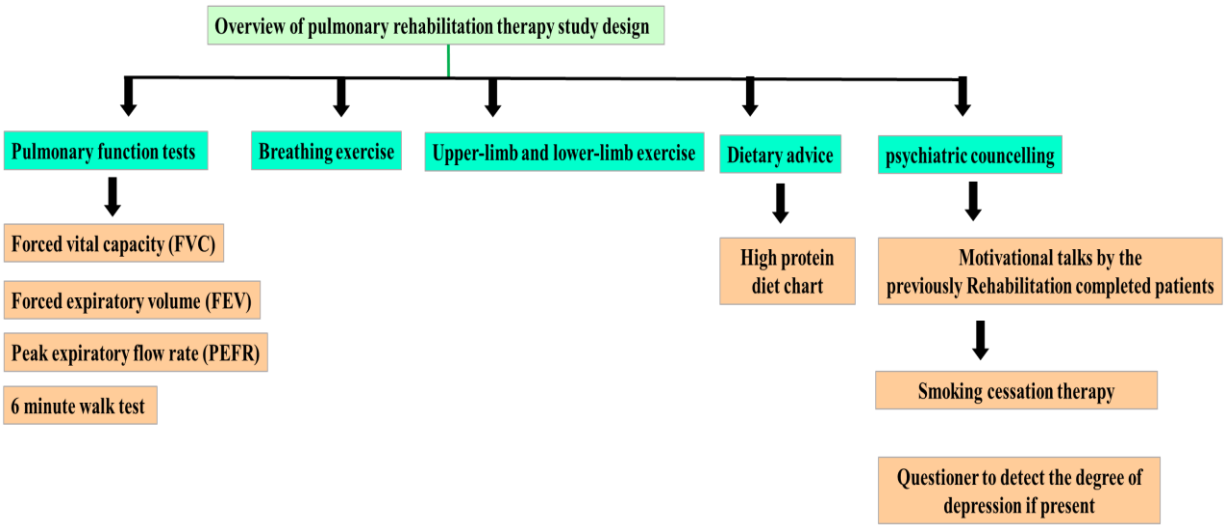
performance [2]. CRD also leads to a reduction in physical activity and psychological problems such as depression, all of which contribute to the patient's disability and poor health-related quality of life. In patients with pulmonary disease, disease severity and prognosis are determined not only by lung function impairment .In patients with mild, moderate, or severe disease, exercise capacity, health-related quality of life, and participation in activities of daily living are often impaired out of proportion to lung function impairment [3].

More recently, PR has been defined as a comprehensive intervention based on a 'thorough' patient assessment followed by patient-tailored therapies designed to improve the physical and psychological condition of patients with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors [4, 5].

Here in this present study, we proposed that self-monitored, home-based re- habilitation would be as effective for improving dyspnea. Our secondary objectives were to compare the effects of home- based rehabilitation on health status [6].

II. MATERIALS AND METHODS

2.1. Overall study design



2.2. Study population and Pulmonary function tests

Forty four patients of various chronic respiratory diseases under medical treatment were taken for the study from August 2019 to December 2019. Our study was reviewed and approved by the institutional ethical committee. Informed consent from all subjects was obtained before they were tested. In general, pulmonary function testing (PFT) is employed to measure lung volumes, bronchial obstruction, gas exchange, lung compliance and ventilatory capacity. Spirometer was performed by one tester using a calibrated Gould Sentry System rolling-seal spirometer while subjects were seated [7].

2.3. Measurement of vital signs

We have collected the vital parameters such as Blood pressure, Pulse rate, Respiratory rate, Oxygen saturation-SPO2 and Body Mass Index that were collected and documented from all the study participants enrolled. Presence of symptoms such as breathlessness, cough, expectoration, chest pain ware evaluated. Systemic hypertension, Coronary heart disease, Dyslipideamia, Diabetes mellitus were considered as comorbid conditions [7].

2.4. Determination of FEVI/ FVC ratio

The parameters such as Forced expiratory volume in one second (FEV1), Forced vital capacity (FVC) and the ratio of the two volumes (FEV1/FVC) has been calculated by spirometry. A FEV1/FVC < 70 % where

FEV1 is reduced more than FVC signifies an obstructive defect either COPD or Bronchial asthma. If completely reversible it is bronchial asthma and if partially reversible it is COPD. The FEV1 can be expressed as a percentage of the predictive value which allows classification of the severity of the impairment. If it is >80 it was designated as Mild followed by 50-79% as moderate, 30-49% as severe and <30 as very severe [8].

2.5. Measurement of PEEF

The peak expiratory flow (PEEF), also called peak expiratory flow rate (PEFR), was measured by using the Clement Clarke mini peak flow meter after doing calibrations and the best of three readings were selected.

2.6. 6 minute walk test

The patient is instructed to walk on a straight track, ideally 100 feet in length. Patients are advised that they can set their own pace and can pause to rest, if needed, but should resume walking as soon as they are able. If the patient does pause to rest, the elapsed timer for the test continues. Obtaining the total distance walked (six-minute walk distance [6mwd]) and the SPO2 & HR measurements are the primary objective of the test [8].

2.7. Upper limb exercise (30 min)

This involved a 10-min warm-up period, 10-min of aerobic activity and 10-min cool-down. The aerobic activity included diagonal arm raises, arm abduction and elevation and reverse, and arm abduction, forward flexion, and reverse; and straight arm rises.

2.8. Lower limb exercise (30 min)

This involved a 10-min warm up, 10-min of cycling on an ergometric bicycle and 10-min cool down.

2.9. Combined upper and lower limbs exercise

This involved UL and LL exercise training on alternate days using the same protocols. The participants were encouraged to exercise at intensities that allowed them to exercise for at least 10 minutes at a modified Borg Scale rating of 3 (moderate level of breathlessness) to 4 (somewhat hard breathing) [8].

2.10. Diet recommendation for the individuals

Diet with 15 to 35 % of the protein was recommended. The food such as, sprouts, beans, peas, corn, ground nut, non-fat meat, sea foods, milk was recommended with the total calories of 2200 -2500 kcl/Day.

2.11. Dyspnoea grading

Patients were asked about their perceived breathlessness and were then classified into MRC dyspnoea grades 0, 1, 2, 3, 4, or 5 according to how they perceived their disability. The MRC dyspnoea scale is a questionnaire that consists of five statements about perceived breathlessness. Patients selected the grade that applied to them [9].

2.12. Statistical methods

Categorical data were presented as numbers (percentage) while continuous variables were presented as mean (± standard deviation). One way ANOVA and X^2 were used to compare continuous and categorical variables among groups respectively. Paired *t*-test was used within each group to assess whether a significant change from baseline had occurred. A *p* value <0.05 was considered significant. Data were analyzed with the Statistical Package for Social Sciences (SPSS, Chicago, IL).

III. RESULTS

Out of 42 patients enrolled, 3 patients got admitted in the hospital because of secondary infection and exacerbations. During that time of hospital admissions, rehabilitation was stopped for them and resumed after discharge. Two patients lost follow up. All the patients were given a call the day before the contact day session and reminded of the session. To make them more involved in the programme, small library with the stories in native language and newspapers was setup so that they can read when they take rest. Also a small healthy snack with beverages given to refresh them in between when they feel tired since many of

the patients were travelling for two to three hours to reach our Centre for the programme. Also prizes were given to those who enrolled first and completed making it as a motivation to other patients (Figure 1).

Demographic characteristics of the subjects and the results of spirometry testing were taken. Forty-two subjects underwent spirometric testing. None of the subjects were severely obese (150% or greater of their IBW), but 12 subjects were mildly obese, weighing 120% or more of their IBW. Each participant underwent spirometry testing during each testing session using a Microplus handheld spirometer according to American Thoracic Society guidelines. Forced expiratory volume in 1 second and forced vital capacity (FVC) were measured. According to American Thoracic Society guidelines, each participant must perform a minimum of 3 FEV1 maneuvers within 5% of each other in order to meet reliability guidelines. The reliability and validity of measurements obtained with handheld spirometry have also been assessed, and we believed them to be sufficient for this study.

Both the pretreatment and the post experimental results were comparable in respect of age and sex, as well as their baseline forced expiratory volume (FEV and forced vital capacity (FVC). In pretreatment condition, the mean (±SD) FEV 1 was 42.27 while in the post experimental results was 47.0276. The mean FEV1 /FVC ratio were 84.97 and 82.50 in the pretreatment and post treatment respectively.

Table 1

Baseline data for demographic variables and vitals

Parameter	Observed values
Male (%)	**72.72 % (n=32)**
Female (%)	**27.2% (n=12)**
BMI	**27.14**
SPO2	**94.13**

Table – 2 chronic respiratory diseases distribution

CRD	No. of. Patients
COPD	27
Bronchiectasis	5
Interstitial Lung Disease	3
Post pulmonary tuberculosis sequalae fibrosis	7

3.1. Quality of life and psychiatric councelling

QoL was assessed with a disease-specific questionnaire, such as the Chronic Respiratory Disease Questionnaire (CRQ). The "effect size" for each of the rehabilitation domains assessed in the questionnaire was calculated. This was achieved by dividing the difference between the pretreatment and post treatment values by the interquartile range of the pre-treatment value. The effect size is of value in demonstrating the importance of a treatment effect within a study. The "physical functioning" and improved significantly after walk tests, upper-limb and lower-limb training. . In addition, psychological support can facilitate the adjustment process by encouraging adaptive thoughts and behavior – coping strategies that help patients to reduce their negative emotions, which in turn, may improve compliance with PR. Psychological support helps in overcoming addictions, especially tobacco smoking and, along with medical treatment for smoking cessation, is an important intervention in PR programs.

Table -3

Various indices before and after rehabilitation program

Characteristics	Pre-examination	Post-examination	p Value
Mean FEV1	42.27	47.027	0.6
Mean FCV	53.80	55.7	0.1
FEV1/FCV	84.97	82.5	0.5
PEET	27.16	29.03	0.3
FEV-25 %	29.67	32.33	0.5
6 min walk test			**0.7**
SPO_2	95.48	96.80	0.8
HR	93.32	98.71	0.4
Dyspnea	8-10	1-4	0.7

3.2. Outcome of 6 minutes' walk test

The mean SPO2 level on 6MWT at entry to PR was 95.48. Following PR, the mean SPO2 with 6MWT was 99.90. As compared to non-responders, responders were significantly younger with a worse respiratory function. Logistic regression analysis showed that, in all patients, the significant change in 6MWT was significantly associated with FEV1 values.

3.3. Impact of Baseline Dyspnea on Outcomes

Compared with standard care, pulmonary rehabilitation reduces anxiety and dyspnea in patients with CRD. The results proved the fact that pulmonary rehabilitation generally confers the greatest improvements in dyspnea than other available therapies, like bronchodilators either oral or inhaler forms along with inhalational steroids or both. Changes in the degree of dyspnoea according to Bogh scale came to 1-4 compared to 8-10 at the start of the therapy in almost all patients.

Figure 1 – Programme conducted in hospital A.Ball throwing exercises B. Graded weight lifting exercises C. Physiotherapist doing trunk strengthening exercises D. Upper limb strengthening exercises by bicycling E. Lower limb strengthening exercises by staircase climbing

IV. Discussion

The purpose of this paper has been to analyze the outcomes used in studies on pulmonary rehabilitation in CRD patients, besides the efficacy of these treatments in improving the quality of life and the ability in carrying out daily life activities [10]. Patients with CRD are typically less active in daily life than are healthy older adults. In addition, inactivity is associated with poor functional status and higher risk of hospital admissions and mortality. It appears obvious that CRD patients would be more physically and socially active after PR. However, there is currently no strong evidence that patients translate the benefits obtained from PR into a more active lifestyle in real life [11]. The study assumed as a primary outcome for the evaluation of the pulmonary rehabilitation programs during the six-minute walking test and the peripheral muscle strength, with attention paid to the impact on the quality of life [12]. From our study it's clear that the PR has certainly been demonstrated to provide beneficial effects on dyspnea, improvement in muscle strength and endurance, improvement of psychological status, reduction of hospital admissions, and improvement of QoL in CRD patients, with a gradual increase in daily physical activity and autonomy [13]. Home-based interventions are a cheaper, more cost-effective method of care than traditional hospital treatment and enable patients to remain in their own environments, close to the family, where exercise training specific to their daily activities can be applied [14]. It must be noted, however, that home-based interventions are principally focused on respiratory muscle training, whereas pulmonary rehabilitation performed in the hospital tackles additional aspects, such as quality of life, breathlessness sensation, psychological profile, and effectiveness of therapeutic interventions [15, 16].

Conflict of interest

Authors do not have conflict of interest

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