



## TO STUDY THE IMPACT OF MODIFIED PULMONARY REHABILITATION PROGRAMME ON IMPROVEMENT OF MORBIDITIES IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) PATIENTS

### Respiratory Medicine

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### ABSTRACT

**Background :** Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality throughout the world. It is characterized by slow emptying of the lung during forced expiration and measured by FEV1/FVC ratio. **Objectives:** To assess the difference in the patient's level of symptoms (MMRC Grading), psychological assessment (PHQ9), objective parameters (6 Minute Walk Test, Spirometry) after giving modified pulmonary rehabilitation. **Material and Methods:** An analytical study was carried out on 150 participants attending our hospital who were enrolled after their informed and written consent. Demographic data, history, physical examination, and psychological assessment were conducted of all the patients. The total duration of the study is of 18 months. Out of that one patient is followed for 12 weeks during which during the first 6 weeks of the study patients were given pharmacotherapy as per Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines and for the next 6 weeks patients were given pharmacotherapy with pulmonary rehabilitation. **Results:** Out of 150 patients, the majority of the patients presented with MMRC grade 2 or 3 at the initiation of study and at the end of the study, their grades were improved. The value of spirometry testing, 6 Minute walk test, and the PHQ9 (Psychological assessment) score was also improved at the end of the study as compared to the initiation of the study. **Conclusion:** Pulmonary rehabilitation plays a sentinel role in management of COPD and it increases the survival of COPD patients.

### KEYWORDS

Modified Pulmonary Rehabilitation Programme Morbidities Chronic obstructive pulmonary disease (COPD)

#### INTRODUCTION:

COPD is the most common chronic pulmonary disorder affecting 10-15% of adults all over the world.<sup>1</sup> It is one of the biggest cause of unnatural death in the rural and urban areas of India and its prevalence continues to increase. Cigarette smoking is the most significant factor in the development of COPD. Passive smoking, domestic exposure to pollution, and cooking fuels in the form of cow dung and wood in rural communities are also important factors.

The prevalence of Chronic Obstructive Pulmonary Disease (COPD) is constantly increasing<sup>2</sup> while its incidence is growing in old age<sup>3</sup>. COPD is also a leading cause of morbidity worldwide, particularly in developing countries. Whereas COPD is an obstructive and progressive airway disease, it is also associated with a significant reduction in physical activity, and psychological problems, all of which contribute to the patient's disability and poor health-related quality of life (HRQoL).<sup>4</sup> Recently emphasis has been placed on questionnaires designed to assess health status and prognosis in COPD.<sup>5</sup>

For a long time, the treatment of COPD has focused mainly on the pharmacological improvement of airway obstruction. However, over the last two decades, growing evidence of systemic manifestations in COPD patients and their negative effects on the functioning of these patients has accelerated the development and use of non-pharmacological treatments, such as pulmonary rehabilitation (PR). PR and pharmacological therapy are not competitive but rather, must work closely together, if they are to result in a more successful outcome.

The benefit of PR in patients with COPD in improving exercise capacity and Health-related quality of life (HRQoL), and in reducing breathlessness and health care utilization (particularly bed days) has been widely established by randomized studies, summarized in reviews, and by meta-analyses.<sup>6-8</sup> PR is now recommended in several influential guidelines.<sup>9</sup> Unfortunately the practical use of rehabilitation in COPD is virtually nonexistent or under-resourced in most countries. Misunderstanding of the usefulness of a PR program, in addition to the high cost, has hindered the widespread distribution of comprehensive PR centers. Pulmonary rehabilitation is holistic therapy provided to patients with a respiratory disease that aims to address both physical and psychological problems associated with it. Optimizing ventilator

function can decrease the work of breathing and severity of breathlessness and improve the ability to perform work. Breathing pattern training with visual feedback has been shown to increase FEV1 and FVC in patients with COPD. A reduction in the number of hospitalization or hospital stay is also reported.

#### Methodology:

##### Study design:

This study was analytical, performed in the department of Respiratory Medicine at tertiary care hospital over a period of 18 months. A COPD patient with an MRC score of 3, 4, or 5, an MRC score of 1 or 2 with a related hospital admission in the last 12 months, or an exacerbation requiring treatment with steroids and Sufficient functional mobility to participate in the exercise regime (particularly walking) were included in the study. And the patients having unstable angina, recent MI, impaired cognitive function, etc, were excluded from the study. The study was approved by the institutional ethics committee.

#### Data Collection:

COPD patients fulfilling inclusion criteria were selected after taking their informed consent in their local language. Demographic data, history, physical examination, and psychological assessment were conducted of all the patients. For the first 6 weeks of the study, patients were given pharmacotherapy as per Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, and for the next 6 weeks, patients were given pharmacotherapy with pulmonary rehabilitation. Various parameters like MMRC score, Spirometry, and 6 Minute walk test, Psychological assessment (PHQ9) were conducted at the initiation of pharmacotherapy (At the beginning of the study), at the initiation of pulmonary rehabilitation with pharmacotherapy (After completion of 6 weeks), and end of the study (at 12 weeks) in structured individualized sheet. During the second half (After 6 weeks), there was one visit every week where patients were asked to get a chest physician consultation, physiotherapy consultation for supervised physiotherapy, psychiatric assessment as per patient's condition, dietary counseling, and telephonic interview were done. Patients were given a home-based chart to monitor and record compliance with pharmacotherapy and physiotherapy. Details of all patients were recorded in individual patient cards and were maintained. At end of the study difference in patients' level of symptoms (MMRC), psychological assessment (PHQ9), and objective parameters (6MWT, Spirometry) between two phases of the

study were measured.

### RESULT:

A total of 150 participants attending the hospital were enrolled after their informed and written consent. The majority of the patients were males (86.66%) and the remaining were females (13.33%). The majority of patients are within the age group of 68-72 years. Out of 130 male patients, 118 patients were smokers and out of 20 female patients, 2 were smokers. Out of 150 patients, 47 patients had a history of biomass exposure. My study also suggests that patients having a longer duration of smoking exposure have fewer chances of improvement. In my study, 26 patients were industrial workers followed by 21 were security workers followed by 19 were farmers. Out of 150 patients, 99 patients have a history of hospitalization in the last year.

Out of 150 patients 10 (6.66%) patients were belongs to GOLD 2, 139 (92.66%) patients were belongs to GOLD 3, 1(0.60%) patient belong to GOLD 4 classification.

### GOLD Classification in COPD

|                    |                            |
|--------------------|----------------------------|
| GOLD 1 MILD        | FEV1 ≥ 80% predicted       |
| GOLD 2 MODERATE    | 50% ≤ FEV1 < 80% predicted |
| GOLD 1 SEVERE      | 30% ≤ FEV1 < 50% predicted |
| GOLD 1 VERY SEVERE | FEV1 < 30% predicted       |

**Table no.1 Distribution of patient according to MMRC grade (at the 12<sup>th</sup> week of study)**

| DISTRIBUTION OF PATIENT ACCORDING TO MMRC GRADE |        |      |                    |
|-------------------------------------------------|--------|------|--------------------|
| AT THE 12TH WEEK OF STUDY                       |        |      |                    |
| MMRC GRADE                                      | FEMALE | MALE | NUMBER OF PATIENTS |
| GRADE -0                                        | 0      | 0    | 0                  |
| GRADE -1                                        | 7      | 15   | 22                 |
| GRADE-2                                         | 13     | 115  | 128                |
| GRADE -3                                        | 0      | 0    | 0                  |
| GRADE-4                                         | 0      | 0    | 0                  |
| TOTAL                                           | 20     | 130  | 150                |

Table No. 1 shows that, At the initiation of the study, Out of 150 patients, 99 patients were present with MMRC GRADE 2, and 51 patients were present with MMRC GRADE 3. After 6 weeks of study (after giving Pharmacotherapy) all 150 patients were present with MMRC GRADE 2.

**Table no. 2 Distribution of the patients according to the mean value of FVC, FEV1, and FVC/FEV1 at the initiation of the study(FVC1, FEV1, FVC/FEV1), After 6 weeks of study(FVC2, FEV2, FVC/FEV2) and after 12 weeks of study(FVC3, FEV3, FVC/FEV3)**

| MEAN VALUE AND SD(STANDARD DEVIATION) OF FVC, FEV1, FVC/FEV1                        |           |       |      |     |
|-------------------------------------------------------------------------------------|-----------|-------|------|-----|
|                                                                                     | Parameter | MEAN  | SD   | N   |
| At Initiation of Study                                                              | FVC1      | 46.76 | 5.82 | 150 |
|                                                                                     | FEV1      | 39.32 | 8    | 150 |
|                                                                                     | FEV1/FVC1 | 57.67 | 6.33 | 150 |
| After 6 weeks of Study (After giving Pharmacotherapy)                               | FVC2      | 68.41 | 9.24 | 150 |
|                                                                                     | FEV2      | 41.05 | 8.04 | 150 |
|                                                                                     | FEV1/FVC2 | 59.66 | 5.76 | 150 |
| After 12 weeks of Study (After giving Pharmacotherapy and Pulmonary rehabilitation) | FVC3      | 77.36 | 6.66 | 150 |
|                                                                                     | FEV3      | 51.33 | 6.89 | 150 |
|                                                                                     | FEV1/FVC3 | 59.48 | 7.94 | 150 |

Table no. 2 shows that there is significant improvement in FVC, FEV1 and FEV1/FVC is observed after giving pharmacotherapy alone and after giving pharmacotherapy and pulmonary rehabilitation both.

**Table no. 3 Distribution of patients according to the mean value and SD of 6MWT(6 Minute Walk Test) at initiation of study(6MWT1), After 6 week of study(6MWT2) and at 12 week of study(6MWT3)**

| MEAN VALUE AND SD(STANDARD DEVIATION) OF 6MWT |        |        |     |
|-----------------------------------------------|--------|--------|-----|
| PARAMETER                                     | MEAN   | SD     | N   |
| 6MWT1                                         | 374.02 | 62.78  | 150 |
| 6MWT2                                         | 432.27 | 78.99  | 150 |
| 6MWT2                                         | 466.24 | 117.63 | 150 |

Table no. 3 shows that there is significant improvement in 6MWT is observed after giving pharmacotherapy alone and after giving pharmacotherapy and pulmonary rehabilitation both.

### Psychological assessment (PHQ9) SCORE

In this study total of 150 patients were selected, there is a significant improvement in PHQ9 Scoring was observed after giving pharmacotherapy alone and after giving both pharmacotherapy and pulmonary rehabilitation. PHQ9 scoring use to assess psychological status and depression. Scoring ≥ 5 indicates a significant depressive condition.

In my study, 115 patients are screened negative for depression having a PHQ9 score < 5. 35 patients screened positive having a score ≥ 5.

### DISCUSSION:

COPD is the most common chronic pulmonary disorder affecting 10-15% of adults all over the world. It is one of the biggest cause of unnatural death in the rural and urban areas of India and its prevalence continues to increase. Pulmonary Rehabilitation embodies a very important and safe therapeutic option that aims to reverse the systemic manifestations of COPD and which, along with pharmacological therapy, can be used to obtain optimal patient management, leading to a favorable change in the daily life of our COPD patients. With the increasing burden of COPD patients in the world, there is an urgent need for advocacy with the concerned authorities, for a more widespread reimbursement of PR(Pulmonary Rehabilitation) programs worldwide.<sup>10</sup> In our study out of 150 patients, the majority of the patients were males (86.66%) and the remaining were females (13.33%). The majority of patients are within the age group of 68-72 years. Out of 130 male patients, 118 patients were a smoker and out of 20 female patients, 2 were smokers. Out of 150 patients, 47 patients had a history of biomass exposure. My study also suggests that the patients having a longer duration of smoking exposure have fewer chances of improving. In my study, 26 patients were industrial workers followed by 21 were security workers followed by 19 were farmers. One of the largest studies on pulmonary rehabilitation by Ries include 119 patients. 8 weeks of Pulmonary rehabilitation consisted of twelve 4-hour sessions that included education, physical and respiratory care instruction, psychosocial support, and supervised exercise training. Monthly reinforcement sessions were held for 1 year. The education group attended four 2 hour sessions that included videotapes, lectures, and discussions but not individual instruction or exercise training. It shows improvement in Pulmonary function, maximum exercise tolerance and endurance, gas exchange, shortness of breath, self-efficacy for walking, depression, general quality of well-being, and hospitalizations as compared to patients who received education alone.<sup>11</sup> Bendstrup in a control 12-week study of outpatient pulmonary rehabilitation which includes physical training, occupational therapy, education, and smoking cessation therapy shows the 6-min walk distance increased by 80 meters at 6 weeks (halfway in the program), 113 meters at the end of the program, and 96 meters at 12 weeks after the program ended. These changes were all significantly greater than those of the control group.<sup>12</sup> One low cost study from Kolkata which includes 32 patients which includes 6 months of pulmonary rehabilitation in form of education, psychosocial intervention, and exercise training show Dyspnea indices showed a significant reduction of over 64% in the study group. The mean 6-MWD showed an average increase of 78.41 meters, which is correlated with our study.<sup>13</sup>

### CONCLUSION:

Pulmonary rehabilitation plays a sentinel role in the comprehensive management of COPD. It must become cost-effective. It improves survival in COPD patients regardless of age, sex, and the severity of the disease. We must recognize, acknowledge and eliminate barriers to patients participating and fully realizing the clinical benefits of PR(Pulmonary Rehabilitation) in COPD.

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