

## **Impact of Demographic Factors on COPD Severity and Response to Pulmonary Rehabilitation**

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**Abstract-**This study investigates the influence of demographic factors such as smoking index and disease duration on COPD severity and the effectiveness of pulmonary rehabilitation. Conducted as a prospective observational study at JLN Medical College, Ajmer, it included 30 COPD patients assessed over two months. Statistical analyses revealed significant variations in post-bronchodilator FEV1 ( $p=0.04$ ) and 6MWT ( $p=0.004$ ) across different smoking index groups. Disease duration also influenced Borg dyspnoea scale scores ( $p=0.001$ ). The findings suggest that demographic factors play a crucial role in COPD progression and response to rehabilitation.

### **I. Introduction**

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality globally characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious

particles or gases. In 1990, the World Health Organization (WHO) Global burden of disease study showed that the COPD was the 6th leading cause of death worldwide. At present COPD ranks fourth leading cause of mortality.<sup>1</sup>

Pulmonary rehabilitation (PR) is defined as a multidisciplinary programme of care for patients with chronic respiratory impairment that is individually tailored and designed to optimize each patient's physical and social performance and autonomy.<sup>2</sup> It has emerged as an effective intervention integrating exercise training, education, and behavioural changes to enhance patient's quality of life. COPD progression and severity vary based on demographic factors such as smoking history, socioeconomic status, and disease duration. Understanding these variations can help optimize treatment strategies and rehabilitation programs. This study explores the relationship between demographic factors and COPD severity

and assesses their influence on pulmonary rehabilitation outcomes.

## **II. Aim & Objectives**

1. Analyze the impact of smoking index and disease duration on COPD severity
2. Evaluate demographic variations in response to pulmonary rehabilitation.
3. Correlate socioeconomic factors with COPD progression and functional impairment.

## **III. Materials and Methods**

The prospective observational study was conducted at Department of Respiratory medicine, JLN Medical College Ajmer (Rajasthan) with 30 patients categorized based on smoking index and disease duration during August 2016- October 2017. Before initiating the study, we got permission from ethical committee of the institution to carry out the study. Patients suffering from COPD (FEV1/FVC less than 70% of actual measured values and the FEV1 less than 80% of predicted value) of age group 35 years or more living in or near to Ajmer and willing to quit smoking were included in this study while patients who have/had Tuberculosis and/or AIDS, Cardiac and other systemic diseases, Neuromuscular disorders, Any chest or physical deformity along with COPD or not willing to quit smoking

were excluded from this study. The assessment includes Pre- and post-rehabilitation evaluation (before starting the exercise program i.e. at 0 month, at the end of one month and at the end of two months )of post bronchodilator FEV1, Respiratory rate, Borg dyspnoea scale, 6MWT and demographic data analysis.

## **IV. Observations and Results**

### **A. Comparison of groups according to duration of illness**

In our study patients were divided into three groups according to duration of illness 0-10 years, 10-20 years and 20-30 years. Duration of illness was compared with effect of 2 months of Pulmonary Rehabilitation in Borg dyspnoea scale, post bronchodilator FEV1 and 6 minute walk distance over the period of 2 months. Statistically significant improvement in Borg dyspnoea scale was seen in all the three groups by 2 months of pulmonary rehabilitation i.e. in group of duration of illness 1-10 years ( p value= 0.001), 10-20 years ( p value= 0.001) and 20-30 years ( p value= 0.02). This observation indicates that by pulmonary rehabilitation improvement in Borg dyspnoea scale occurs irrespective of duration of illness. In group of duration of illness < 10 years maximum improvement in Borg dyspnoea scale occurs with minimum 1 month of pulmonary rehabilitation while in groups

of duration of illness 10-20 years and 20-30 years, improvement in Borg dyspnoea scale occurs with minimum 2 month of pulmonary rehabilitation.

Statistically significant improvement in post bronchodilator FEV1 was seen only in the group with duration of illness 20-30 years by 2 months of pulmonary rehabilitation (p value= 0.01). This observation indicates that benefit of pulmonary rehabilitation on post bronchodilator FEV1 is seen with duration of illness >20 years.

There was no statistically significant improvement in the 6 minute walk test i.e. mean distance covered in 6 minutes and SPO<sub>2</sub> at end of 2 months in each group. This observation indicates that there is no significant correlation in improvement of mean distance covered in 6 minutes and SPO<sub>2</sub> by 2months of pulmonary rehabilitation with different group of duration of illness.

### **B. Comparison of groups according to Smoking Index**

In our study patients were divided into three groups according to smoking index <100, 100-300 and >300. Smoking index was compared with effect of 2 months of Pulmonary Rehabilitation in Borg dyspnoea scale, post bronchodilator FEV1 and 6 minute walk distance over the period of 2 months.

Statistically significant improvement in Borg dyspnoea scale was seen in all the three groups by 2 months of pulmonary rehabilitation i.e.in group of smoking index <100 (p value= 0.001), 100-300 (p value= 0.001) and >300 (p value= 0.001). This observation indicates that by pulmonary rehabilitation improvement in Borg dyspnoea scale occurs irrespective of smoking index.

In group of duration of smoking index <100 statistically significant improvement in Borg dyspnoea scale at the end of 1 month as compared to 0 month (p value= 0.006), at the end of 2<sup>nd</sup> month as compared to 1 month (p value= 0.01) and at the end of 2<sup>nd</sup> month as compared to 0 month (p value= 0.001). This observation indicates that improvement in Borg dyspnoea scale in group of duration of smoking index <100 occurs with minimum 1 month of pulmonary rehabilitation.

In group of duration of smoking index 100-300 improvement in Borg dyspnoea scale was statistically significant at the end of 1 month as compared to 0 month (p value= 0.01), at the end of 2<sup>nd</sup> month as compared to 1 month (p value= 0.04) and at the end of 2<sup>nd</sup> month as compared to 0 month (p value= 0.001). This observation indicates that improvement in Borg dyspnoea scale in group of duration of smoking index 100-300 occurs with minimum 1 month of pulmonary

rehabilitation.

In group of duration of smoking index >300 improvement in Borg dyspnoea scale was statistically significant at the end of 1 month as compared to 0 month (p value= 0.002), at the end of 2<sup>nd</sup> month as compared to 1 month (p value= 0.007) and at the end of 2<sup>nd</sup> month as compared to 0 month (p value= 0.001). This observation indicates that improvement in Borg dyspnoea scale in group of duration of smoking index >300 occurs with minimum 1 month of pulmonary rehabilitation.

Statistically significant improvement in post bronchodilator FEV1 was seen only in the group of smoking index 100-300 (p value=0.04) by 2 months of pulmonary rehabilitation. This observation indicates that by pulmonary rehabilitation improvement in post bronchodilator FEV1 occurs with smoking index between 100-300. In group of duration of smoking index 100-300 improvement in post bronchodilator FEV1 was statistically significant at the end of 2<sup>nd</sup> month as compared to 0 month (p value= 0.03) but improvement was statistically insignificant at the end of 2<sup>nd</sup> month as compared to 1 month (p value= 0.549) and at the end of 1 month as compared to 0 month (p value= 0.607). This observation indicates that improvement in post bronchodilator FEV1 occurs with minimum of 2 months of pulmonary rehabilitation.

Statistically significant improvement in mean distance covered in 6 minutes was seen only in the group of smoking index <100 (p value=0.004) by 2 months of pulmonary rehabilitation. This observation indicates that by pulmonary rehabilitation, improvement in mean distance covered in 6 minutes with smoking index <100.

In group of duration of smoking index <100 improvement was statistically significant in mean distance covered in 6 minutes at the end of 2<sup>nd</sup> month as compared to 0 month (p value= 0.004) whereas improvement was statistically insignificant at the end of 2<sup>nd</sup> month as compared to 1 month (p value= 0.101) and at the end of 1 month as compared to 0 month (p value= 0.194). This observation indicates that improvement in mean distance covered in 6 minutes occurs with minimum of 2 months of pulmonary rehabilitation. There was no statistically significant improvement in the SPO<sub>2</sub> at end of 2 months in each group i.e. in group of smoking index <100, 100-300 and >300.

## V. Summary

This study was conducted at JLN Medical college Ajmer on 30 COPD patients with the approval of institutional ethics committee. In this study it was observed that demographic factors, particularly smoking history and disease duration,

significantly influence COPD severity and rehabilitation outcomes. No significant correlation was observed between socioeconomic status and COPD severity. Tailored rehabilitation programs considering these factors may enhance treatment efficacy.

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