

# PEFR in Categorizing the Recovery Pattern in COPD

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**Abstract-** Improvement in Peak Expiratory Flow Rate (PEFR) in 35 Patients with acute severe bronchospasm was studied to evaluate the rate of recovery from the episodic attack. Two groups of COPD were identified. One group with quick and complete recovery from the episodic attack of bronchospasm who were described as “Accelerated Responders” and in the other group the recovery was slow and incomplete and were referred to as “slow Responders”. The way how PEFR values establish a pattern in obstructive disease help us not only to identify the patients into groups but also to discriminate them for diagnosis & treatment of chronic obstruction for patients who are particularly at risk are discussed over here.

**Index Terms-** PEFR IN COPD, ACCLARATED RESPONDERS, SLOW RESPONDERS

## I. INTRODUCTION

Measurement of PEFR has been used for a number of years in evaluation of obstructive ventilator defects. The Wright Peak Flow Meter<sup>(1)</sup> a device for measuring peak expiratory flow rate was introduced in 1959<sup>(1,2)</sup> for assessing ventilator capacity particularly in obstructive airway diseases. Peak Flow Meter was widely used<sup>(3,4)</sup> because of its easy management<sup>(5,6)</sup>, accuracy and reproducibility<sup>(6,7,8)</sup>. A number of studies<sup>(9,10)</sup> have already shown the usefulness of this method of peak expiratory flow rate measurement for rapid determination of pulmonary reserve for pre-operative assessment of pulmonary function and in evaluating change in patient's degree of pulmonary disability<sup>(11,12,13)</sup>.

Although Peak flow measurements seem fairly well established, there have not been many studies for evaluating the pattern of results of COPD for categorization and treatment. Recording of PEFR 4 times a day (8am, 12 noon, 2pm, 6pm) in patients with acute severe spasmodic attack help us to predict confidently which patients will recover rapidly and which will not.

From PEFR reading these patients may be divided into two groups. One group of patients with complete recovery from the attack (demonstrated by quick improvement in PEFR from initial reading) were referred to as “Accelerated responders” to drugs.

Group of patients whose recovery was slow and incomplete with no significant improvement in PEFR was referred to as “Slow Responders”. There were significant difference between the two groups in duration of Hospital admission and treatment. The value of recording the simple measurement of PEFR using a handy simple instrument, yielding

so many valuable information for treatment and evaluation are discussed over here.

## II. MATERIALS AND METHODS

The present study comprised 35 diagnosed COPD patients (26 males & 9 females) who were selected from out patients of chest and allergy- asthma clinics of General Hospital. The patients were diagnosed on the basis of History, Clinical assessment followed by Radiologic examinations. They had complaints of frequent episodic illness Bronchospasm before and during the course of study. PEFR was measured for all patients using Wright Peak Flow Meter.

Measurements were taken with the subject sitting upright and the highest value from three peak expiratory flow rate maneuvers was recorded. Care was taken to ensure that the instrument was kept horizontal and none of the venting slots were obscured. Peak flow rate was measured four times a day 8am, 12 noon, 2pm, 6pm in a standard fashion for all patients. Recovery from the attack was assessed by improvement in Peak Flow Rate.

Most of the patients included in the present study received oral or intravenous steroids. In high doses and inhaled intravenous Bronchodilators in a standard fashion. Some of them who were considered to be not so ill received oral steroid therapy and inhaled Bronchodilators only. When acute phase has passed, parenteral treatment was slowly discontinued and then withdrawn at varying intervals for each patient.

## III. RESULTS AND OBSERVATION

Recovery was examined in terms of increase of Peak Expiratory Flow Rate from the time of admission. It became apparent that 2 distinct pattern of recovery could be established.

Group-1. (Accelerated Responders). Among the total number of 35 patients selected for study, 20 patients belonged to this group. 4 out of 20 achieved 50% of predicted PEFR within 30 hours and 9 out of 20 within 48 hrs. The rest of 7 patients out of 20 showed improvement in PEFR in 72 hours.

The mean duration of treatment was for one week (ie 4-11 days). 25% of them were successfully treated without recourse to intravenous steroids or bronchodilators. The diurnal variation of PEFR measurement associating with the morning exacerbation of symptoms (ie fall in PEFR reading at 8am. (Morning Dip) was a prominent feature in Group 1. There was Morning Dip or Morning and Evening Dip (ie fall in PEFR reading at 12 noon and 6 pm in this Group). Diurnal fluctuation in PEFR reading was statistically significant in Accelerated Responders unlike the other group. The mean difference in PEFR reading between

8am and 2pm is greater than 9% which is statistically significant ( $p < .05$ ).

The rate of recovery correlated well with the difference of improvement in PEFR in consecutive readings in a day ( $r = 0.75$ ). These patients were successfully treated with oral steroids and inhaled bronchodilators. PEFR at the time of discharge is almost at the level of predicted value or slightly more. Most of the patients in this group are youngsters, suffering from atopic asthma revealed from personnel history and multiple skin tests (table 1 and Group 11)

Group 11 (Slow Responders) The rest of 15 patients among 35 were segregated to this category. They Required a long period of treatment of 21 days Mean PEFR was only 60.4% of the predicted value at the time of discharge. Moreover patients in the slow recovery group had significantly lower PEFR ( $< 60$ lit/mint). The diurnal variation in measurement of PEFR is only 1-3% between 4 consecutive readings in first 3-4 days which is not significant and the measurement became statistically significant only after minimum of one full week of treatment and there was a statistically significant difference in PEFR values between 1 and 11 Group at the time of discharge from Hospital ( $p < 0.01$ ). Patients in the Second Group were older, more ill, with either chronic smokers, or possibly associated with chronic bronchitis and some of them even with fungal infections (table 11 and 111)

In Group 1 among the 20 patients who were categorized as "Accelerated Responders" showing complete recovery at the time of discharge. One patient showed very low i.e., irrecordable peak flow rate on admission with severe morning and evening dip in PEFR. The rate of recovery of this patient was slower than the rest of the usual in this group 1 but by the 3<sup>rd</sup> day of admission he had caught up and thereafter there was no difference between him and the rest of the patients in Group 1 and this patient had a coryzal illness with purulent bronchitis at the time of admission.

#### IV. DISCUSSION

For practical purposes acute severe Asthma may be defined as an initially unresponsive attack of Asthma sufficiently severe to lead to hospitalization and inevitably it embraces an inhomogeneous group of patients. Within each of the major groups identified, the manner of improvement in PEFR was remarkably similar. No individual could be assigned with confidence to either of the Recovery Group at the time of admission. Assessment of PEFR at least 4 times a day establish a full extent of potential variation in airway obstruction and helpful in categorization of the patients into specific group of recovery and determination of the nature of further treatment. Factors precipitating the attacks were also studied but have not been analysed statistically. Attacks could not be confidently attributed to any particular precipitating factor but emotional or physical or mental stress were the predominant factors for most of the patients in group 11. Other factors such as duration of symptoms, type of treatment and rate of development of the attack before admission could also be assessed retrospectively by PEFR measurement.

**TABLE 1**  
**CONSTITUTION OF STUDY POPULATION IN GROUP 1**  
**TOTAL NO= 20**

AETIOLOGY	MALE	FEMALE
ATOPIC ASTHMA	3	0
UPPER RESPIRATORY INFECTION	3	2
EXERCISE INDUCED ASTHMA	3	0
POLLEN INDUCED(GARDENER)	0	1
DUST INDUCED	6	2

**TABLE - 11**  
**CONSTITUTION OF STUDY POPULATION IN GROUP2**  
**TOTAL NO=15**

AETIOLOGY	MALE	FEMALE
CHRONIC BRONCHITIS(SMOKERS)	3	1
BRONCHOPULMONARY ASPERGILLOSIS	0	1
CHRONIC BRONCHITIS WITH EMPHYSEMA	2	0
BRONCHIECTASIS	2	1
ASTHMATIC BRONCHITIS(COTTON MILL WEAVER)	2	1
EMPHYSEMA	1	0
CORPULMONALE	1	0

**TABLE 111**  
**CLINICAL FEATURES IN BOTH GROUPS**

INDICES	GROUP 1	GROUP 2
TOTAL NO	20	15
AGE (YEARS) RANGE	22.4 15-40	51.0 47-60
DURATION OF RECOVERY(DAYS) RANGE	7 4-11	21 16-26
PEFR LIT/MIN.(PRE TREATMENT) RANGE LIT/MIN	125 100-205	80 60-120
PEFR LIT/MIN (POST TREATMENT) RANGE	380 350-430	200 160-320

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DIFFERENCE BETWEEN PRE AND POST TREATMENT P < 0.01

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