

## A STUDY ON ANTIBIOTIC PRESCRIBING PATTERN IN OBSTRUCTIVE LUNG DISEASE INPATIENTS

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### ABSTRACT

**Objectives:** The main objectives of this study were to estimate the demographic details of patients with obstructive lung disease and to study the various organisms causing exacerbations and its resistance pattern and also to analyze the culture and sensitivity pattern in obstructive lung disease patients.

**Methods:** It was a retrospective, observational study carried out for 1 year at the Department of Pulmonary Medicine of a tertiary care teaching hospital in Kerala, India. Total 200 patients who were admitted under the pulmonary ward during the time period from 1<sup>st</sup> June 2013 to 1<sup>st</sup> June 2014 and who satisfied the inclusion and exclusion criteria were included in the study. A standardized data collection form was prepared, and necessary data were collected from patient's medical records.

**Results:** The maximum number of patients was in the age group of 60-69. 61% patients were residing in the urban area. 32.5% of patients were found to have a history of smoking. 61% patients were diagnosed with the chronic obstructive pulmonary disease (COPD). 74.5% sample collected were sputum. Culture test alone was carried out for 48.5%. 88% were prescribed with cephalosporin. Among the cephalosporin class cefpodoxime was the most commonly prescribed (63%). 42 patients had two drug therapy.

**Conclusion:** A periodic study on the usage of antibiotics and sensitivity pattern in the hospital will enable the health care professionals to select the appropriate one to promote the rational use of antibiotics.

**Key words:** Asthma, Chronic obstructive pulmonary disease, Exacerbation, Antibiotics.

### INTRODUCTION

Disease of small airways may be common to various chronic obstructive lung diseases. Because peripheral airway resistance is normally so small, there may be a considerable obstruction in peripheral airways that would affect ventilation distribution and gas exchange [1]. The various types of obstructive lung disease include:

- Asthma
- Chronic obstructive pulmonary disease (COPD)

COPD is a disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases [2]. According to the National Asthma Education and Prevention Program (NAEPP), asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role: In particular mast cells, eosinophils, T-lymphocytes, macrophages, neutrophils, and epithelial cells [3].

#### Causes of acute exacerbations

##### Viral and bacterial infection

In 50-70% of acute exacerbations of COPD, the pathophysiological basis is usually infectious. Hemophilus influenzae is the most frequent bacterium isolated in all series followed by *Streptococcus pneumoniae*, *Moraxella catarrhalis*, and *Pseudomonas aeruginosa*. Some reports show that *Chlamydomphila pneumoniae* and *Mycoplasma pneumoniae* in acute exacerbations of COPD are important causes of community-acquired pneumonia [4].

Viral infection and bacterial infections are the risk factors for asthma exacerbation. The dominant viruses were rhinoviruses, respiratory syncytial virus, influenza virus, and metapneumovirus. HRV infection is

a frequent cause of exacerbations in adults with asthma. Influenza virus infection also induces asthma attacks in adults [5].

#### Smoking

The cigarette smoking influences the rate of decline of lung function [6]. Smoking causes pathophysiologic changes in the airways, including inflammation and airway hyper responsiveness that support a role for smoking in asthma pathogenesis. Smoking and Statesboro High School (SHS) exposure increase the risk for asthma exacerbations. In addition to increasing the risk for asthma exacerbations, maternal smoking during pregnancy and early childhood exposure to SHS are associated with increased risk of early life asthma [7].

Passive exposure to cigarette smoke may also contribute to the development of COPD by increasing the lung total burden of inhaled particles and gases. Most smokers develop some respiratory impairment due to COPD [8].

#### Environmental pollution

Air pollutants and chemicals, such as benzenes, lead, CO<sub>2</sub>, NO<sub>2</sub>, and CO, play a role in the pathogenesis of respiratory diseases. Prolonged exposure to air pollution and petroleum vapors causes broncho constriction. Mucosal irritation and alveolar swelling lead to obstructive and restrictive disorders of lungs [9].

Antibiotics are one of the most frequently prescribed medicines in modern times. It has been the cure to many diseases by killing or stopping the growth of various microorganisms. Therefore, the use of antibiotics has become a routine practice for the treatment of obstructive lung disease exacerbations. The role of antibiotics in treating mild or moderate acute exacerbation is unclear. Most randomized trials evaluating antibiotics for obstructive lung disease were restricted to

patients hospitalized for acute exacerbations. Antibiotics can help patients to live longer and feel better.

### Pharmacotherapy

Along with smoking cessation, which is the only treatment modality known to significantly limit disease progression; pharmacologic therapy is central to the management of COPD patients. Pharmacotherapy for COPD consisted of maintenance and reliever medications. Maintenance medications included inhaled corticosteroid (ICS), long-acting beta-agonist (LABA), fixed-dose combination ICS + LABA, tiotropium, and inhaled ipratropium (IPR) or fixed-dose combination IPR + albuterol (collectively referred to as IPR). Reliever medications included short-acting beta-agonist (SABA), oral corticosteroid (OCS), nebulized IPR or combination IPR - albuterol (collectively referred to as nebulized IPR [neb IPR]), and antibiotics [10].

### METHODS

#### Study design

Retrospective observational study.

#### Study duration

The study period was from 1<sup>st</sup> July 2014 to 31<sup>st</sup> May 2015.

#### Study population

Patients with obstructive lung disease exacerbations who were admitted under the pulmonary ward of a tertiary care teaching hospital in Kerala during the time period (1<sup>st</sup> June 2013 to 1<sup>st</sup> June 2014) and who satisfied the inclusion and exclusion criteria were included in the study.

#### Inclusion criteria

1. In patients who are diagnosed with obstructive lung disease
2. Patients who are prescribed with at least one antibiotic
3. In patients with obstructive lung disease in the age group of  $\geq 12$  years.

#### Exclusion criteria

1. Patients who are admitted to the ICU
2. Patients who are immunocompromised.

#### Sample size

Sample size (n) was calculated statistically on the basis of the incidence rate of infectious diseases and use of antibiotics by the exacerbated obstructive lung disease patients in India. The sample size was  $n > 185$ .

### RESULTS

A total of 200 patients who satisfied the inclusion and exclusion criteria were included in this study. The maximum number of patients, i.e. 71 (35.5%) were in the age group of 60-69 years, and 54 (27%) were in the age group of 70-79 (Table 1).

In this study, 66% were male patients and 34% were female patients in the usage of antibiotics (Table 2). COPD exacerbations accounted for the majority of the diagnosis made (61%), followed by asthma exacerbations (39%) (Fig. 1).

Culture test alone was carried out for 48.5% of the total cases studied, whereas culture and sensitivity pattern were done for 26% of the cases (Table 3). Cephalosporins are the most frequently prescribed antibiotic (88%) followed by quinolones (48%), macrolides (39%). The most commonly prescribed supportive therapy in obstructive lung disease study population to be proton pump inhibitors (93%) followed by multivitamins (76%), antidiabetics (51.5%) (Tables 4 and 5). Regarding the antibiotic therapy pattern, it was noticed that 8 had single drug therapy, 42 had two drug therapy, and only 23 had five-drug therapy.

**Table 1: Age distribution of patients**

Age group	Number of patients	Percentage
18-29	10	5
30-39	7	3.5
40-49	11	5.5
50-59	31	15.5
60-69	71	35.5
70-79	54	27
80-89	14	7
90-99	2	1

**Table 2: Gender distribution of patients**

Gender	Number of patients	Percentage
Male	133	66
Female	67	34

**Table 3: Diagnostic tests**

Tests done	Number of patients	Percentage
Culture alone	97	48.5
Culture and sensitivity	52	26

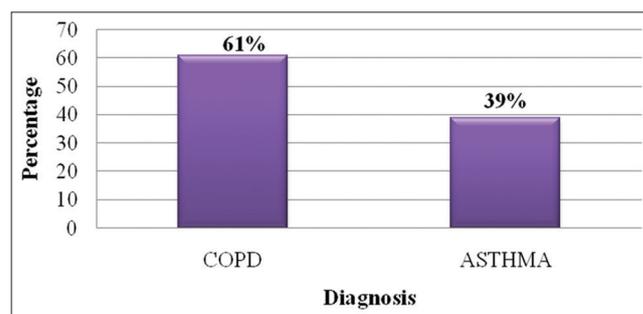
**Table 4: Prescribing pattern of antibiotic classes**

Antibiotic class	Number of patients	Percentage
Cephalosporins	176	88
Quinolones	96	48
Macrolides	78	39
Carbapenems	39	19.5
Penicillins	28	14
Aminoglycosides	25	12.5
Tetracyclines	13	6.5
Polypeptides	11	5.5
Co-trimoxazole	2	1
Glycopeptides	1	0.5

**Table 5: Prescribing pattern of supportive therapy**

Treatment details	Number of patients	Percentage
Proton pump inhibitors	186	93
Multivitamins	152	76
Antidiabetics	103	51.5
Antihypertensive	88	44
NSAIDS	83	41.5
Diuretics	54	27
Cough syrups	35	17.5
Antiemetics	22	11

NSAIDS: Non-steroidal anti-inflammatory drugs



**Fig. 1: Diagnosis of patients**

## DISCUSSION

The male to female ratio of the study patients was 1.92:1. Most of the patients who were included in this study were staying in the urban area, i.e. 122 (61%) and only 78 (39%) were staying in the rural area. This result correlated to a study by Pinal on analysis of prescription pattern and drug utilization in asthma therapy [11,12]. In this study, 32.5% of patients were found to have a history of smoking. A similar prospective study was conducted by Lokke, on developing COPD: 25 years follow-up the study of the general population [13]. The samples collected for diagnosis include blood (13.5%) and sputum (74.5%). Among the cephalosporin class, it was concluded that cefpodoxime was the most commonly prescribed (63%). Among the quinolone class, levofloxacin was commonly used one (47.5%). Among the penicillin, piperacillin with tazobactam was used mostly (21%). In antibiotic therapy pattern, it was noticed that 4% had single drug therapy, (21%) had two drug therapy, and only 11.5% had five-drug therapy. The mean duration of hospitalization was found to be 6.47 days.

## CONCLUSION

The study of the prescribing pattern of antibiotics seeks to monitor and evaluate if necessary and suggest modifications in prescribing pattern as to make medical care rational and cost effective. The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of obstructive lung disease exacerbated patients. The rising incidence of bacterial resistance to common antibiotics particularly, multi-drug resistant *Pneumococci* has promoted the need to use antibiotics judiciously in exacerbated conditions. As antibiotics share a very high percentage in any prescription, the periodic study on the usage of antibiotics and sensitivity pattern in the hospital set up is to be conducted which enables the health care professionals to select the appropriate one to promote the rational use of antibiotics. Much antibiotic prescription is of little value, and a decreased prescription rate may lead to a low rate of resistance to them. On the other hand, lower antibiotic prescription seems to be theoretically associated with an increase in the complications of infections.

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