

## Research Article



## A Prospective Observational Study of Medications Related Problems in Patients with Chronic Obstructive Pulmonary Disease

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### ABSTRACT

The objective of our study is to assess various medications related problems in patients suffering from COPD (Chronic Obstructive Pulmonary Disease). A prospective observational study was carried out on a total of 105 COPD patients in MVJ Medical College and Research Hospital for a period of six months. A total of 105 inpatients were enrolled in the study of which 81% were males and 19% were females. We could observe that 38.09% of enrolled patient were in the 60-70 age range and 73% of the patient were smokers. The majority (87.61%) of the patients were from low socio economic status, whereas 75.3% patients were having co-morbid condition. Type 2 diabetes mellitus was the most common Co morbid condition (28.57%) followed by Corpulmonale (20%) and Hypertension (18%). Antibiotics, Short Acting Beta 2 Agonist and Corticosteroids were the commonly prescribed monotherapies. 73% of the patients were prescribed with combination therapy and commonly prescribed combinations were short acting Beta 2 agonist, short acting anticholinergic and inhaled corticosteroids. We could identify a total of 424 medication related problems. The commonly found medication related problem were Drug-Drug Interaction (29.24%), Polypharmacy (24.76%), Drug Duplication (16.98%) Adverse drug reactions (10.40%) and in prescriptions we could identify Spelling Mistakes (3.77%), incomplete data (10.6%), Illegible data (3.30%) and Frequency error (0.47%) as well. Polypharmacy, Drug-drug interactions, Adverse Drug Reactions and Drug Duplications were the commonly identified medications related problems in COPD patients.

**Keywords:** COPD, Polypharmacy, Adverse Drug Reactions, Drug Duplications.

### INTRODUCTION

As per Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, chronic obstructive pulmonary disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases<sup>1</sup>.

The chronic airflow limitation that is characteristic of COPD is caused by a mixture of small airways disease (e.g., obstructive bronchiolitis) and parenchymal destruction (emphysema)<sup>2</sup>.

The most frequently occurring symptoms of COPD are wheezing, shortness of breath, cough with sputum production, and generalized fatigue, frequent respiratory infections. COPD complications are Pneumonia, Osteoporosis, Weight loss or Weight gain, Cor-Pulmonale, Pneumothorax. The complications due to COPD can be prevented by using safe use of drugs<sup>3</sup>. COPD are a major cause of morbidity and mortality across the world. According to the Epidemiological study more than 3 million COPD patient died in 2012, which is equal to 6% of all deaths causes. COPD prevalence is 5.0% among Indian males and about 3.2% among Indian females over 35 years of age<sup>4</sup>.

Medications related problems include drug-drug interactions, adverse drug reactions, poly-pharmacy,

prescriptions errors and drug duplications. Research on the effect of pharmaceutical care in patient with COPD shows a significant improvement in the COPD knowledge, medication adherence, medication beliefs and significant reduction in hospital stay.<sup>5</sup>

The World Health Organization defines an adverse drug reaction (ADR) as "a response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function".<sup>6</sup>

Drug - Drug interaction can be defined as "A change in a drug's effect on the body when the drug is taken together with a second drug. A drug-drug interaction can delay, decrease, or enhance absorption of either drug. This can decrease or increase the action of either or both drugs or cause adverse effects<sup>7</sup>. Polypharmacy, defined by the World Health Organization as "the administration of many drugs at the same time or the administration of an excessive number of drugs" is frequent among the elderly as they often suffer from chronic diseases with concomitant pathologies.<sup>8</sup>

Therapeutic duplication is the practice of prescribing multiple medications for the same indication without a clear distinction of when one agent should be administered over another – for example, pain, nausea and vomiting, and constipation. If multiple medications from the same therapeutic class are ordered, each



medication must include a specific indication or include criteria for which medication to administer first, second, third, etc.<sup>9</sup>

A prescription error is 'a failure in the prescription writing process that results in a wrong instruction about one or more of the normal features of a prescription'. The 'normal features' include the identity of the recipient, the identity of the drug, the formulation, dose, route, timing, frequency, and duration of administration.<sup>10</sup>

According to various studies occurrence of various medication related problems are commonly seen in COPD patients and this populations are prescribed with multiple therapy because all the patients are comes under the geriatric populations. So our study is needed for the better understanding of the various drug related problems and thereby helps the patients for the safe use of drugs.

### **Aim of the study**

To assess the common drug related problems that are identified among the medications prescribed to treat the patients who are suffering from chronic obstructive pulmonary disease in tertiary teaching hospital.

## **PATIENTS, MATERIALS AND METHODS**

### **Study design**

Prospective observational study

### **Study site**

The study was conducted at Department of General Medicine Ward, MVJ Medical College and Research Hospital, Hoskote, Bangalore, South India.

### **Study period**

The study was performed over a period of six months from September 2016 to March 2017

### **Study population**

105 inpatients of MVJ Medical College and Research Hospital

### **Sources of data**

#### **Case Report Form**

A separate data entry form for incorporating patient details was designed. The format contains the socio demographic details of patients and parameters to assess medication related problems.

Drug interaction checker, Lexi comp, Drugs.com, Stockley's drug interactions, Martindale-the complete drug reference, GOLD guidelines, WHO scale of causality assessment, NARANJO scale.

### **Study criteria**

#### **Inclusion criteria**

All in-patients of 18yrs and above who are diagnosed as suffering from chronic obstructive pulmonary disease with or without the co morbid conditions.

#### **Exclusion criteria**

The patients who are unwilling to give informed consent to participate in the study. The patients who are on alternative system of therapy such as Ayurveda, Unani and Homeopathy.

#### **Ethical approval**

Human Ethical Clearance was obtained for carrying out the research work from ethical Committee of the study Hospital.

#### **Study procedure**

A prospective -observational study was conducted among 105 patients who are admitted in the general medicine department of study site (MVJ Medical College and Research Hospital).The study was conducted after gaining approval for the proposed protocol from the (IEC) Institutional Ethical Committee. All patients who meet the inclusion criteria were enrolled in the study after taking (IC) Inform Consent. All the patient who was presented with COPD in the General Medicine in-patient Department on the study site (MVJ Medical College and Research Hospital) were reviewed. The basic Demographics, Medication Related Details and Laboratory investigation values were collected by using the Case Report Form. The cases were assessed for prescription errors like spelling mistakes, Frequency error, incomplete data and illegible data. Type and extent of the medication errors like Drug interactions, Polypharmacy, Adverse Drug Reactions, drug duplications were assessed using Lexicomp drug database, whereas suspected ADRs were assessed for Causality using Naranjo scale. The results of the study were analyzed statistically using descriptive analysis.

## **RESULTS AND DISCUSSION**

A Prospective Observational Study was conducted among patients who had COPD. A total of 105 patients were enrolled in the study conducted for a period of six months. From the study, we could identify that 85 patients were male (80%) and 20 were female (20%) (Table: 1) participants.

Male patients were dominated in the study .This findings supports with the study of the unrec-Ognizedepidemic in India by Jindal SK.<sup>11</sup>

Out of total 105 COPD patients, the majority of the patient group was in the age group of 60-69 which constitutes about 38% of the total population and 40-49 age group contributes the least number of samples (4.80%) (Graph:1). The patients who were having smoking habits (73%) were more prone to develop COPD (Table:2).



The majority of the enrolled patients were from lower socioeconomic status, which was similar to the study conducted by Toru oga et al.<sup>12</sup>

Patients with long standing duration of COPD are at an increased risk of getting complications such as pneumonia, osteoporosis, and Corpulmonale, sleep problems as well as increase in medication related problems. In our study, type 2 Diabetes Mellitus, Hypertension, CorPulmonale was the commonly found comorbid conditions.<sup>13</sup>

Most commonly prescribed COPD class of drugs were Methylxanthines (40.62%), Corticosteroids(16.6%), and combinations of short acting beta 2agonist,short acting anticholinergic, ICS (35.33%) followed by LABA (long acting Beat 2agonist) +ICS (inhaled corticosteroids) and Mucolytic. Commonly prescribed antibiotics were Cephalosporin’s (31.36%) and Macrolides (10.39%). This result is in agreement with the study conducted by Mr. Sajeshkalkandiveettilet al inIndia. Prescription we could identify spelling mistakes (4.05%), incomplete data (11.39%), illegible data (3.54%) data and frequency errors (0.5%).<sup>14, 15.</sup>

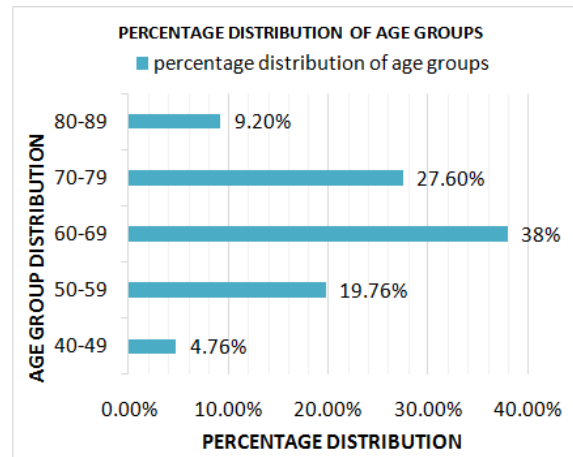
Drug -drug interactions were the most commonly occurred drug related problems (Graph:2). It contributes 32.15% of total drug related problems of which Major constitutes 8.63% followed by moderate (33.85%) and mild (59.83%) interactions (Table:3&4). The medication related problems given in COPD patients involves polypharmacy which was related to the research done by Lawrence Grouse.<sup>1</sup>

**Table 1:** Demographic details

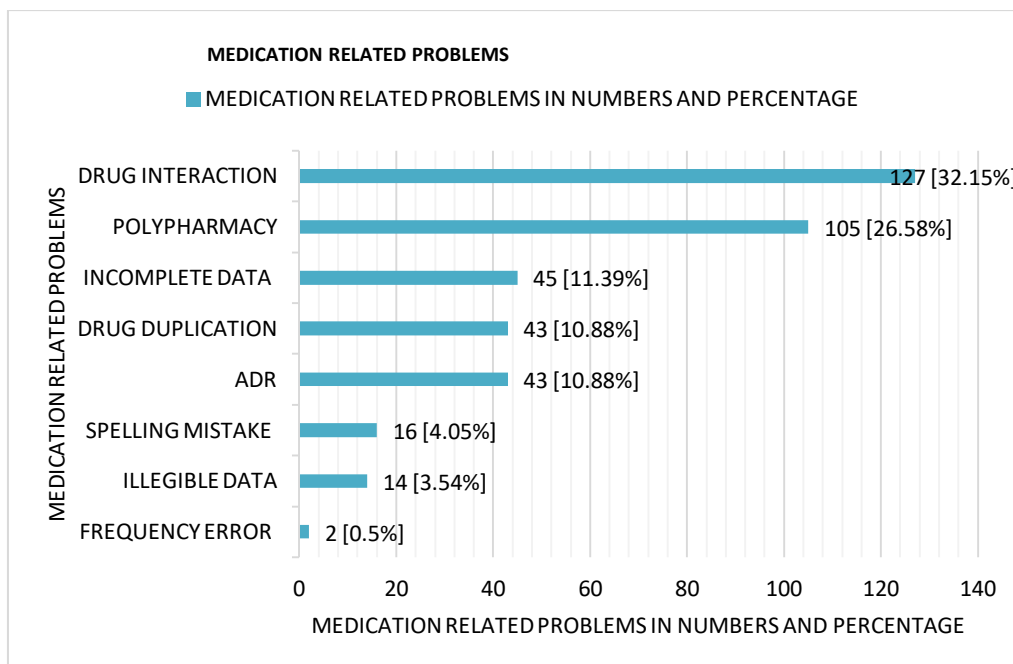
Gender Distribution	Percentage	Number Of Patient
MALE	80%	85
FEMALE	20%	20

**Table 1 :** Social Habits

Social Habit	Number	Percentage
Smoker	76	73%
Non smoker	29	27%



**Graph 1:** Distribution of age among participants (n=105)



**Graph 2:** Medication Related Problems

**Table 3:** Severity assessment of drug Interactions

Severity	Number (N=127)	Percentage (%)
Mild	76	59.84
Moderate	43	33.85
Severe	08	8.63

**Table 4:** Severe Drug- Drug Interactions and Management

S.NO	INTERACTING DRUGS	MECHANISM	MANAGEMENT
1	Theophylline Derivatives +Acebrophylline	Acebrophylline may enhance the stimulatory effect of Theophylline	CNS stimulants or other theophylline derivatives should not be Coadministered with acebrophylline
2	Chlorpheniramine +Ipratropium(Oral Inhalation)	Ipratropium (Oral Inhalation) may enhance the anticholinergic effect of Anticholinergic Agents	Avoid concurrent use of ipratropium with any other drugs that have anticholinergic properties.
3	Serotonin Modulators + Antiemetic's (5HT3 Antagonists)	The combination could result in serotonin syndrome.	Patients should be monitored for the development of serotonin syndrome during such therapy.
4	Domperidone+ ipratropium and salbutamol	Combination may enhance the QTc-prolonging effect of Highest Risk of QTc-Prolonging Agents(domperidone)	The concomitant use of highest risk QTc-prolonging agents with any other QTc-prolonging agent should be avoided.
5	Linezolid+ ipratropium and salbutamol	Linezolid may enhance the hypertensive effect of Sympathomimetic.	Reduce initial doses of Sympathomimetic agents, and closely monitor for enhanced blood pressure elevations, in patients receiving linezolid.
6	Linezolid + Theophylline	Linezolid may enhance the hypertensive effect of Sympathomimetic	Reduce initial doses of sympathomimetic agents, and closely monitor for enhanced blood pressure elevations, in patients receiving linezolid.
7	Spirolactone+telmisartan	Combination may increase the risk of hyperkalemia.	Monitored closely and furosemide is given to control the potassium level.

In our study all the 105 prescriptions had polypharmacy. In general, majority of the drug causes at least one type of drug related problems when it is administered alone or in combinations or in different route of administration. This study support the research conducted by Apikoglu-Rabus *Set al*<sup>15</sup> on Drug-related problems and Pharmacist interventions in a cohort of patients with Asthma and Chronic Obstructive Pulmonary Disease.

Drug duplication contributes 10.88% of total drug related problems. The Causality Assessment of ADR is done with Naranjo scale .The ADRs occurred were predictable only. In our study, ADRs were mostly found in Methylxanthines (68.11%) and SABA (13.95%). Methylxanthines are known to cause Hypokalemia,heartburn,tachycardia, hyperglycemia, tachypnea, decreased sleep, headache, irregular heart rate and Salbutamol cause dry mouth ,hypokalemia musclepain, increased heart rate,heartburn,muscle tremor this results supports with the study conducted by N.Tyagi et al<sup>16</sup> (Table :5&6).

## CONCLUSION

Our study assesses medication related problems in COPD patients who are under treatment. Male patients with smoking habits were are affected more compared to female. Majority of Patients were in the age group of 60-69.

Study on medication related problems could help to identify the common problems such as Poly Pharmacy, Drug-Drug Interactions, Drug Duplications, and Adverse Drug Reactions in most of the prescriptions. Various factors affect the different type of medication related problems. They are inappropriate use of medication due to lack of knowledge, smoking and comorbid conditions such as Type II DM Hypertension, Cor-Pulmonale etc.

The most prominent limitations of the study were the short duration and the difficulty in obtaining the required sample size. At the conclusion of our study, we would like to take our research a step forward and help COPD patients to improve their medication use. Future studies need to be conducted to know about the long term impact of the drugs on the patients hence, further



assessment on Medication Adherence and long term Adverse Effects in patient with COPD is required. Occupation and the living area mostly affect the

prevalence of the disease, our study were conducted in a rural area so data from an urban area is also required for a comparative study.

**Table 5:** Suspected adverse drug reactions

NAME OF THE DRUG	ADR	No. of Occurrences
NEBULISATION DUOLIN+BUDECORT	• Dry mouth	• 1
	• Increased heart rate	• 1
	• Hyper pigmented patches	• 1
BUDESONIDE	• Decreased urine out put	• 1
HYDROCORTISONE	• Generalized weakness	• 1
	• Decreased sleep	• 1
LEVOSALBUTAMOL	• Burning micturition	• 1
AZITHROMYCIN+ALBUTEROL	• Tachycardia	• 1
	• Muscle cramps	• 1
THEOPHYLLINE DOXOPHYLLINE	• Hypokalemia	• 8
	• Heart burn	• 1
	• Tachycardia	• 10
	• Hyperglycemia	• 1
	• Tachypnea	• 3
	• Decreased sleep	• 1
	• Head ache	• 1
	• Irregular heart beat	• 3
SALBUTAMOL	• Dry mouth	• 1
	• Hypokalemia	• 1
	• Muscle pain	• 1
	• Increased heart rate	• 1
	• Heart burn	• 1
	• Muscle tremor	• 1

**Table 6:** Causality Assessment of ADR Using Naranjo Scale

Causality	Number (43)	Percentage (%)
Possible (1-4)	15	34.9%
Probable (5-8)	27	62.8%
Definite( >/=9)	01	2.3%

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