Original Article

Study of Prescribing Pattern of Drugs in Chronic Obstructive Pulmonary Disease in Tertiary Care Teaching Hospital

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ABSTRACT

Background: Chronic obstructive pulmonary disease, a common preventable and treatable disease has been a major public health problem in this century and is one of the leading causes of morbidity and mortality in the industrialized and the developing countries. Irrational use of drugs is a major concern in modern clinical practice; more than half of all medicines are prescribed, dispensed inappropriately. This was a prospective study with an aim to analyze the drug prescribing pattern in chronic obstructive pulmonary disease patients. **Materials and Methods:** The study was conducted in 163 patients of either sex admitted in the general and pulmonary medicine departments over six months from September 2017 to February 2018 at NMCH and RC, Raichur, Karnataka. **Results:** Out of 163 study population male patients were more (82%) and majority of the patients were from the age group of 58-68 years (45.73%). It was found that smoking was more prominent in study population (39.63%). Bronchodilators were mostly prescribed class of drugs (31.94%) in the management of COPD followed by antibiotics (25.58%). Salbutamol with budesonide combination therapy was given in majority of prescriptions. Hypertension (19.63%) was the most common co-morbidity. Generic drug prescriptions were found low (1.42% drugs). **Conclusion:** The study concludes that symptomatic treatment was given for COPD patients in our hospital. Combination therapy was preferred over monotherapy. Bronchodilators were the mostly prescribed class of drugs among COPD drugs. Antimicrobial therapy was given for all patients. Polypharmacy was found in all prescriptions. Diagnosis of COPD lacked spirometry.

Key words: COPD, Bronchodilators, Prescribing pattern, Corticosteroids, Polypharmacy.

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) has been a major public health problem in this century and will remain as a challenge for the future. Worldwide COPD is in spotlight; because of its high prevalence, morbidity and mortality create powerful challenges for the healthcare system.[1]

Chronic Obstructive Pulmonary Disease (COPD) is a disabling respiratory disease characterized by airflow obstruction and associated symptoms (including breathing difficulties caused by shortness of breath and wheezing, airway hyperactivity, chronic cough, sputum production, exercise intolerance and poor quality of life) The major risk factor for COPD is tobacco smoking. However, other factors such as exposure to air pollutants, may increase oxidative stress and inflammation in the lungs and contribute to the susceptibility of development of COPD.[2] COPD encompasses two serious lung disease emphysema and chronic bronchitis (CB) which results in chronic airway inflammation and progressive loss of lung function, making it difficult to breathe normally.[3]

COPD is a chronic, non-communicable disease which poses a continuous burden on health care infrastructure. More than 3 million people died due to COPD in 2012, which is equal to 6% of all deaths causes. Ninety percent of these deaths occur in low-and middle-income countries. COPD prevalence is 5.0% among Indian males and approximately 3.2% among Indian females over 35 years of age.[4] It is projected to be the 3rd leading cause of death by 2030. According to a recent systematic review which includes

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estimates from the INSEARCH and other major studies in India, the prevalence of CB seems to range between 6.5% and 7.7% in rural and up to 9.9% in urban India.[5]

Drug treatment forms a major portion of health expenditure. Irrational use of drugs is a major concern in modern clinical practice, more than half of all medicines are prescribed, dispensed or sold inappropriately.[4] Although COPD is a progressive, incurable disease, pharmacological treatment can help control symptoms, reduce exacerbations and improve exercise tolerance and health status. The mainstay of pharmacological therapy for COPD is bronchodilation with a long-acting muscarinic antagonist (LAMA), a long-acting β2-agonist (LABA), or a combination of the two, depending on the severity of breathlessness and the patient's risk of exacerbations. However, a significant proportion of patients with COPD can fail to achieve adequate control of symptoms or exacerbation risk reduction while receiving only a long-acting bronchodilator, such as a LAMA or LABA, in monotherapy. Escalation to multiple bronchodilators with or without an inhaled corticosteroid (ICS) will depend on the patient's symptom burden (including dyspnea at rest or exertion, cough, sputum production and COPD assessment test or modified Medical Research Council breathlessness scores) and risk of exacerbations. The strongest predictor of a patient's future exacerbation frequency remains the number of exacerbations they have experienced in the previous year. Current treatment guidelines recommend the use of triple therapy with an ICS/LAMA/LABA for patients currently on bronchodilators with continued persistent symptoms and/or at risk for future exacerbations.[2,6,7]

Prescription pattern monitoring studies (PPMS) are drug utilization study which is a tool that mainly focuses on prescribing and administering of drugs. They promote appropriate use of monitored drugs and reduction of abuse or misuse of monitored drugs.[8]

Bad prescribing habits lead to ineffective and unsafe treatment, exacerbation or prolongation of illness, distress and harm to the patient and higher costs.[1] In this present study an attempt was made to study prescribing pattern followed in our study site with emphasis on prescribing behavior of physician.

MATERIALS AND METHODS

Study design and setting

The prospective observational study was conducted for 6 months, in the inpatients of pulmonology and general medicine ward of Navodaya Medical College Hospital and Research Center, Raichur. Data was collected by using specially designed data entry form. The following information was collected for each patient: social demographics, lifestyle, smoking history, presence of comorbidities, level of dyspnea, disease severity, prescribed COPD treatments and exacerbation history.

Subjects

The current observational study used a prospective audit of 163 COPD patients with or without co-morbidity admitted in pulmonology and general medicine department during the study period.

Inclusion Criteria

Inclusion Criteria satisfies the COPD patients of either sex with (or) without co-morbid condition admitted in general medicine and pulmonary medicine and age 18-80 years.

Exclusion criteria

Patients who refuse to participate, Pediatrics, Pregnant and lactating women were excluded from the study.

Ethical consideration

The ethical approval to conduct the study was obtained from the Ethical Review Committee of Navodaya Medical College Hospital and Research Centre. Written consents were obtained from each participant.

Data analysis: The collected data expressed in percentage.

RESULTS

A prospective observational study was carried out by reviewing prescription of 163 COPD patients. The patients were categorized on the basis of gender, age, social history, comorbid conditions. Out of 163 patients 134 (82%) were male and 29 (18%) were females. The large number of patients were in age group of 58–68years (45.73%) followed by 48-58 years (23.78%), 68-78 years (14.63%), 38-48 years (9.146%), >78 years (4.26%) and least were found in the age group of 18-28 years (1.21%) and 28-38 years (1.21%). The mean age of the patients was 59.16 (±10.54). Among 163 patients, 64 (39.63%) were smokers, 63 (38.42%) were non-smokers and 36 (21.95%) were ex-smokers. It was also observed that 24 (14.63%) were alcoholics, 122 (75%) were non-alcoholics and 17 (10.37%) were ex-alcoholics. Out of 163 patients, 117 (71.77%) were not having any other comorbid condition the most common comorbidity was hypertension [32(19.63%)], followed by diabetes mellitus

[10(6.13%)], tuberculosis [4(2.45%)], corpulmonale [3(1.84%)], GI disorders [2(1.22%)] and least observed conditions were ulcer [1] and esophageal carcinoma [1] with 0.61% each as mentioned in the [Table 1].

A total of 2175 drugs were prescribed for 163 patients, out of which 1493 used for the management of COPD. Among COPD class of drugs bronchodilators were mostly prescribed [477(31.94%)], followed by antibiotics [382(25.58%)], corticosteroids [252(16.87%)], bronchial secretion enhancers [137(9.17%)], mucolytics [72(4.82%)], antihistamine [67(4.48%)], leukotriene-antagonist [63(4.21%)] and oxygen inhalation [18(1.20%)], opioids [14(0.93)], antitussive [11(0.8%)] as mentioned in the [Table 2].

Table 3 shows distribution of bronchodilators among COPD drugs. Beta sympathomimetics [217(45.49%)] were mostly prescribed, followed by methylxanthines [155(32.49%)], anticholinergics [105(22.02%)].

Table 4 illustrates distribution of corticosteroids in which inhaled corticosteroids [155(61.50%)] were highly prescribed followed by systemic corticosteroids [97 (38.49%)].

Table 5 shows distribution of antibiotics. Among 382 antibiotics, 266 (69.64%) were beta-lactam antibiotics which includes, penicillins (145 drugs) and cephalosporins (120 drugs).

Figure 1 illustrate details of concomitant drugs prescribed. H2 antagonist was [106(15.54%)] highly prescribed drugs followed by paracetamol [105(15.4%)] followed by antihypertensive drugs [85(12.46%)].

Table 6 illustrates Route of administration of drugs of which oral route of administration was mostly used [987(45.38%)] with prescribed drugs in COPD patients with or without comorbidity, followed by parenteral route [786(36.14%)], inhalation route [398(18.13%)], topical route [4(0.18%)].

Table 7 illustrates combination therapy in study population. Salbutamol + budesonide and theophylline + etiophylline were given in equal percentage and were most commonly prescribed (39.26%), followed by salbutamol + ipratropium + budesonide (36.80%).

Table 8 illustrates severity of possible drug-drug interactions found in prescriptions in which minor severity were mostly found among all prescriptions [359(49.18%)] followed by moderately severe drug-drug interactions [337(46.16%)] and major interactions [34(4.66%)].

Table 1: Socio-demographic parameters.

Gender
Male - 82%
Female - 18%
Age
18 to 28 – 1.21%
28 to 38 – 1.21%
38 to 48 – 9.146%
48 to 58 – 23.78%
58 to 68 – 45.73%
68 to 78 – 14.63%
>78 – 4.26%
Smoking History
Smokers – 39.63%
Non-smokers -38.42%
Ex-smokers – 21.95%
Alcohol History
Alcoholics – 14.63%
Non-alcoholics – 75%
Ex-alcoholics - 10.37%
Comorbidities
COPD without any co-morbidity – 71.77%
COPD with HTN -19.63%
COPD with DM – 6.13%
COPD with TB – 2.45%
COPD with corpulmonale – 1.84%
COPD with GI disorders – 1.22%
COPD with ulcer – 0.61%
COPD with esophageal carcinoma – 0.61%

Table 2: Different class of drugs prescribed for management of COPD (*n*=1493).

Class of drug	No. of drugs	Percentage
Bronchodilators	477	31.94%
Antibiotics	382	25.58%
Corticosteroids	252	16.87%
Bronchial secretion enhancers	137	9.17%
Mucolytics	72	4.82%
Antihistamines	67	4.48%
Leukotriene antagonist	63	4.21%
Oxygen inhalation	18	1.20%
Opioids	14	0.93%
Antitussives	11	0.8%

Table 3: Distribution of prescribed Bronchodilators among COPD drugs (*n*=477).

Bronchodilators	No. of drugs	Percentage
Beta sympathomimetics	217	45.49%
Methylxanthines	155	32.49%
Anticholinergics	105	22.02%

DISCUSSION

A prospective observational study was carried out by reviewing prescription of 163 COPD patients. Out

Table 4: Distribution of prescribed corticosteroids among COPD drugs (*n*=252).

Corticosteroids	No. of drugs	Percentage
Inhaled corticosteroids	155	61.50%
Systemic corticosteroids	97	38.49%

Table 5: Distribution of prescribed Antibiotics among COPD drugs (*n*=382).

Class of antibiotics	No. of drugs	Percentage
Beta lactam antibiotics	266	69.64%
Macrolide antibiotics	60	15.70%
Fluoroquinolones	34	8.90%
Aminoglycosides	14	3.66%
Oxazolidinedione	5	1.30%
Lincosamide antibiotics	2	0.53%
Tetracyclines	1	0.27%

Table 6: Route of administration of drugs (*n*=2175).

Route of administration	No. of drugs	Percentage
Parenteral	786	36.14%
Oral	987	45.38%
Inhalation	398	18.3%
Topical	4	0.18%

Table 7: Combination therapy in study population (*n*=163).

Drugs	No. of patients	Percentage
Salbutamol +budesonide	64	39.26%
Theophylline + etiophylline	64	39.26%
Salbutamol + ipratropium +budesonide	60	36.80%
Levocetrizine + montelukast	50	30.67%
Piperacillin + tazobactum	30	18.40%
Ceftriaxone + sulbactam	26	15.95%
Ambroxol + doxofylline	23	14.11%
Amoxicillin + clavulanic acid	17	10.43%
Salbutamol + ipratropium	16	9.81%
Ipratropium + budesonide	14	8.58%
Salmeterol + fluticasone	10	6.13%

of 163 patients 134 (82%) were male and 29 (18%) were females. The analysis showed that COPD occurs more in men than in women, which get confirmed by demographic results and is largely due to cigarette smoking and other causes can be environmental and occupational exposure to vapor, dust, gas and fumes. This finding is in accordance with results of the previous studies conducted by Unni A *et al*.[9] and Sawant PM *et al*.

Table 8: severity of possible drug-drug interactions (*n*=730).

Drug-drug interactions	No. of interactions	Percentage
Major	34	4.66%
Moderate	337	46.16%
Minor	359	49.18%

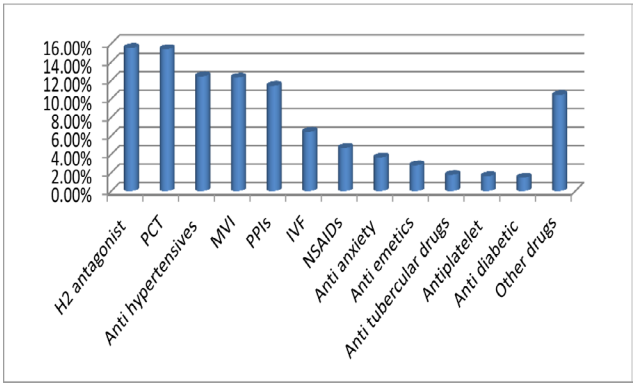

Figure 1: Concomitant Drugs (*n*=682).

Among the total prescriptions collected, age was taken into consideration by dividing into 7 age groups being kept at interval of 10 years each. The large number of patients were in age group of 58-68years (45.73%) followed by 48-58 years (23.78%). The mean age of the patients was 59.16 (±10.54). Age-associated changes in the structure and function of the lung may increase pathogenic susceptibility to COPD and occupational factors can also contribute to COPD. So, risk of developing COPD is more in middle age and elderly patients.

Among 163 patients, 64 (39.63%) were smokers, 63 (38.42%) were non-smokers and 36 (21.95%) were ex-smokers. History of cigarette smoking is the major cause of COPD because cigarette smoke contains harmful toxins that affect the lung functionality and it may leads to stiffening of the air sacs, deterioration of walls between air sacs, thickening and inflammation of the airway walls and increases the production of mucus in the airways, causing air obstruction. It was also observed that 24 (14.63%) were alcoholics, 122 (75%) were non-alcoholics and 17 (10.37%) were ex-alcoholics.

Out of 163 patients, 117 (71.77%) were not having any other comorbid condition and the most common comorbidity found in remaining patients was hypertension [32(19.63%)]. Hypertension is frequently seen in COPD patients because of loss of alveolar remodeling of the pulmonary vessels by chronic hypoxia and inflammation, decreases in the levels of endothelial vasodilators such as nitric oxide and vasospasm caused by factors such as

endothelin-1. The stress, age, lifestyle modifications may also contribute to hypertension. The result representing hypertension as the mostly found comorbid condition had similarity with previous studies conducted by Unni A *et al.*[9] and Sawant PM *et al.* and Mahmoodan M *et al.* It was seen that all the prescriptions contained more than 3 drugs which indicates polypharmacy.

Out of 2175 drugs, 1493 were used for the management of COPD. Among COPD class of drugs bronchodilators were mostly prescribed [477(31.94%)], which was supported by the results of the previous study conducted by Singh S *et al.*[10] Bronchodilators are central to the treatment of COPD because they alleviate bronchial constriction and airflow limitation, reduce hyperinflation and improve emptying of the lung and exercise performance.

Salbutamol (65.89%) is the mostly prescribed drug among bronchodilators. Inhaled corticosteroids [155(61.50%)] are preferred over systemic corticosteroids [97(38.49%)]. This finding is similar to that of previous study done by Vikneswari *et al.*[11] Systemic bioavailability from the gastrointestinal tract is reduced with inhaled corticosteroids so systemic side effects like hypertension, hyperglycemia etc. can be reduced by the use of inhaled corticosteroids.

Our study showed that ceftriaxone was the mostly prescribed (99 drugs) antibiotic and it was supported by the previous studies conducted by the Singh S *et al.*[10] and Kothai R *et al.* and Abraham N *et al.*

It was found that oral route of administration was mostly used [987(45.38%)] with prescribed drugs in COPD patients with or without comorbidity, followed by parenteral route [786(36.14%)]. In the assessment of combination therapy, we found that salbutamol + budesonide and theophylline + etiophylline were given at same rate and it was found that most commonly prescribed (39.26%), followed by salbutamol + ipratropium + budesonide (36.80%).

Salbutamol – Budesonide was the mostly found possible drug-drug interaction in the prescription which was due to polypharmacy. Generic prescriptions were found low [30(1.42%)]. This is similar to the study conducted by Kothai R *et al.* Prescribing the drugs with their brand name increases the cost of therapy to the patients increasing generic prescribing would rationalize the use and reduce the cost of drug and also reduces the confusion relating to drug names, cost and stock items.

Use of drugs from essential drug list should be promoted for the optimal use of limited resources for maximum safety and satisfy the health care needs of majority of population. Our study showed that the percentage of drugs prescribed from WHO-EDL 2017 was 90.72%.

CONCLUSION

The study concludes that symptomatic treatment was given for COPD patients. Combinational therapy was preferred over monotherapy. Bronchodilators were the mostly prescribed class of drugs among COPD drugs. Antimicrobial therapy was given for all patients All the prescription contain more than three drugs indicating polypharmacy and the diagnosis of COPD lacked spirometry.

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CONFLICT OF INTEREST

Nil.

ABBREVIATIONS

COPD: Chronic Obstructive Pulmonary Disease; **WHO:** World Health Organization; **EDL:** Essential Drug List; CB: Chronic Bronchitis; **LAMA:** Long-Acting Muscarinic Antagonist; **LABA:** Long-Acting β2-Agonist; **ICS:** Inhaled Corticosteroids; **PPMS:** Prescription Pattern Monitoring Studies.

SUMMARY

- The present study was carried out in 163 COPD patients of either sex admitted in the general and pulmonary medicine departments with an aim to analyze the drug prescribing pattern. In study population, male patients were more (82%) and majority of the patients were from the age group of 58-68 years (45.73%).
- It was found that smoking is most prominent risk factor for COPD (61.59%) and Hypertension was the most common co-morbid condition in study population (19.63%).
- Bronchodilators were mostly prescribed class of drugs (31.94%) in the management of COPD followed by antibiotics (25.58%) and corticosteroids (16.87%).

- Among bronchodilators, beta sympathomimetics (45.49%) were mostly used in which salbutamol (65.89%) the most was commonly prescribed drug.
- Among Antibiotics, Beta lactam antibiotics (69.64%) were mostly prescribed, in which ceftriaxone was the mostly prescribed antibiotic.
- Among corticosteroids, ICS (61.50%) were mostly given in patients and Budesonide (16.87%) was the mostly prescribed inhaled corticosteroid.
- Oral route (45.38) was preferred among the total drugs used in study population. Salbutamol with budesonide combination therapy was given in majority of prescriptions (64 out of 163 prescriptions) followed by Salbutamol + budesonide + Ipratropium bromide combination (60 out of 163 prescriptions).
- Generic drug prescriptions were found to be low (1.42% drugs).

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