



Study of prescribing pattern of drugs in chronic obstructive pulmonary disease in tertiary care teaching hospital in India

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ABSTRACT

A widespread potentially preventable disease, chronic obstructive pulmonary disease has been a serious public health problem in this decade, and is one of the main causes of mortality and morbidity in developed and emerging nations. Irrational use of medicines is a major problem in current clinical practice; more than half of all pharmaceutical items are administered, illegally dispensed. It was a retrospective research aimed at examining the practice of prescribing drugs in patients with pulmonary disease. The research was performed at Sun Shine tertiary care teaching Hospital, Hyderabad, India in 154 patients of either sex confined to the general and pulmonary medicine departments over six months from June 2019 to December 2019. For the 154 population of the study male participants were more (77.92 percent) and most patients were from the 58-68 year age group (46.75 percent). Smoking has been found to be more prominent in the sample population (40.25 per cent). In COPD treatment, bronchodilators were mainly prescribed class of drugs (39.384 percent) followed by antibiotics (30.90 percent). In most prescriptions, salbutamol was administered with budesonide combination therapy. The much more common co-morbidity was hypertension (12.98 per cent). The prescriptions for generic drugs were found to be low (1.51 per cent drugs). The report found that our hospital provided symptomatic treatment for patients with COPD. This has chosen combination therapy over monotherapy. Bronchodilators were amongst COPD patients the most recommended class of medications. Both patients were administered antimicrobial therapy. Everything prescriptions contain polypharmaceutical. COPD diagnosis lacked spirometry.

Keywords: Bronchodilators, Monotherapy, COPD, Salbutamol, Polypharmacy, COPD.

INTRODUCTION

In this century, Chronic Obstructive Pulmonary Disease (COPD) has been a major public health problem and will remain a challenge for future. Worldwide COPD is in the spotlight; due to its high prevalence, morbidity and mortality create powerful healthcare system challenges [1]. Chronic obstructive pulmonary disease (COPD) is an impaired respiratory disease characterized by airway inflammation and

symptoms associated (including breathing problems trouble breathing and wheezing, airway hyperactivity, chronic cough, sputum development, exercise aversion and reduced quality of life) Tobacco smoking is a significant risk factor for COPD. Nevertheless, other factors, such as air pollution, can increase oxidative stress and inflammation in the lungs and lead to COPD developmental susceptibility [2]. COPD encompasses two significant lung

diseases, emphysema and chronic bronchitis (CB), resulting in chronic inflammation of the lung and progressive loss of lung function, making it hard to breathe normally [3]. COPD is a chronic, non-communicable disease that continually places a burden on health care infrastructure. About 3 million people have died in 2012 because of COPD, which is equivalent to 6 percent of all causes of death. 90 percent of those deaths occur in countries with low and middle incomes. The prevalence of COPD among Indian males is 5.0 per cent and among Indian females is about 3.2 per cent over 35 years of age [4]. It is forecast to become the third leading cause of death by 2030. According to a systematic reviews analysis that includes estimates from the INSEARCH and other major research in India, the incidence of CB tends to vary from 6.5% to 7.7% in rural and up to 9.9% in urban Indian [5].

Drug treatment forms a substantial part of health spending. In modern clinical practice, unreasonable use of drugs is a key problem, as more than half of all medicines are recommended, dispensed or improperly sold [4]. While COPD is a leftist, incurable disease, pharmacological therapy may help control symptoms, reduce exacerbations and enhance exercise tolerance and state of health. The cornerstone of COPD pharmacological therapy is bronchodilation with such a long-acting muscarinic antagonist (LAMA), a long-acting β_2 -agonist (LABA), or a combination of both, based on breathlessness severity and patient's risk of exacerbation. However, a substantial percentage of COPD patients may fail to meet adequate symptom control or exacerbate reduced risk while only having received a long-acting bronchodilator, such as LAMA or LABA, in monotherapy. Escalation to numerous bronchodilators without an inhaled corticosteroid (ICS) will rely heavily on the symptom burden of the patient (including rest or exertion dyspnea, cough, sputum production and COPD evaluation test or modified shortness of breath scores of the Medical Research Council) and the risk of worsening. The best predictor of the potential frequency of exacerbation for a patient remains the amount of exacerbations that they encountered in the previous year. Current recommendations for care suggest the use of ICS / LAMA / LABA combination therapy for patients still on bronchodilators with recurrent symptoms and/or at risk for potential exacerbations [2, 6, and 7].

Prescription pattern tracking studies (PPMS) are study of drug usage and are a method that focuses

primarily on prescribing and administering drugs. They promote the proper use of monitored drugs and reduce the abuse or misuse of supervised drugs [8]. Bad prescription habits lead to inadequate and unsafe treatment, increased incidence or continuance of disease, distress and harm to the patient and higher costs. In this study, an attempt is made to understand prescription patterns followed in our study site with focus on prescribing actions of the patient.

MATERIALS AND METHODS

Study design and setting

The prospective retrospective research was performed for 6 months in Sun Shine tertiary care teaching Hospital; Hyderabad, Pulmonology and general medicine ward patients. Data was obtained using an input method designed specifically for data entry. With each patient, the following information was collected: social background, diet, history of smoking, presence of comorbidities, extent of dyspnea, seriousness of the condition, prescribed COPD therapies and history of exacerbation.

Subjects

The current experimental procedure used a potential audit during the course of the study of 154 Patients with COPD with or without co-morbidity confessed in the Department of Pulmonology and General Medicine.

Inclusion Criteria

Inclusion Requirements includes patients with COPD of either sex with (or) no co-morbidity admitted in general medicine and pulmonary medicine and age 18-80.

Exclusion criteria

Patients who refuse to attend were excluded from the study: Paediatrics, pregnant women and lactating women.

Ethical consideration

The ethical approval to conduct the study was obtained from the Ethical Review Committee of Sun Shine tertiary care teaching Hospital by researcher team from HITS College of Pharmacy. Written consents were obtained from each participant.

Data analysis

The collected data expressed in percentage.

RESULTS

A prospective study was undertaken by reviewing 154 patients with COPD on prescription. The patients were classified according to gender, age, social history, co-morbidity conditions. 120 (77.92 percent) of the 154 patients were male, and 34 (22.07 percent) were female. The large number of patients in the 58-68 year age group (46.75 percent) followed by 48-58 years (19.40 percent), 68-78 years (12.33 percent), 38-48 years (7.79 percent), > 78 years (3.24 percent) and the lowest in the 18-28 year age group (1.94 percent) and 28-38 year age group (1.94 percent). Of the 154 patients, 62 (40.25%) were smokers; 60 (38.96%) were non-smokers; and 32 (20.77%) were ex-smokers. It was also noted that 22 (14.28%) were alcoholics, 115 (74.67%) were non-alcoholics and 17

(11.03%) were ex-alcoholics. Out of 154 patients, 114 (74.02%) were not having any other comorbid condition the most common comorbidity was hypertension [20(12.98%)], followed by diabetes mellitus [7(4.54%)], tuberculosis [5(3.24%)], corpulmonale [3(1.94%)], GI disorders [3(1.94%)] and least observed conditions were ulcer [1] and esophageal carcinoma [1] with 0.64% each as mentioned in the [Table 1].

A total of 2214 drugs were prescribed for 154 patients, out of which 1592 used for the management of COPD. Among COPD class of drugs bronchodilators were mostly prescribed [527(33.10%)], followed by antibiotics [492(30.90%)], corticosteroids [200(12.56%)], bronchial secretion enhancers [100(6.28%)], mucolytics [89(5.51%)], antihistamine [82(5.15%)], leukotriene-antagonist [45(2.80%)] and oxygen inhalation [24(1.50%)], opioids [19(1.19%)], antitussive [14(0.87%)] as mentioned in the [Fig 2].

Table 1: Socio-demographic parameters.

Parameter	No of Persons	Percentage
Gender		
Male	120	77.92
Female	34	22.07
Age		
18 to 28 – 1.21%	3	1.94
28 to 38 – 1.21%	3	1.94
38 to 48 – 9.146%	12	7.79
48 to 58 – 23.78%	40	19.40
58 to 68 – 45.73%	72	46.75
68 to 78 – 14.63%	19	12.33
>78 – 4.26%	5	3.24
Smoking History		
Smoker	62	40.25
Non Smoker	60	38.96
Ex-Smoker	32	20.77
Alcohol History		
Alcoholics	22	14.28
Non-alcoholics	115	74.67
Ex-alcoholics	17	11.03
Comorbidities		
COPD without any co-morbidity	114	74.02
COPD with HTN	20	12.98
COPD with DM	7	4.54
COPD with TB	5	3.24
COPD with corpulmonale	3	1.94
COPD with GI disorders	3	1.94

COPD with ulcer	1	0.64
COPD with esophageal carcinoma	1	0.64

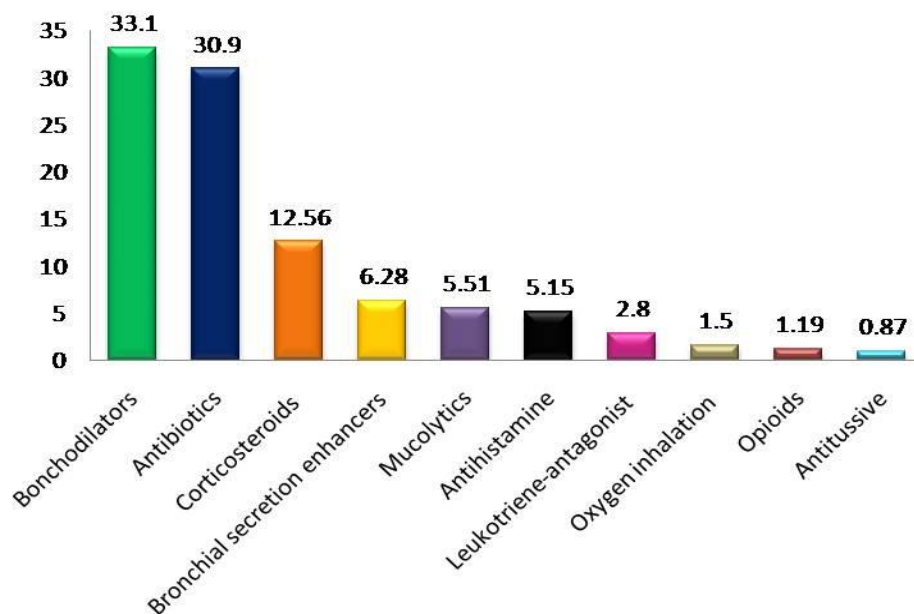


Fig 2: Different class of drugs prescribed for management of COPD (n=1592).

Figure 2 shows distribution of bronchodilators among COPD drugs. Beta sympathomimetics [242(45.92%)] were mostly prescribed, followed by

methylxanthines [170(32.25%)], anticholinergic [115(21.82%)].

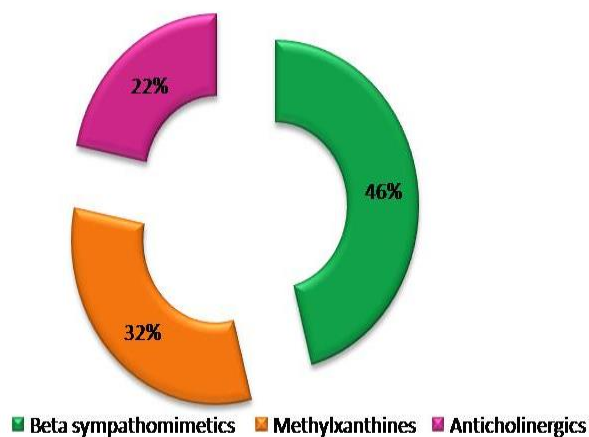


Figure 2: Distribution of prescribed Bronchodilators among COPD drugs (n=527).

Figure 3: illustrates distribution of corticosteroids in which inhaled corticosteroids [170(60.28%)] were

highly prescribed followed by systemic corticosteroids [112 (39.70%)].

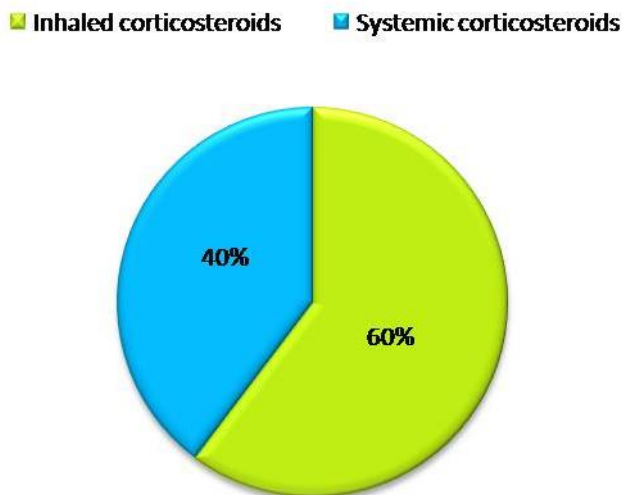


Figure 3: Distribution of prescribed corticosteroids among COPD drugs (n=282).

Table 2 shows distribution of antibiotics. Among 402 antibiotics, 274 (68.15%) were beta-lactam

antibiotics which includes, penicillins (150 drugs) and cephalosporins (124 drugs).

Table 2: Distribution of prescribed Antibiotics among COPD drugs (n=402).

Class of antibiotics	No. of drugs	Percentage
Beta lactam antibiotics	274	68.15
Macrolide antibiotics	63	15.67
Fluoroquinolones	38	9.45
Aminoglycosides	17	4.22
Oxazolidinone	6	1.49
Lincosamide antibiotics	3	0.74
Tetracyclines	1	0.24

Table 3: illustrates details of concomitant drugs prescribed. H2 antagonist was [104(14.13%)] highly prescribed drugs followed by paracetamol

[101(13.72%)] followed by antihypertensive drugs [88(11.95%)].

Table 3: Concomitant Drugs (n=736).

Drug	No. of drugs	Percentage
H2 Antagonist	104	14.13
PCT	101	13.72
Anti-Hypertensive	88	11.95
MVI	80	10.86
PPIs	74	10.05
IVF	56	7.60
NSAIDs	48	6.52
Anti-anxiety	40	5.43
Anti-emetics	32	4.34
Anti-tubercular drugs	28	3.80
Ant platelets	18	2.44
Anti-diabetic	15	2.03
Other drugs	72	9.78

Figure 4, illustrates Route of administration of drugs of which oral route of administration was mostly used [992(45.19%)] with prescribed drugs in

COPD patients with or without comorbidity, followed by parenteral route [796(36.26%)], inhalation route [403(18.35%)], topical route [4(0.18%)].

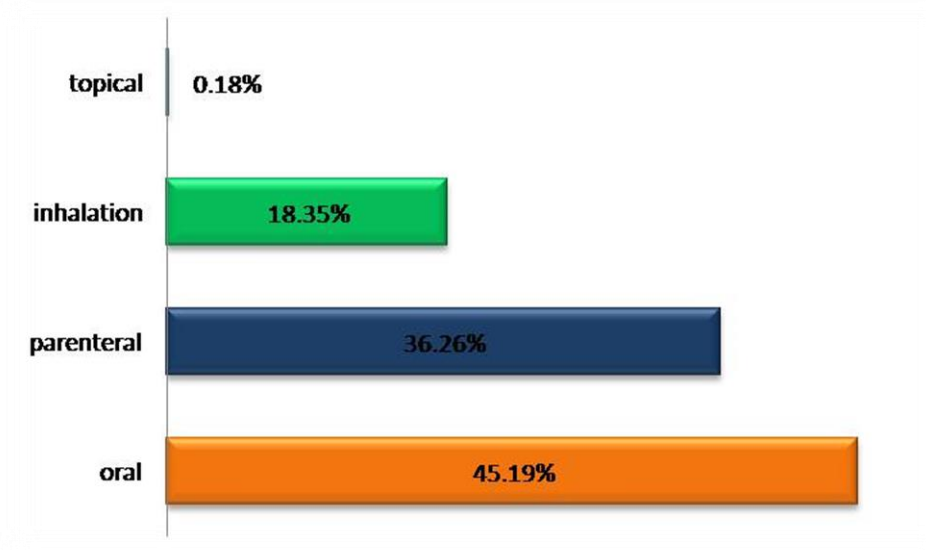


Figure 4: Route of administration of drugs (n=2195).

Table 4 illustrates combination therapy in study population. Salbutamol + budesonide and theophylline + etiohylline were given in equal

percentage and were most commonly prescribed (40.90%), followed by salbutamol + ipratropium + budesonide (38.31%).

Table 4: Combination therapy in study population (n=154).

Drug	No. of Patients	Percentage
Salbutamol + budesonide	63	40.90
Theophylline + etiohylline	63	40.90
Salbutamol + ipratropium +budesonide	59	38.31
Levocetirizine + montelukast	49	31.81
Piperacillin + tazobactam	31	20.12
Ceftriaxone + sulbactam	27	17.53
Ambroxol + doxofylline	24	15.58
Amoxicillin + clavulanic acid	18	11.68
Salbutamol + ipratropium	17	11.03
Ipratropium + budesonide	15	9.74
Salmeterol + fluticasone	10	6.49

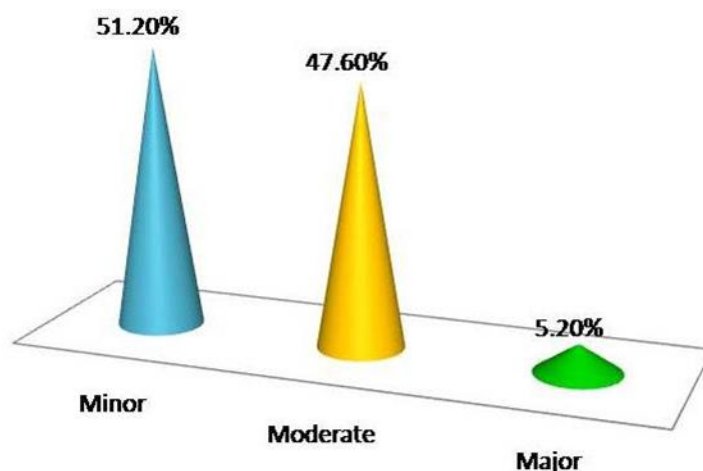


Figure 5: severity of possible drug-drug interactions (n=750).

Figure 5, illustrates severity of possible drug-drug interactions found in prescriptions in which minor severity were mostly found among all prescriptions [384(51.20%)] followed by moderately severe drug drug interactions [357(47.60%)] and major interactions [39(5.20%)].

DISCUSSION

A prospective observational study was conducted by reviewing 154 patients with COPD on prescription. 120 (77.92 percent) of the 163 patients were male, and 34 (22.07 percent) were female. The study found that COPD occurs more in men than women, which is supported by historical studies and is primarily attributed to cigarette smoking, while other factors may be environmental and occupational exposure to vapour, smoke, gas and fumes. This finding is consistent with the findings of previous studies carried out [9] and Sawant PM.

Of the total prescriptions received, age was taken into account by splitting into 7 age groups that are held at a 10-year period each. The large number of patients was 58-68 years of age group (46.75%) followed by 48-58 years old (19.40%). Age-associated alterations in lung form and composition may boost pathogenic susceptibility to COPD, and employment factors may contribute to COPD as well. Therefore, the risk of developing COPD is higher in middle-aged patients and the elderly.

Of the 154 patients, 62 (40.25%) were smokers; 60 (38.96%) were non-smokers; and 32 (20.77%) were ex-smokers. History of smoking cigarettes is the

main cause of COPD because tobacco smoke contains harmful toxins that affect the function of the lung and may lead to air bags being tightened, walls between air bags deteriorated, airway wall thickening and inflammation increased and mucus production in the airways causing air blockage. It was also found that 22 (14.28%) were alcoholics, 115 (74.67%) were non-alcoholics and 17 (11.03%) were ex-alcoholics.

114 (74.02 percent) of the 154 patients did not have any other incidence and the most common comorbid conditions found in the remaining patients was high blood pressure [20(12.98 percent)]. High blood pressure is frequently seen in COPD patients due to loss of alveolar renovations of the pulmonary vessels caused by chronic hypoxia and infection, decreases in endothelial vasodilator levels such as nitric oxide and vasospasm caused by factors such as endothelin-1. The modifications in stress, age, lifestyle can also contribute to hypertension. The outcome chosen to represent high blood pressure was consistent with previous studies [9] and Sawant PM et al. and Mahmoodan M et al. as the most commonly found comorbid condition. All the prescriptions were seen to contain more than 3 drugs which imply polypharmacy.

Of the 2214 medications, 1592 have been used for COPD management. By many COPD class of drug bronchodilators were recommended mostly [627(39.38%)], which was endorsed by the findings of the statistical study conducted by Singh S et al.(10) Bronchodilators are central to COPD treatment because they ameliorate bronchial constriction and

airflow restriction, decrease hyperinflation and improve lung emptying and physical activity.

Salbutamol (62.46%) is the mostly prescribed drug among bronchodilators. Inhaled corticosteroids [170 (60.28%)] are preferred over systemic corticosteroids [112(39.71%)]. This finding is similar to that of previous study [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 research found that ceftriaxone was the most widely prescribed antibiotic (97 drugs), and it was confirmed by earlier studies [10].

It was observed that the oral route of administration in COPD patients with or without comorbidity was mainly used [992(45.19 percent)] with prescription medications, followed by parenteral route [796(36.26 percent)]. In the combination therapy evaluation, we found that salbutamol + budesonide and theophylline + etioophylline were administered at the same pace and it was found to be the most widely prescribed (40.90%), followed by salbutamol + ipratropium + budesonide (38.31%).

Salbutamol – Budesonide was the drug-drug interaction often found in the medication, leading to

polypharmacy. Generic prescriptions [31(1.44 percent)] were found to be low. This is analogous to the Kothai R analysis. Prescribing the drugs with their brand raises the cost of treatment to patients rising generic prescriptions would justify the use and decrease the cost of the drug as well as reduce the confusion regarding drug names, cost and products of stock.

To maximize the use of scarce resources for optimal protection and meet the health care needs of the majority of the population, use of drugs from the essential drug list should be encouraged. Our study revealed that the percentage of drugs prescribed at WHO-EDL 2017 was 91.87%.

CONCLUSION

The study concludes that the COPD patients received symptomatic treatment. It has preferred combinational therapy over monotherapy. Bronchodilators were amongst COPD patients the most prescribed class of medications. Antimicrobial therapy was administered to all patients. The prescription contains more than three drugs indicating polypharmacy and lacked spirometry for COPD diagnosis.

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