



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203



Human Journals

Research Article

January 2023 Vol.:26, Issue:2

© All rights are reserved by Sripriya C et al.

## Evaluation of Prescription Pattern and Pharmaco-Economic Analysis According to WHO-Gold Guidelines in COPD Patients Attending a Tertiary Care Hospital



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203



Sarumathi S<sup>1</sup>, Simi Varghese<sup>1</sup>, Steffy Mathew<sup>1</sup>,  
Vandana B N<sup>1</sup>, Vanil Roy Talluri<sup>1</sup>, Sripriya C\*<sup>2</sup>,  
Juveria Banu<sup>2</sup>

<sup>1</sup>Pharm D Interns, Department of Pharmacy  
Practice, The Oxford College of Pharmacy,  
Hongasandra, Bangalore-560068, Karnataka, India.

<sup>2</sup>Assistant Professor, Department of  
Pharmacy Practice, The Oxford College of Pharmacy,  
Hongasandra, Bangalore-560068, Karnataka, India.

**Submitted:** 22 December 2022

**Accepted:** 28 December 2022

**Published:** 30 January 2023

**Keywords:** Anti-muscarinic agents, Beta agonist, Chronic Obstructive Pulmonary Disease (COPD), Corticosteroids, Pharmaco-economics analysis, Prescription pattern.

### ABSTRACT

**Background & Objectives:** Airway obstruction or anomalies in the alveoli are common, avoidable, and treatable signs of chronic obstructive pulmonary disease (COPD), which is mostly brought on by prolonged exposure to noxious gas particles. The primary goal of this study is to assess the prescription patterns and pharmaco-economics analysis in Chronic Obstructive Pulmonary Disease (COPD) patients admitted to tertiary care hospitals using WHO-GOLD recommendations. **Materials and methods:** This is an observational cross-sectional study carried out for a period of 6 months. A total of 96 patients who met the inclusion criteria were included in the study. The quantitative variables were presented using descriptive statistics such as mean, and standard deviation. The Association between variables was tested using t-test. All p values less than 0.05 are considered as significant. **Results:** Out of 74 total number of prescription, the minimum cost of drug is 29.6 and maximum cost of drug is 301. An Average of 5.92 drugs was prescribed for every prescription. The average cost of therapy is found to be 373.28 rupees. The prescription pattern study showed high usage of Beta agonist alone and in combination with Anti-muscarinic agents followed by inhaled corticosteroids and Xanthine derivatives which are according to the GOLD guidelines. **Conclusions:** The evaluation of prescription patterns aids in the analysis of commonly prescribed medications and their efficacy, which aids healthcare professionals in adopting the practice of prescribing medications with higher efficacy and optimal cost, reducing the medical and financial burden of the patient, and improving the patient's health.



[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

## INTRODUCTION

The term "chronic obstructive pulmonary disease" (COPD) refers to a condition that is "common, preventable, and treatable; that is characterized by persistent respiratory symptoms, including airway limitation due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles of gases"<sup>1</sup>.

Although estimates have ranged from 7 to 19%, it is mostly unknown how common COPD is worldwide. According to the Burden of Obstructive Lung Disease (BOLD) research, the prevalence of the disease is 10.1% worldwide. Women had a pooled prevalence of 8.5% while males had a prevalence of 11.8%<sup>2</sup>. With a prevalence of COPD grade 2 or above of 10.1% overall, 11.8% for men and 8.5% for women and a significant prevalence of COPD of 3-11% among nonsmokers, BOLD reported lower lung function than prior studies<sup>3</sup>. Emphysema and chronic bronchitis are the two of these illnesses that affect people the most frequently. Emphysema primarily damages the lungs' air sacs, which obstructs airflow outward. Second, bronchitis causes inflammation and tube constriction, which permits mucus to accumulate<sup>4</sup>.

Breathing problems are a hallmark of chronic obstructive pulmonary disease. The initial symptoms, which include intermittent coughing and shortness of breath, might be moderate. Early signs include moderate but persistent coughing and sporadic shortness of breath, especially after activity. Symptoms may worsen and become more difficult as they advance. Fatigue, swelling in the feet, ankles, and legs, and weight loss are possible symptoms of chronic obstructive pulmonary disease in its latter stages. If you smoke or are frequently around secondhand smoke, your symptoms are probably going to be much worse<sup>4</sup>.

Obstructive lung disease, such as COPD, is characterized by a severe and long-lasting inflammatory response to allergens breathed. I also include persistent bacterial infections in this inflammatory condition. Neutrophil granulocytes and macrophages, two different kinds of white blood cells, are the inflammatory cells in question. Some persons with chronic obstructive lung disease have eosinophil involvement comparable to that in asthma, while those who smoke more often have Tc1 lymphocyte involvement. The chemotactic factors of inflammatory mediators contribute to some of this cell response. The destruction of the lungs' connective tissue by proteases that are poorly controlled by protease inhibitors, oxidative stress caused by the high concentration of free radicals in cigarette smoke and generated by inflammatory cells, and oxidative stress all contribute to lung injury. Emphysema results

from the breakdown of the lungs' connective tissue, which consequently affects airflow and the absorption and expulsion of breathing gases. Inflammatory mediators produced by the lungs into the blood may be partially to blame for general muscle atrophy that frequently occurs in COPD<sup>5</sup>.

Inflammation causes the Airways to narrow, and internal scarring can lead to hyperinflation or air trapping. Exercise-induced hyperinflation is associated with shortness of breath in COPD because partial lung filling makes breathing in uncomfortable and can get worse during an episode. Poor gas exchange caused by decreased ventilation from airway blockage, hyperinflation, and a diminished desire to breathe at all during exacerbation can result in low oxygen levels and, eventually, high carbon dioxide levels in the blood. While emphysema can cause the capillaries in the lungs to break down, persistent low oxygen levels can cause the lungs' arteries to constrict. Both of these modifications lead to elevated pulmonary artery blood pressure, which may result in right-sided heart failure owing to lung illness, commonly known as cor-pulmonale<sup>5</sup>.

Either non-pharmacological treatment or pharmaceutical management can be used to treat this. Other self-management strategies include quitting smoking, increasing exercise and physical activity, proper nutrition, medication adherence, and coping skills. Non-pharmacological interventions also include providing COPD education, stressing the importance of taking medications on a daily basis and using an inhaler with routine follow-up visits. The patient should be inspired to give up smoking, practice regular exercise, eat a healthy diet, and adhere to their medication schedule. Some of the drugs utilized in pharmacotherapy include beta-2 agonists, anti-cholinergics, methylxanthines, such as inhaled corticosteroids, phosphodiesterase-4 inhibitors, and mucolytic drugs<sup>6</sup>.

***Prescription pattern and cost analysis:***

According to the Global Burden of Disease Study, there were 251 million cases with COPD worldwide in 2016. Every year, COPD is becoming more common. According to estimates, the illness was responsible for 3.17 million fatalities worldwide<sup>7</sup>. Medical expenses for treating COPD and the indirect cost of morbidity can constitute a significant economic and social burden for countries given the frequency of this disease and the length of sickness for individuals affected. To lessen the impact of the condition on morbidity, mortality, and

improved quality of life, an appropriate prescription pattern must be followed. Additionally, it makes sure that the patient's financial responsibilities are minimized<sup>8</sup>.

This study aims to determine the financial impact of COPD and to evaluate the cost-effectiveness of healthcare interventions for both prevention and treatment. This study sheds light on the efficacy and safety of the treatment used to control the condition<sup>9</sup>.

***Need for study:***

Given that COPD is a medical condition that is quite prevalent around the world, the study is necessary to enhance patient health care and prescribing methods. This study will aid in the interpretation of treatment alternatives employed in this healthcare context and provide affordable treatment options with the best possible therapy. This study will enable healthcare professionals to analyze the most frequently prescribed pharmaceuticals, which will benefit patients by easing the financial burden of prescription and treatment expenditures. Both physician prescription practices and patient adherence to the treatment are significantly influenced by the cost of the medication. The cost sustainability of the COPD therapeutic choices will be assessed with the help of this research.

**MATERIAL AND METHODS**

Ethical approval is obtained from the Institutional ethics committee of the Oxford Medical College, Hospital and Research Centre, Attibele, Bangalore. This cross-sectional study was carried out in The Oxford Medical College and Research Centre located in Attibele, Bangalore for 6 months. Coming to the sample size, by using the formula  $X = Z^2 P (1-P) / e^2$ , 96 Cases admitted during the period of 2020-21 was followed after obtaining the informed consent to get outcome analysis.

***Inclusion criteria:***

Prescriptions of patient with either sex, or prescription of patients above 18 years of age were included.

***Exclusion criteria:***

Prescription of pediatrics and pregnancy women and prescription of patients that are over a year old were excluded from the study.

***Sources for data collection:***

Patient case records for inpatients & outpatients used to obtain patient's medical history, recording observations & administration of drugs and therapies, test results etc.

***Data Collection:***

*Step 1:* Ethical approval from Institutional Ethics Committee of The Oxford Medical College, Hospital and Research Centre. IEC/TOMCHRC/180/2020-21.

*Step 2:* Demographics of the patient (Name, Age, Sex, etc.) were collected and the date regarding diagnosis, prescribed drugs, indication and their route of administration, frequency and dose of drugs, number of days of stay in case of inpatients.

*Step 3:* Analysis of medication prescribed to the COPD patients using prescribing indicators was done which includes:

- a. Number of drugs per prescription.
- b. Most commonly prescribed beta 2 agonist.
- c. Most commonly prescribed anti-cholinergics.

*Step 4:* Cost analysis of medication per prescription using cost indicators which include:

- a. Average total cost per prescription.
- b. Cost of prescription for patients with co-morbidity.
- c. Cost of prescription for patients without co-morbidity.

*Step 5:* The obtained data is subjected for suitable statistical analysis method.

*Step 6:* The feedback results were provided to clinicians and other relevant groups.

***Statistical analysis:***

Statistical Analysis was performed using Microsoft Excel 2007. The Data was entered into excel sheet and analyzed. The data was presented using frequencies, percentages along with appropriate graphs and charts. The quantitative variables were presented using descriptive statistics such as mean, and standard deviation. The Association between variables were

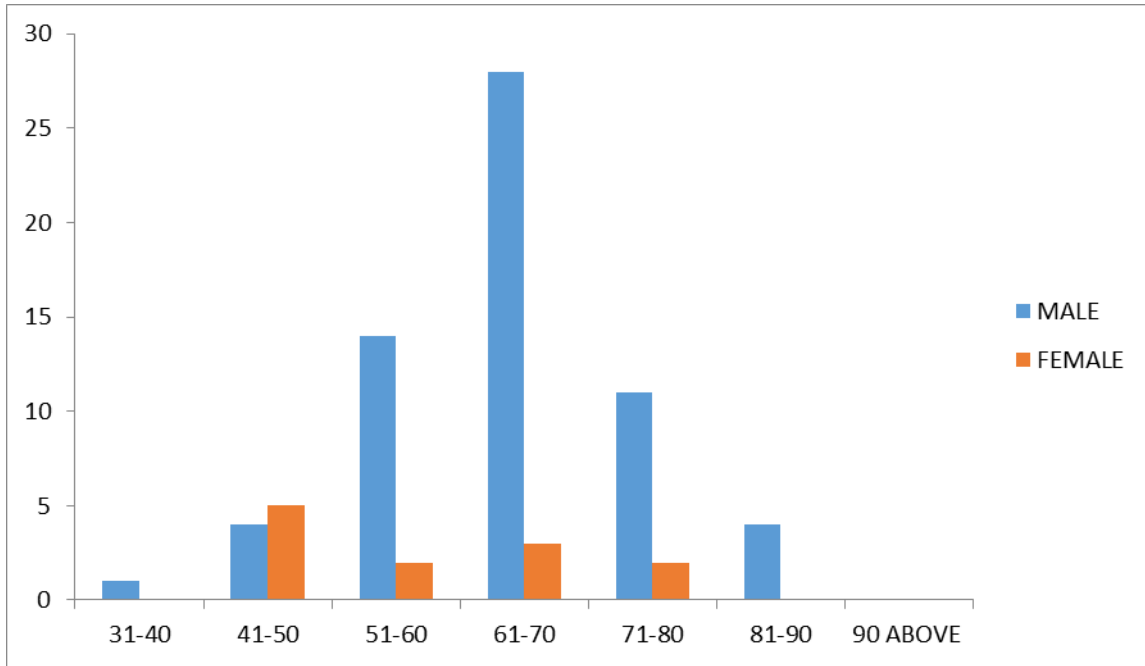
tested using t-test. The level of significance was set at 0.05. All p values less than 0.05 are considered as significant.

## RESULTS

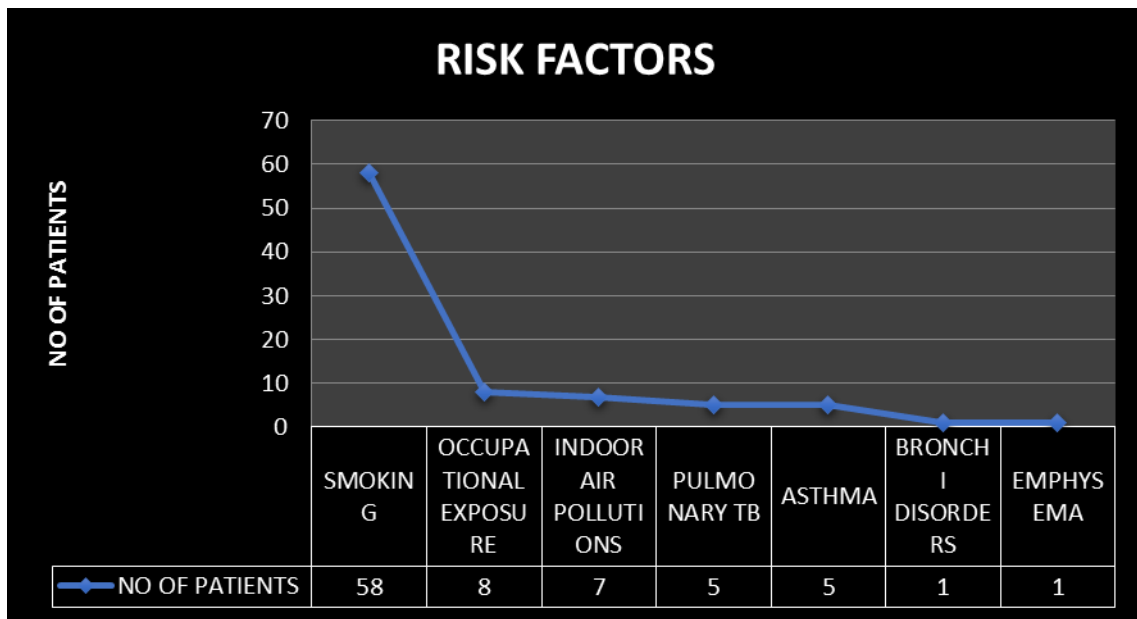
The patients were divided in 7 groups as per the age groups. Most of the patients were found in the age group of 61 – 70 in Males and 41-50 in females. Age and Gender wise distribution of patients represented in Fig 1. The social activities such as smoking, tobacco (in any form) and alcohol consumption are taken consideration. Out of 74 prescriptions, the highest was smoking (55 %) and tobacco (32%) and alcohol (13%). Usually, COPD is associated with risk factors and major risk factor was found to be Smoking, other factors include occupational exposure, indoor air pollution and respiratory health issues. Risk factor in patients that caused COPD represented in Fig 2. Route of COPD drug administration represented in Fig. 3. COPD drugs prescribed were given in Table 1.

The mean number of drugs per prescription is 5.92 (std. deviation = 2.20). The minimum no of drugs per prescription was 2 and maximum no of drugs per prescription was 12. Out of 74 prescriptions, COPD alone were 41 patients (55.4%) and COPD with co-morbid condition were 33 patients (44.59%). Out of 74 prescriptions, it shows that as the age increases drugs prescription is also increased due to the patient's compliance towards it except age group of 71-80 years as less no of patients and above 90 years no patients were found. The average no of drugs prescribed for the classified age group are 31-40 years is 3, 41-50 years is 5.22, 51-60 is 5.87 ,61-70 is 6.17, 71-80 is 5.5 and 81-90 years is 7.6 were found. Statistical analysis of prescription according to GOLD guidelines was given in Table 3.

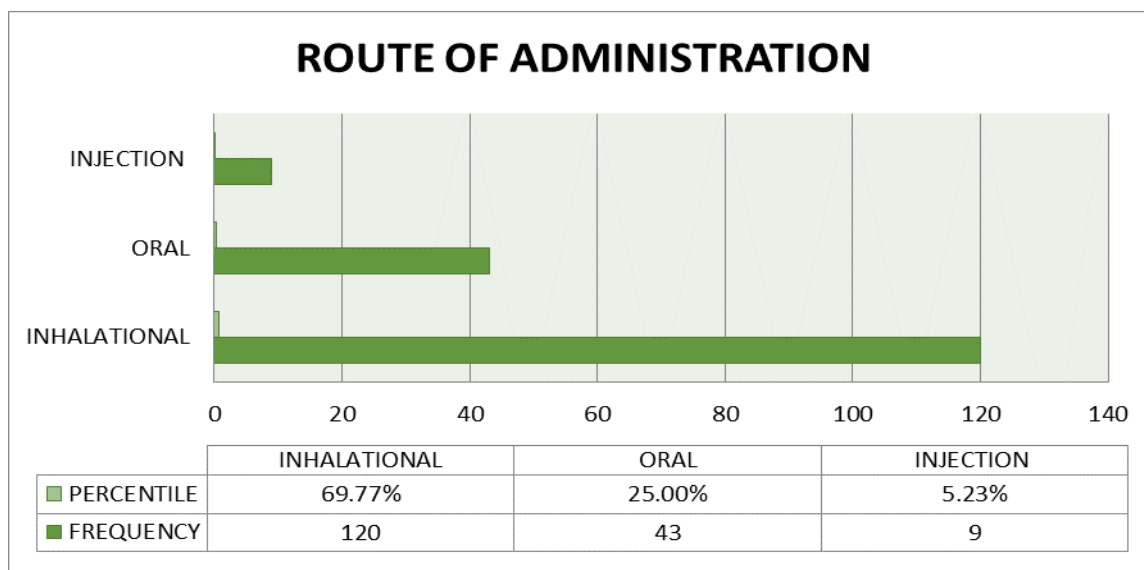
The average cost of prescription for the management of COPD is found to be 373.28 (Std. dev =203.63). The minimum and maximum cost of drug per prescription in COPD drugs is 29.6 INR and 301 INR respectively. Salbutamol was found to be the most cost-effective drug among all COPD drugs and Formeterol + Budesonide was found to be the most expensive drugs prescribed. In other drugs ceftriaxone, phenytoin and human insulin was found to be the most expensive drugs prescribed. Descriptive studies of cost of prescription & Cost of COPD drugs prescribed were given in Table 4 & 5 respectively. Statistical analysis of cost of prescription for COPD with and without co-morbidity was given in Table 6.



**FIG. NO. 1: AGE AND GENDER WISE DISTRIBUTION OF PATIENTS**



**FIG. NO. 2: RISK FACTOR THAT CAUSED COPD IN PATIENTS**



**FIG. NO. 3: ROUTE OF ADMINISTRATION OF DRUGS PRESCRIBED**

**TABLE NO. 1: COPD DRUGS PRESCRIBED**

DRUGS PRESCRIBED	TOTAL NO OF PRESCRIPTION	PERCENTAGE
SALBUTAMOL	20	12.42%
SALBUTAMOL + IPRATROPIUM BROMIDE	50	31.05%
BUDESONIDE	28	17.39%
FORMOTEROL + BUDESONIDE	14	8.70%
THEOPHYLLINE	14	8.70%
ACEBROPHYLLINE+ ACETYLCYSTINE	28	17.39%
ACEBROPHYLLINE	6	3.73%
FLUTICASONE PROPIONATE + SALMETEROL	1	0.62%
TOTAL NO OF DRUGS	161	



**TABLE NO. 2: CATEGORY OF COPD DRUGS PRESCRIBED ACCORDING TO GOLD GUIDELINES**

CATEGORY OF COPD	NO OF PRESCRIPTION
A	31
B	17
C	25
D	1

**TABLE NO. 3: STATISTICAL ANALYSIS OF PRESCRIPTION ACCORDING TO GOLD GUIDELINES**

STATISTICS	ACCORDING TO GOLD(n=59)	NOT ACCORDING TO GOLD(n=15)
MEAN	5.93	5.87
STD.DEV	2.58	2.26
p value		0.4682

**TABLE NO. 4: DESCRIPTIVE STUDIES OF COST OF PRESCRIPTION**

STATISTICS	MEASURE
TOTAL NO OF PRESCRIPTION	74
MINIMUM COST DRUG	29.6
MAXIMUM COST DRUG	301
MEAN OF DRUG COST	373.28
STANDARD DEVIATION	203.63

**TABLE NO. 5: COST OF COPD DRUGS PRESCRIBED**

<b>DRUGS PRESCRIBED</b>	<b>COST / DAY /PRESCRIPTION</b>
SALBUTAMOL	Rs. 29.6
SALBUTAMOL+IPRATROPIUM BROMIDE	Rs.69
BUDESONIDE	Rs.118.85
FORMETEROL + BUDESONIDE	Rs. 301
THEOPHYLLINE	Rs.27
ACEBROPHYLLINE	Rs.142.45
ACEBROPHYLLINE +ACETYLCYSTINE	Rs. 127
FLUTICASONE PROPRIONATE + SALMETEROL	Rs.209

**TABLE NO. 6: STATISTICAL ANALYSIS OF COST OF PRESCRIPTION FOR COPD WITH AND WITHOUT CO-MORBIDITY**

<b>PARAMETER</b>	<b>COST (COPD WITH COMORBID)</b>	<b>COST (COPD WITHOUT COMORBID)</b>
n	46	28
MEAN	396.67	334.86
STANDARD DEVIATION	232.22	136.47
<b>P VALUE</b>		<b>0.07710</b>

**DISCUSSION**

74 individuals' prescriptions were examined as part of our investigation. Analysis of prescription data revealed that more male patients (62) than female patients (60) reported having COPD (12). Most prescriptions were written for people in the 61-70 age range for men and the 41-50 age range for women. A 2020 research by Poonam Salman and colleagues revealed a comparable prevalence of COPD patients in the study's age range<sup>10</sup>.

The minimum number of drugs per prescription was 2 and maximum was found to be 12. Out of 74 prescriptions patients with COPD alone were 41 patients (55.4) and COPD with co-morbidities were 33 patients (44.59%) and combination therapy was found to be more when compared to monotherapy. This is similar to the study conducted by Shiv Kumar and his coworkers in the year 2019. The result of this study demonstrates similar prescribing pattern in comparison with the present study<sup>11</sup>. The overall Utilization of the COPD drugs were found to be beta agonist (Salbutamol) (12.52%), combination of beta agonist and Anti-Muscarinic agent (Salbutamol + Ipratropium Bromide) (31.05%), inhaled corticosteroids (Budesonide) (17.39%), Xanthine derivatives (Theophylline) (8.70%). This is similar to the study conducted by Shiv Kumar *et al* 2019<sup>11</sup>. All the COPD medications were in accordance with the GOLD guidelines.

In this study it was found that for COPD most of the prescription had inhalation dosage form when compared to oral dosage form. This is similar to the study conducted by Paul D Terry and his coworkers in the year 2020<sup>12</sup>. The average cost of prescription for the management of COPD is found to be 373.8. When taken into account of COPD drugs only, the costliest drug was found to be Formoterol+Budesonide. The high cost of prescription observed in the prescriptions may be attributed to high usage of inhalational corticosteroids in these prescriptions. Kruti D. Patel and coworkers has revealed that pharmacoeconomic evaluation of COPD is essential to obtain optimal therapy at lowest price<sup>13</sup>. The patients in the present study were treated according to the GOLD guidelines by their health care practitioners and were also assessed expertly and regularly. However effective COPD control reduces cost particularly by decreasing hospitalization.

In conclusion, the lowest medicine cost is 29.6 and the highest drug cost is 301 out of a total of 74 prescriptions. For every prescription, 5.92 different medications were recommended. A 373.28 rupee average is revealed to be the cost of treatment. It has been determined from this study that the majority of COPD prescriptions in our hospital are written in accordance with the gold standards. According to the gold recommendations, inhaled corticosteroids and Xanthine derivatives were used most frequently after the prescription pattern analysis revealed substantial usage of Beta agonist both alone and in combination with Anti-muscarinic drugs (salbutamol + ipratropium bromide). By analyzing the most frequently prescribed medications and their effectiveness, prescription pattern analysis aids healthcare professionals in following the practice of prescribing medications with the highest efficacy

and lowest cost, which lessens the patient's financial and medical burden and improves their health.

***Limitations:***

- a. There was insufficient data in this trial to support the full follow-up of outpatients.
- b. The investigation was place over a shorter period of time.
- c. The results of the study need to be confirmed by bigger investigations on treatment patterns involving a wider population.
- d. If other hospitals are involved in the research, more authentic data can be acquired.

***ACKNOWLEDGEMENT:***

We wish to express our sincere gratitude to Dr. Padmaa M. Paarakh., M Pharm, PhD, professor & principal of The Oxford College of Pharmacy, Bengaluru for providing us the opportunity to perform our project work. We thank Prof. G Parthasarathy., M Pharm, PhD., HOD, department of pharmacy practice, The Oxford College of Pharmacy. It is our pleasure to express our gratitude to all who support us in this study.

***FINANCIAL SUPPORT & SPONSORSHIP:***

None

***CONFLICT OF INTEREST:***

None

***REFERENCES:***

1. Vestbo J. COPD. Clin. Chest Med 2014; 35(1):1-6.
2. What is the worldwide prevalence of chronic obstructive pulmonary disease (COPD)? [Internet]. Medscape.com. 2021. <https://www.medscape.com/answers/297664-7353/what-is-the-worldwide-prevalence-of-chronic-obstructive-pulmonary-disease-copd>
3. Contributor N. COPD 1: pathophysiology, diagnosis and prognosis. Nursing Times 2021. <https://www.nursingtimes.net/clinical-archive/respiratory-clinical-archive/copd-1-pathophysiology-diagnosis-and-prognosis-23-03-2020/>
4. Everything You Need to Know About Chronic Obstructive Pulmonary Disease (COPD) [Internet]. Healthline. 2021. <https://www.healthline.com/health/copd>
5. COPD - Diagnosis and treatment - Mayo Clinic [Internet]. MayoClinic.org. 2021. [https://www.mayoclinic.org/diseases-conditions/copd/diagnosis\\_tmt/drc-20353685](https://www.mayoclinic.org/diseases-conditions/copd/diagnosis_tmt/drc-20353685)

6. Montuschi P. Pharmacological treatment of chronic obstructive pulmonary disease. *Int J Chron Obstruct Pulmon Dis* 2006;1(4):409–23.
7. Terzikhan N, Verhamme K M C, Hofman A, Stricker B H, Brusselle G G, Lahousse L. Prevalence and incidence of COPD in smokers and non-smokers: the Rotterdam Study. *Eur J Epidemiol* 2016;31(8):785–92.
8. Jyothi D B, Prasad S V, Vangoori Y, Bharatha A. A prospective study on prescription pattern in chronic obstructive pulmonary disease. *Maedica (Buchar)*. 2020;15(1):37–44.
9. Torabipour A, Hakim A, Ahmadi Angali K, Dolatshah M, Yusofzadeh M. Cost analysis of hospitalized patients with chronic obstructive pulmonary disease: A state-Level Cross-sectional study. *Tanaffos* 2016; 15(2):75–82.
10. Sawant P M, Padwal L S, Kale S A, Pise N H, Shinde M R. Study of drug prescription pattern among COPD patients admitted to medicine in-patient department of tertiary care hospital. *IJBCP*. 2017; 6(9):2228-32.
11. Salwan Poonam, singla, Juhi, Shalini. Prescription pattern in the management of chronic obstructive pulmonary disease patients in a tertiary hospital: an observational study. *Int J Basic Clin Pharmacol* 2020, 9 (10): 1578-1582.
12. Flynn R W, MacDonald T M, Chalmers J D, Schembri S. The effect of changes to GOLD severity stage on long term morbidity and mortality in COPD. *Respir. Res* 2018;19(1):1-0.
13. Sadatsafavi M, Ghanbarian S, Adibi A, Johnson K, FitzGerald J M, Flanagan W, *et al.*, Development and validation of the Evaluation Platform In COPD (EPIC): a population-based outcomes model of COPD for Canada. *Med Decis Making*. 2019 Feb; 39(2):152-67.

