

## ORIGINALARTICLE

**Study of Drug Utilization Pattern of Bronchodilators and Anti-inflammatory Agents in Acute Exacerbation of Bronchial Asthma and COPD at a Tertiary Care Centre**Akkamma Dadibhanvi<sup>1</sup> and Shobha V. Huilgol<sup>1</sup><sup>1</sup> Department of Pharmacology,

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**Abstract:**

**Introduction:** Bronchial Asthma (BA) and chronic obstructive pulmonary diseases (COPD) are inflammatory diseases. Patient clinically presents with difficulty in breathing and airway hyperactivity. In an acute exacerbation patient need hospitalization for symptomatic treatment. Patients also associated with comorbidity and need personalized drug to treat acute exacerbation of asthma and COPD. **Aims and Objectives:** To determine the prescribing pattern of drugs in acute exacerbation of BA and COPD patients of 40-70 year old age. **Material and Method:** A cross sectional study was conducted on 175 patients who were diagnosed acute exacerbation of BA and COPD. Study was carried between February and July 2022. Patient demography, history, general examination, relevant investigations and treatment administered during the study period was recorded. Results obtained were tabulated and analysed using mean, frequency, percentage, descriptive statistics and Pearson's chi-square test. **Results:** Our study analysed 326 drug prescriptions of bronchodilators and anti-inflammatory drugs for conditions of BA and COPD. 96% of drugs were prescribed as polytherapy. 92.6% of prescription were for bronchodilators as fixed dose combination (FDC) of short-acting  $\beta_2$  adrenergic receptor agonist (SABA) + short acting muscarinic antagonist (SAMA) + Budesonide as Inhaled Corticosteroids (ICS). **Conclusion:** In our study majority COPD patients were elderly age group 60-70 year and received maximum number of FDC drugs SABA/SAMA + ICS. Limitation of our study is small sample size and study did not analyse drugs used to treat associated comorbid condition and drug safety. Our study needed follow up of patients and safety analysis was also required.

**Keywords:** Asthma, Bronchodilators, COPD, Comorbid, Drug utilization.

**Introduction:**

Bronchial Asthma (BA) and Chronic Obstructive Pulmonary Diseases (COPD) are the most prevalent non communicable chronic diseases and characterized by persistent respiratory system and airflow limitation which produces shortness of breath, chest tightness and wheezing.<sup>(1, 2)</sup> Global prevalence of asthma was 6.2% and COPD was 4.9% and in India prevalence of COPD was of 7.4% and self reported asthma was 1.9%.<sup>(3, 4,5)</sup> Asthma and COPD are chronic diseases need regular treatment. It is important that patients follow treatment guidelines and practice of smart inhalation technique. This may prevent acute exacerbation and frequent hospitalization. Majority of patients show non-adherence to pharmacological treatment for asthma and COPD these results in poor clinical outcome. Burden of this disease affects patient quality of life, increase in their health care cost and loss of job and poor socioeconomic status.<sup>(6,7)</sup> Asthma and COPD both are chronic inflammatory diseases and affected by various factors like smoking, environmental allergens, microbiological agents and genetic factor.<sup>(8,9)</sup> Environmental factors like high air pollution, dust, smoke and occupational exposure to vapors and fumes play an important role in developing COPD.<sup>(10,11)</sup> Disease causing factors and inflammatory cells are differing for asthma and COPD. In bronchial asthma there is activation of mast cells, infiltration of eosinophils, and T helper 2 (T<sub>H</sub>2) lymphocytes whereas in COPD inflammatory cell of neutrophils, macrophages, and cytotoxic T-lymphocytes (Tc1 cells) causes irritation of the airway.<sup>(12)</sup> Patients clinically presents with symptoms like difficulty in breathing, airway hyperactivity and needs symptomatic pharmacological treatment like bronchodilators and anti-inflammatory agents. Examples of bronchodilators are Beta 2 Adrenergic agonist (sympathomimetics), Theophylline (methylxanthines) and Anticholinergic agents (muscarinic receptor antagonists) and anti-inflammatory are corticosteroid, anti-leukotrienes and Immunomodulators.<sup>(13,14)</sup> Seasonal asthma is seen in early childhood which disappears during adolescence and

reappears in adulthood above 40 year. Acute exacerbation asthma and COPD are more prevalent in older age group.<sup>(15)</sup> Patients also associated with comorbid condition like cardio vascular system (CVS)-heart failure, hypertension, endocrine diseases like thyroid, diabetes mellitus. It is difficult to follow basic guidelines for prescription of drugs for BA and COPD in those who require individual drug choice for associated comorbid condition.<sup>(16)</sup> The aim of the study is to determine the drug utilization pattern of bronchodilators and anti-inflammatory agents in acute exacerbations of bronchial asthma and chronic obstructive pulmonary disease.

### Material and Methods:

A cross sectional study was conducted inpatient department of medicine Al-Ameen Medical College and Hospital Vijayapura, Karnataka India. After getting approval from the institutional ethics committee an observational study was carried between February and July 2022. Total 175 patients were enrolled into the study that are known case of BA and COPD and were admitted in inpatient department for acute exacerbation and consent was taken and the need for the study was explained. Patient's demography, history, general examination, relevant investigations and treatment administered during the study period was observed. Study included both male and female patients and study included patients of age between 40 to 70 years. Pregnant women and lactating mother were excluded from the study and patients with poor general condition and patients with acute renal failure and acute hemodynamic variation were excluded from the study. Result obtained were tabulated and analysed using mean, frequency, percentage, descriptive statistics, Pearson's chi-square test. Statistical Package for the Social Science (SPSS) version 21 was used and a 'p' value <0.05 was considered significant.

### Results:

In our study total 175 patients were observed, who were suffering from acute exacerbation of BA, COPD and BA associated with COPD. Mean age of study participants was 59.2. Table-1 shows details of socio demo graphic features as gender, socioeconomic status and lifestyle of patients which were observed. Patients were also associated with 9.4% of comorbid conditions and among comorbid conditions about 3.5% of patients were diabetes mellitus, Cushing's syndrome and 5.9% of patients were associated with cardiovascular diseases like hypertension, ischemic heart disease and anemia and treatment were received for the same. Our study analysed 326 drug prescriptions of bronchodilators and

Anti - inflammatory drugs. Table-2 shows frequency of

Table-1: Frequency of Socio demo graphics Features Distribution

Socio demo graphics Features		Frequency (%)
Age	40-50 yr	30.9%
	50-60 yr	17.7%
	60-70 yr	51.4%
Gender	Male	69.1%
	Female	30.9%
Disease	Asthma	23.4%
	COPD	64.5%
	COPD and Asthma	11.9%
Occupation	Retired from Job	13%
	Business	19%
	Farmer	19%
	Factory worker	33%
	House wife	16%
Socioeconomic Status	<10,000 Rs	58.9%
	>10,000 Rs	41.1%
Life Style	Smoking	Male 39.4%
	Tobacco chewing + Smoking	Male 14.9%
	Tobacco Chewing	Male and Female 39.4%

Table -2 Frequency Distribution of Drug Combination Disease wise

Drug Combination	BA	COP D	BA+COPD
[SABA/SAMA+ICS ]+LTRA+SCS+ Methylxanthines	-	5.10%	1.70%
[SABA/SAMA+ICS ]+LTRA	6.90%	6.90%	2.30%
[SABA/SAMA+ICS ]+LTRA+SCS	2.90%	5.80%	2.90%
[SABA/SAMA+ICS ]+ SCS	1.10%	9.70%	1.70%
[SABA/SAMA+ICS ]	9.10%	24%	2.30%
[SABA/SAMA+ICS ]+ Methylxanthines	-	6.90%	1.10%
LTRA	1.10%	1.10%	-
LTRA + SCS	1.10%	1.10%	-
SCS	1.10%	0.60%	-

[SABA/SAMA+ICS ]+ SCS+	-	2.30%	-
[SABA/SAMA+ICS ]+LTRA+	-	1.10%	-
Methylxanthines			
<b>Total drug received</b>	<b>23.3%</b>	<b>64.5%</b>	<b>12%</b>

drug prescription disease wise and about 64.5% of drug were prescribed for condition COPD and followed by BA(23.3%) and asthma associated with COPD(12%). Maximum number of drugs was combination agents; about 52% of drug prescriptions was received by patients of old age 60-70 years and followed by age group 40-50yr(30%) and 50-60 yr(18%). Patients were prescribed drugs in form of brand name and maximum 4 numbers of drugs per person were received. Our study analysed that 96% of drugs prescribed as poly therapy and followed by mono therapy. Among mono therapy 2% of prescribed drugs were systemic steroids (SCS) and 2% oral Leukotriene Receptor Antagonist (LTRA). 92.6% of prescription were as fixed dose combination(FDC) of short-acting  $\beta_2$  adrenergic receptor agonist(SABA) and short acting muscarinic antagonist( SAMA) and Budesonide Inhaled Corticosteroids (ICS) followed by systemic corticosteroids, among LTRA(40%) only montelukast was drug utilised and Methylxanthines(19.3%)(combination of Etophylline and Theophylline) as bronchodilator were prescribed. In this study patients of BA and COPD who were also suffering from acute respiratory tract infection [ARTI] and received low dose of systemic steroids (38.4%) like inject able hydrocortisone (21.1%), dexamethasone (15.4%) and Methylprednisolone (1.1%) were given for 24 hr for relief of acute exacerbation.

### Discussion:

In this study most of patients received SABA (Salbutamol) and SAMA (Ipratropium bromide) to reverse symptoms of the acute exacerbation BA and COPD. Our study observed that majority of patients of BA and COPD received FDC of SABA/SAMA and ICS for acute exacerbation who were needed hospitalization and treatment was given following standard guidelines.<sup>(17)</sup>Kostakou E *et al* Study showed that combination SABA+SAMA and ICS were prescribed for acute exacerbation of asthma and COPD.<sup>(18)</sup>Our study observed that about 40% of LTRA (montelukast) and 19.3% of Methylxanthines (Etophylline and Theophylline)were prescribed as adjuvant to triple inhaled therapy and injectablesteroids.Kostakou E *et al* Study reviewed that there is an improvement in the lung function with use of LTRA [Montelukast and

Zafirlukast] for acute asthma and maximum response that can be achieved by addingOf Methylxanthines[aminophylline,theophylline] for acute asthma.Studywas not able showsafety of use methylxanthines.<sup>(18)</sup>Our study matches with similar study done by Sawant *et al* where COPD patients received FDC of SABA+SAMA and ICS for acute exacerbation.<sup>(19)</sup>Zhang Ret *al* Study analysed that use of budesonide with optimal dose there is an improvement in lung function of patients with acute exacerbation BA and COPD.<sup>(20)</sup>Cheng SL *et al* perspective REACT study showed that effectiveness of ICS- budesonide as anti-inflammatory agent was better than use of SABA as monotherapy to control acute asthmaexacerbation.<sup>(21)</sup>Suauet *al* Studys showed that triple therapy of combination SABA/SAMA and ICS better than use of monotherapy in moderate to severe exacerbation asthma and COPD and also study approved that there is an improvement in lung function and free from acute symptoms.<sup>(22)</sup>Lee JK *et al* 6 year follow up of retrospective study observed that use of oral methylxanthines and/or LTRA have shown poor improvement in lung function. Use of these drugs was resulting in acute exacerbation of COPD and makes patients to hospital admissions. Methylxanthines and /or LTRA used instead of SABA and other inhaler because medicines werefell short and methylxanthines and /or LTRA were used for longer duration than the recommended medicines.<sup>(23)</sup> Perspective study of vanHaarst *et al* reviewed several studies that drugs were prescribed based on severity and associated risk of COPD disease. Study also explained merits and demerits of older verses newer drugs like bronchodilators and anti-inflammatory drugs for COPD treatment. Study concluded that current medications are only symptomatic reliever and none of drugs including novel biologic drugs do not reverses disease or slows disease progression.<sup>(24)</sup>In this study patients were also associated with comorbid condition like diabetes mellitus, ischemic heart disease and anemia and treatment for asthma and COPD were difficult to follow guidelines. Frits M E *et al* study briefly explained on personalised medicine for COPD patients with comorbid conditions and study showed that bronchodilators, anti-inflammatory drugs were used to relive acute exacerbation. He explained about unmet needs that lack of individual active participants in their health protection against dust and air born diseases. Clinician should make habits of good clinical practices by using advanced technique in diagnosis of disease like individual genetic study and should follow correct treatment guidelines.<sup>(25)</sup>

### Conclusion:

our study concluded that majority patients were acute exacerbation of BA and COPD who were needed hospitalization. Patients were prescribed for symptomatic therapy like combination of SABA/SAMA+ ICS. Patients were also associated with ARTI and received low dose of systemic steroids. Limitation of our study needed follow up of patients and safety analyses. Our study did not analyse Prescription of antibiotics for associated infective Condition with acute exacerbation of BA and COPD and also did

not analyse prescription of antitussives and mucolytics. Small number of patients was included in our study and study did not analyse drugs used to treat associated comorbid condition and drug safety.

### Acknowledgement:

The authors would like to thank patient participated in our study.

**Sources of supports:** Nil

**Conflicts of Interest:** Nil

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**How to cite this article:** Akkamma Dadibhanvi and Shobha V. Huilgol. Study of Drug Utilization Pattern of Bronchodilators and Anti-inflammatory Agents in Acute Exacerbation of Bronchial Asthma and COPD at a Tertiary Care Centre. *Walawalkar International Medical Journal* 2023;10(1):56-60.  
<http://www.wimjournal.com>.

Received date:12/03/2023

Revised date:25/08/2023

Accepted date: 26/08/2023