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Original Research Article

## Prescription pattern among patients having mild to moderate bronchial asthma using metered dose inhaler and dry powder inhaler in tertiary hospital in western india

Neha Akhoun, D. B. S. Brashier\*

Department of Pharmacology,  
Armed Forces Medical College,  
Pune, Maharashtra, India

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**\*Correspondence to:**

Dr. D. B. S. Brashier,  
Email: [drdickbrashier@gmail.com](mailto:drdickbrashier@gmail.com)

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### ABSTRACT

**Background:** Bronchial asthma is a syndrome characterized by airflow obstruction that manifests as shortness of breath, wheezing and cough. The treatment is tailored according to the severity of the disease. The drugs used for treatment of bronchial asthma include inhaled corticosteroids, beta-2 agonists, methylxanthines, leukotriene antagonists and mast cell stabilizers. Despite the availability of all these drugs, which are recommended for the treatment, not every patient achieves complete control of the disease. The reason behind this could be irrational prescribing of drugs for the treatment and errors in the technique of using inhaler devices. Though rational prescribing of drugs and correct technique for the use of inhaler can be improved by proper training of target population, but there is paucity of such data in our country.

**Methods:** This study was planned to monitor prescription pattern and errors in use of inhalation devices, in patients diagnosed as cases of mild to moderate bronchial asthma, attending Out Patient Department (OPD) of respiratory medicine of a tertiary hospital. A total of 207 patients were recruited and their prescription pattern and inhalation technique were assessed.

**Results:** The study showed that inhaled short acting  $\beta_2$ -agonists and inhaled corticosteroids were the most commonly used drug groups, which were prescribed to all the patients in the study, followed by long acting  $\beta_2$ -agonists, leukotriene antagonists and methylxanthines in decreasing order.

**Conclusions:** As a conclusion, the treating physicians were prescribing according to the laid down guidelines. It is concluded that such studies should be periodically done to ensure the adherence to the treatment guidelines.

**Keywords:** Bronchial asthma, Dry powder inhaler, Meterd dose inhaler, Prescription pattern

### INTRODUCTION

Chronic respiratory diseases, affecting the airways and other structures of lungs are common respiratory problem worldwide which include bronchial asthma as the most common disease, followed by chronic obstructive pulmonary disease (COPD), occupational lung diseases and pulmonary hypertension. The prevalence of bronchial asthma varies from 10-12% in adults and around 15% in children.<sup>1</sup> It causes approximately 0.18 milliondeaths every year all over the world.<sup>2</sup> Bronchial asthma is a syndrome characterized by airflow obstruction that

manifests as shortness of breath, wheezing and cough. It is classified as intermittent, mild persistent, moderate persistent and severe persistent, according to the clinical features.<sup>3</sup>

The treatment is tailored according to the severity of the disease. The drugs used for treatment of bronchial asthma include inhaled corticosteroids, beta-2 agonists, methylxanthines, leukotriene antagonists and mast cell stabilizers. Despite the availability of all these drugs, which are recommended for the treatment, not every patient achieves complete control of the disease. One of

the possible reasons behind this could be, deviations from recommended guidelines for treatment.<sup>4</sup> The United Kingdom National Review of asthma deaths has identified poor prescribing practices in patients with bronchial asthma, showing over prescribing of short-acting reliever inhalers and insufficient provision of inhaled corticosteroid preventer medication and a failure by clinicians to adhere to British thoracic society (BTS) asthma guidelines. Another study showed that only 30.9% patients were using inhalers, whereas according to Global initiative for asthma (GINA) guidelines, inhalation therapy should be the first choice of treatment for bronchial asthma.<sup>5,6</sup> Secondly, poor compliance of the patients, which could be due to adverse effects leading to under-treatment and hence poor control and further progression of the disease.<sup>6,7</sup> In 2003, WHO published a report stating adherence rates to the treatment in developed countries is only about 50%.

Though rational prescribing of drugs and correct technique for the use of inhaler can be improved by proper training of target population, but there is paucity of such data in our country, hence this study was planned to monitor prescription pattern in patients diagnosed as cases of mild to moderate bronchial asthma, attending Out Patient Department (OPD) of respiratory medicine of a tertiary hospital.<sup>8</sup>

## METHODS

The study was conducted in a tertiary care hospital for a period of two years. The sample size was calculated to estimate 95% confidence interval for proportion of mild to moderate cases of asthma correctly using inhalation devices as per guidelines with 5% absolute error of margin. The sample size worked out to be 207 assuming that about 52% of mild to moderate cases of bronchial asthma are correctly following the prescription technique and assuming there are 420 patients of mild to moderate bronchial asthma registered in asthma clinics (according to the hospital data).<sup>7</sup> This observational cross-sectional study was conducted to study prescription pattern in the patients included as per inclusion and exclusion criteria at a single visit to respiratory medicine out-patient department, after obtaining written informed consent and clearance from institutional ethics committee (IEC). Inclusion criteria was patients of age more than 18 years with mild to moderate bronchial asthma who were using inhalers. Exclusion criteria was patients suffering from severe bronchial asthma and patients concurrently suffering from illnesses other than bronchial asthma, including psychiatric diseases. Data regarding the patients' socio-demographic information, educational status, history of illness and prescribed medications were recorded on a case record form.

## RESULTS

A total of 207 patients were enrolled in the study from outpatient department of respiratory medicine from

January 2015 to December 2015. Information regarding the patients and their treatment were tabulated (Table 1, 2).

**Table 1: Demographic profile of study population.**

Demographic characteristics	Number (%)	
Gender	Male	113 (54.6%)
	Female	94 (45.4%)
Age	18 to 45 yrs	111 (53.6%)
	Above 45 yrs	96 (46.4%)
Educational Status	12 <sup>th</sup> and below	97 (46.8%)
	Graduate	110 (53.1%)

**Table 2: Distribution of study population according to the medication administration.**

Route of administration	Drug group	Drug	No. of patients (%)
Oral	Methylxanthines	Theophylline	37 (100)
	Leukotriene antagonists (LTRA)	Montelukast	39 (100)
Inhaled medications	$\beta_2$ -agonist (SABA)	Levosalmbutamol	207 (100)
	Inhaled corticosteroid (ICS)	Budesonide	91
		Beclomethasone	22
		Fluticasone	81
		Ciclesonide	13
Long acting $\beta_2$ -agonists (LABA)	Salmeterol	40	
		Formoterol	55

There were 113 (54.6%) males and 94 (45.4%) females. Age of patients included in the study was 18 years and above. Patients between 18 to 45 years were 111 (53.6%), whereas patients above 45 years were 96 (46.4%). Their mean age was 39 years.

Out of 207 patients, 97 (46.8%) did some schooling till twelfth standard, whereas 110 (53.1%) were graduates. Total 129 patients used pMDI, out of which, 120 (58%) used pMDI alone and 9 (4.3%) used pMDI with spacer and 78 (37.7%) were using DPI.

**Table 3: Drugs primarily used for the treatment of bronchial asthma in study population.**

Category	Name of the drugs
Short acting beta-agonist	Levosalmbutamol
Long acting beta-agonist	Salmeterol, Formeterol
Corticosteroid	Budesonide, Beclomethasone, Fluticasone, Ciclesonide
Methylxanthine	Theophylline
Leukotriene antagonist	Montelukast

**Table 4: Anti-asthmatic drug utilization (individual/ combination).**

Category of drugs	Therapy		
	Individual	Combination	Total
Long acting beta-agonist	0	95	95
Corticosteroids	112	95	207
Methylxanthines	0	37	37
Leukotriene antagonists	0	28	28

**Table 5: Combination therapy in study population.**

Drug therapy	Number of patients (%)
Two-drug therapy (SABA+ ICS)	112 (54.11%)
Three-drug therapy (SABA+ ICS+LABA)	30 (14.49%)
Four-drug therapy (SABA+ ICS+LABA+LTRA/Methylxanthines)	65 (31.40%)

It was observed that the drugs which were primarily used in the treatment of bronchial asthma and their utilization pattern are as mentioned in Table 3.

None of the patients were on monotherapy. The number and percentage of patients, who received combination therapy i.e., two or more drug regimens, is shown in Table 4. Among the combination treatment regimens, 2-drug regimen was most commonly used (54.11%), while utilization of 3- and 4- drug regimen accounted for 14.49% and 31.40% respectively (Table 5).

Out of 207 patients, 129 used pMDI with or without spacer and 78 used DPI. Furthermore, out of those using pMDI, 75 were on only inhaled corticosteroids and 54 were on combination of inhaled corticosteroids and long acting beta agonist. Levosalbutamol, a short acting  $\beta_2$ -agonist was prescribed to all the patients. Out of 91 patients on budesonide, 46 patients were on budesonide alone and 45 patients were on combination of budesonide and formoterol. Similarly, out of 22 patients on beclomethasone, 15 patients were on beclomethasone alone and 7 patients were on combination of beclomethasone and formoterol.

Out of 81 patients on fluticasone, 41 patients were on fluticasone alone and 40 patients were on combination of fluticasone and salmeterol. Out of 13 patients on ciclesonide, 10 patients were on ciclesonide alone and 3 patients were on combination of ciclesonide and formoterol. LABA (formoterol and salmeterol) were always used in combination with inhaled corticosteroids. Similarly, Theophylline, a methylxanthine and montelukast, a leukotriene antagonist were used only in combination.

Regarding the patients using pMDI, 75 were on only inhaled corticosteroids and 54 were on combination of inhaled corticosteroids and a long acting beta agonist. Among patients on ICS, 20 (26.7%) were on budesonide, 10 (13.3%) on beclomethasone, 35 (46.7%) on fluticasone and 10 (13.3%) on ciclesonide.

Among those on combination of ICS and LABA, 33 (61.1%) were on salmeterol/fluticasone, 13 (24.1%) on formoterol/budesonide, 5 (9.2%) on formoterol/beclomethasone and 3 (5.6%) were on formoterol/ciclesonide. Among methylxanthines, theophylline was the only drug being prescribed, 17 patients were on it. Among leukotriene antagonists, montelukast was the only drug being prescribed, 13 patients were on it (Table 6).

**Table 6: Prescription pattern in patients using pMDI with or without spacer.**

Medications	No. of patients (%)	
Inhaled Corticosteroids	Budesonide	20 (26.7%)
	Beclomethasone	10 (13.3%)
	Fluticasone	35 (46.7%)
	Ciclesonide	10 (13.3%)
	Total	75 (100%)
Combination of ICS + LABA	Fluticasone + Salmeterol	33 (61.1%)
	Budesonide + Formoterol	13 (24.1%)
	Beclomethasone +Formoterol	5 (9.2%)
	Ciclesonide + Formoterol	3 (5.6%)
	Total	54 (100%)
Methylxanthines	Theophylline	17 (100%)
Leukotriene antagonists	Montelukast	13 (100%)

**Table 7: Prescription pattern in patients using DPI.**

Medications	Number of patients (%)	
Inhaled corticosteroids	Budesonide	26 (70.3%)
	Beclomethasone	5 (13.5%)
	Fluticasone	6 (16.2%)
	Total	37 (100%)
Combination of ICS + LABA	Fluticasone + Salmeterol	7 (17.1%)
	Budesonide + Formoterol	32 (78%)
	Beclomethasone +Formoterol	2 (4.9%)
	Total	41 (100%)
Methylxanthines	Theophylline	20 (100%)
Leukotriene antagonists	Montelukast	15 (100%)

Out of those using DPI, 37 patients were on only inhaled corticosteroids and 41 were on combination of inhaled corticosteroids and long acting beta agonist. Among patients on ICS, 26 (70.3%) were on budesonide, 5 (13.5%) on beclomethasone and 6 (16.2%) on fluticasone. Among those on combination of ICS and LABA, 7 (17.1%) were on salmeterol/fluticasone, 32 (78%) on formoterol/budesonide, 2 (4.9%) on formoterol/beclomethasone combination.

Among methylxanthines, theophylline was the only drug being prescribed, 20 patients were on it. Among leukotriene antagonists, montelukast was the only drug being prescribed, 15 patients were on it (Table 7).

## DISCUSSION

A total of 207 patients who were diagnosed with mild to moderate bronchial asthma were recruited in the study and assessment of their prescription pattern and technique of inhalation devices was done.

This study showed that inhaled short acting  $\beta_2$  agonists and inhaled corticosteroids were the most commonly used drug groups, which were prescribed to all the patients in the study, followed by long acting  $\beta_2$  agonists, leukotriene antagonists and methylxanthines in decreasing order. Among pMDI users, the commonest inhaled corticosteroid used was fluticasone and commonest combination used was inhaled fluticasone and salmeterol, these findings were similar to previous study.<sup>9</sup> Among DPI, commonest ICS used was budesonide rotacap and commonest combination was inhaled budesonide and formoterol, this was in concurrence with previous study.<sup>10</sup> The prescription pattern for selection of drug class and route of administration is in accordance with the Global initiative for asthma and Britain thoracic society guidelines.

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