

# Drug Prescription Pattern in Pediatric Patients of Bronchial Asthma Attending outpatient Department in a Private Hospital

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## Abstract

Bronchial asthma, being a chronic airway disease, requires long-term pharmacotherapy. Since, a wide range of anti-asthmatic drugs are available, study of prescription pattern is essential to promote rational use of drugs. The aim of the study was to evaluate prescription pattern in paediatric patients of bronchial asthma in a private hospital. An observational, non-interventional cross-sectional study was conducted in paediatric outpatient department at a private hospital in Aurangabad after institutional ethical clearance. Asthmatic children of either gender or age group 1-17 years were enrolled and patients details such as demographic details, drugs used etc. were filled in the specially designed case record form. Data was presented in percentages. SPSS software version 20.0 was used to analyse data using statistical test ANOVA. 'P' value  $\leq 0.05$  was considered as significant. Out of total 300 children enrolled in the study, 43.33% children had intermittent asthma, 16.33% had mild persistent, 21.34% had moderate persistent and 19% had severe persistent asthma. Asthma in majority of the children (40%) was partly controlled. Maximum study population was males of 6-10 years of age. Most of the children received multiple anti-asthmatic drugs (66%) and prevalence of two drug combinations was the highest (46%). Average drugs per prescription were 2.7. Inhalational route was preferred. Most commonly encountered anti-asthmatic drugs were short acting beta 2 agonists (74.33%) followed by inhalational corticosteroids (56.33%). Inhalational corticosteroid usage was profound in children with persistent asthma. Encounter with antibiotics was found to be 18.33%. All the drugs were prescribed by their brand names. Inhaled and oral corticosteroids were prescribed more often in children with persistent asthma than children with intermittent asthma and differences were statistically significant ( $p=0.001$ ). However, no statistically significant difference was observed among intermittent and persistent asthma in terms of prescription of drugs like salbutamol, levosalbutamol, levosalbutamol plus ipratropium bromide and salmeterol plus fluticasone. The findings of the study suggested a rational approach in providing anti-asthmatic pharmacotherapy to children. Health care professionals seemed to be well versed with the current treatment guidelines. Only matter of concern is prescribing with brand names. Promotion of educational strategies and programmer will incur awareness about benefits of prescribing generic drugs.

**Keywords:** Anti-Asthmatic Drugs, Asthma, Outpatient Department, Paediatrics, Prescription Pattern

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## 1. Introduction

Bronchial asthma is a chronic inflammatory disease of airways affecting adults as well as children. Its characteristics include hyper responsiveness of airways resulting in, recurrent episodes of wheezing, breathlessness, chest tightness and nocturnal or early morning coughing in asthmatic patients<sup>1</sup>. Globally, around 300 million people suffer from asthma and another 100 million will be affected by 2025<sup>2</sup>. In the recent years, a variable upward trend has been observed in prevalence of asthma in children across the countries. It ranges from 4 to 32% for children aged 6-7 years and 13-14 years<sup>3</sup>. Several epidemiological studies estimated a mean prevalence of 2.74 among Indian paediatric population<sup>4</sup>. Moreover, asthma also leads to increase in preventable hospital admissions and school absenteeism in asthmatic children<sup>5</sup>.

Being a chronic disease, its clinical control demands not only long-term pharmacotherapy but also patient co-operation<sup>6</sup>. The Global Initiative for Asthma (GINA) guidelines suggest anti-asthmatic drugs like Short Acting Beta 2 Agonists (SABA), Long Acting Beta 2 Agonists (LABA), corticosteroids, xanthenes derivatives and Leuko-Triene Receptor Antagonists (LTRA) which can be used alone or in combination<sup>7</sup>.

Although drugs cater the desired health care to the patients but their rational use is equally essential to maintain therapeutic efficacy as well as safety<sup>8</sup>. According to the World Health Organisation (WHO) estimates, more than half of the drugs are prescribed, dispensed or sold inappropriately<sup>9</sup>. Irrational drug use increases the cost of therapy, drug resistance, risk of adverse drug reactions (ADR) and patient mortality<sup>10</sup>. The Rational Use of Medicines (RUM) is defined as "Patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community"<sup>11</sup>.

Monitoring of prescription pattern plays an important role in emphasizing rational use of drugs. It also helps to assess appropriateness of a therapy and constitute future guidelines that improve drug utilization patterns and restrict irrational prescribing<sup>12</sup>. Keeping this in mind, our present study intended to evaluate the drug prescription pattern in treatment of paediatric bronchial asthma patients attending outpatient department at a private hospital.

## 2. Materials and Methods

An observational, non-interventional cross-sectional study was conducted from November 2017 to February 2019 at a private hospital in Aurangabad. Asthmatic children of either sex or aged 1-17 years attending outpatient department were included in the study following Institutional ethical approval. Immunocompromised patients, patients with systemic disorders and co-morbid conditions like TB, diabetes, renal disease, etc. and those unwilling to participate were excluded.

Patients satisfying inclusion and exclusion criteria were enrolled in the study only after obtaining Informed Consent Form (ICF) and Assent form. All information such as patient's demographic details and details of prescribed drugs was recorded. After study completion, data was compiled using Microsoft Excel. Data was presented in percentages. Also, SPSS software version 20.0 was used to analyse data using statistical test ANOVA. 'P' value  $\leq 0.05$  was considered as significant.

## 3. Results

A total of 300 asthmatic children were reviewed during the study. Table 1 describes the baseline characteristics of enrolled patients.

**Table 1.** Baseline characteristics of paediatric patients of bronchial asthma

Characteristics		Paediatric patients with asthma, N = 300
Age group (in years)	1-5	85 (28.34%)
	6 -10	164 (54.66%)
	11-15	45 (15%)
	16-17	6 (2%)
Gender	Male	152 (50.67%)
	Female	148 (49.33%)
Area of living	Urban	213 (71%)
	Rural	87 (29%)
Family History	Positive	32 (10.66%)
	Negative	268 (89.34%)
Severity of asthma	Intermittent	130 (43.33%)
	Mild Persistent	49 (16.33%)
	Moderate Persistent	64 (21.34%)
	Severe Persistent	57 (19%)

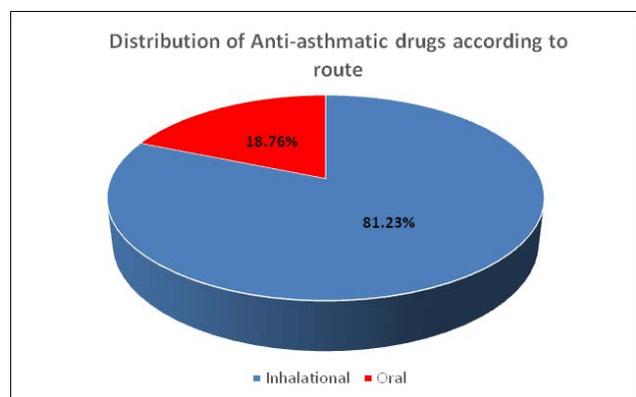
Control of asthma	Well controlled	89 (29.67%)
	Partly controlled	120 (40%)
	Uncontrolled	91 (30.33%)
Comorbidities	Allergic rhinitis	14 (4.67%)
	Obesity	6 (2%)

Table 2 Describes the prescription pattern of drugs used to manage asthma in children enrolled in the study.

**Table 2.** Prescribing indicators

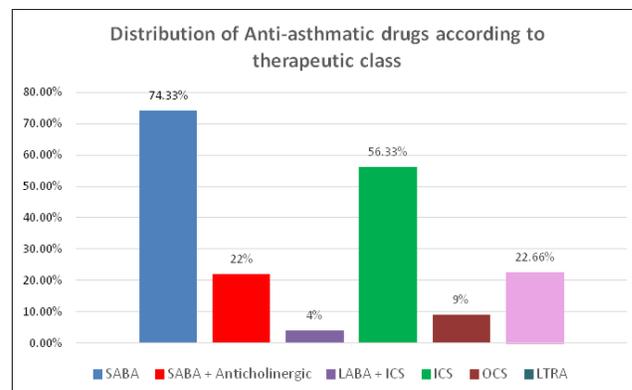
Parameters	Details	
Total number of prescriptions analyzed	300	
Total number of drugs prescribed	811	
Minimum number of drugs per prescription	1	
Maximum number of drugs per prescription	6	
Average number of drugs per prescriptions	2.7	
Drugs prescribed by generic name	0%	
Drugs prescribed by Brand Names	100%	
Percentage of prescriptions with antibiotics (Azithromycin, Amoxicillin + Clavulanic acid)	18.33%	
Prescribed Anti-asthmatic drugs (excluding other concomitant drugs)	Single drug therapy	102 (34%)
	Multiple drug therapy	198 (66%)

Among 198 children prescribed with multiple anti-asthmatic drugs, prevalence of two drug combinations was the highest (46%), followed by three drug combinations (17.33%) and  $\geq 4$  drug combinations (2.66%). Inhalational anti-asthmatic drugs were prescribed the most as shown in Figure 1.



**Figure 1.** Distribution of anti-asthmatic drugs according to route.

Figure 2 depicts the distribution of anti-asthmatic drugs according to therapeutic class. SABA (74.33%) was prescribed the most followed by inhalational corticosteroids (56.33%).



**Figure 2.** Distribution of anti-asthmatic drugs according to therapeutic class.

SABA- Short acting beta 2 agonists; LABA - Long acting beta 2 agonists; ICS - Inhalational corticosteroids; OCS - Oral corticosteroids; LTRA - Leukotriene receptor antagonists.

Prescribing trends of anti-asthmatic drugs on the basis of severity of asthma were also assessed as shown in Table 3.

Commonly prescribed concomitant medications were antibiotics (18.33%), multivitamins and multiminerals (15.33%), antihistamines (13%), and NSAIDs (12.33%).

## 4. Discussion

Globally, asthma is one of the most prevalent disorders in childhood<sup>1</sup>. It is majorly responsible for increased healthcare burden for the families as well as the society. Also, it results in increased frequency of hospital admissions among the paediatric age groups world wide<sup>13</sup>. Monitoring of prescription pattern is an essential tool to achieve rationality and effectiveness in medical care especially in developing countries<sup>14</sup>. Availability of guidelines issued by various international bodies along with clinical standards for management of asthma have emphasised the importance of rational prescribing<sup>7,15</sup>. This study was conducted in outpatient department in a private hospital with an objective to gain an insight into the prescribing practices in paediatric patients of bronchial asthma.

**Table 3.** Comparison of anti-asthmatic drugs according to severity of asthma

Generic name of drug	Severity of Asthma				p-value
	Intermittent N= 130	Mild Persistent N= 49	Moderate Persistent N= 64	Severe Persistent N= 57	
Salbutamol	32 (24.61)	13 (26.53)	12 (18.75)	8 (14.03)	0.294
Levosalmolol	73 (56.15)	23 (46.93)	32 (50)	27 (47.36)	0.998
Levosalmolol + Ipratropium bromide	31 (23.84)	10 (20.4)	11 (17.18)	14 (24.56)	0.658
Salmeterol + Fluticasone	4 (3.07)	1(2.04)	4 (6.25)	3 (5.26)	0.60
Budesonide	33 (25.38)	28 (57.14)	57 (89)	51 (89.47)	0.001*
Prednisolone	1 (0.76)	0	0	26 (45.61)	0.001*
Montelukast	32 (24.61)	5 (10.2)	12 (18.75)	19 (33.33)	0.001*

Values in parentheses depict percentage; \*statistically significant difference

In present study, the patients mainly belonged to the age group of 6-10 years. During childhood, asthma prevalence is more profound in boys as compared to girls<sup>16</sup>. In this study also, asthma was reported to be more prevalent in males (50.67%). These findings are similar to studies by Garje, *et al.*<sup>17</sup> and Shah, *et al.*<sup>18</sup> and Ahmed, *et al.*<sup>19</sup>.

Majority of the children were suffering from intermittent asthma and this finding is consistent with a study conducted by Ahmed, *et al.*<sup>19</sup>. On the other hand, in a study by Garje, *et al.*<sup>17</sup>, majority of patients had mild persistent asthma. This can be attributed to geographical and climatic differences.

The prescription of controllers for long term is governed by the level of asthma control classification<sup>1</sup>. In this study, the level of asthma control was well documented in all the prescriptions and asthma in majority of the children was partially controlled (40%). Urbanisation is an important contributor to asthma in children which can be attributed to increased levels of air pollution and diet modifications<sup>20</sup>. Likewise, in this study, majority of the asthmatic children were from urban areas. A positive family history of asthma was observed in 10.66% children. Also, few cases of associated comorbidities like allergic rhinitis (4.67%) and obesity (2%) were reported.

The average number of drugs per prescription was 2.7 which is slightly higher than the ideal standard of 1.6-1.8<sup>21</sup>. Many other studies like Garje, *et al.* (2.96)<sup>17</sup>, Shah, *et al.* (6.10)<sup>18</sup>, Ahmed, *et al.* (3.19)<sup>19</sup> and Kumar, *et al.* (3.5)<sup>22</sup> had also observed a higher value of the same. None of the drug was prescribed by generic name which is considered irrational. A similar trend was observed in a study by

Garje, *et al.*<sup>17</sup>. This can be due to lack of awareness and negative perceptions about generic prescribing as well as undue influence of pharmaceutical companies among health care practitioners<sup>23</sup>.

Unnecessary use of antibiotics increases the cost of therapy and is responsible for antibiotic resistance. Nevertheless, research in the past have demonstrated concurrent prescription of antibiotics and anti-asthma drugs in paediatric population<sup>24,25</sup>. Encounter with antibiotics in this study was only 18.33% which is lower as compared to the standard value of 20% - 26.8%<sup>18</sup>. Likewise, some studies also showed lower value of this indicator- Garje, *et al.* (19%)<sup>17</sup> and Trivedi, *et al.* (17.3%)<sup>26</sup>. This indicates adequate control of asthma as well as rationality in prescription among health care providers.

In the present study, prescription of multiple anti-asthmatic drugs was considerably high (66%) which suggests adherence to standard treatment guidelines<sup>1</sup>. These findings comply with other published studies such as Garje, *et al.*<sup>17</sup>, Karki, *et al.*<sup>27</sup> and Prasad, *et al.*<sup>28</sup>. Among the children treated with multiple drug therapy, two drug combinations (46%) were prescribed the most. In contrast, some studies preferred  $\geq 3$  drug combinations of anti-asthmatic drugs<sup>17,27,28</sup>.

According to treatment guidelines for asthma, inhalational therapy should be the first choice because it enables local delivery of drugs and minimises systemic side effects<sup>26</sup>. This study also found that the patients were mainly prescribed inhalational dosage forms of anti-asthmatic drugs. The studies by Trivedi, *et al.*<sup>26</sup> and Prasad, *et al.*<sup>28</sup> were also in the same line.

The acceptance of inhalation therapy among patients suggests awareness among patients as well as counselling by the treating physician. Although, other studies like Garje, *et al.*<sup>17</sup> and Karki, *et al.*<sup>27</sup> reported higher use of oral medicaments.

Pattern of anti-asthmatic drug prescription showed highest prescription of relievers like SABA (74.33%) followed by inhalational corticosteroids (56.33%). Comparatively other anti-asthmatic drugs were used less. The usage of SABA resembles studies like Garje, *et al.*<sup>17</sup> (81%), Shah, *et al.*<sup>18</sup> (70.86%), and Kumar, *et al.* (83.6%)<sup>21</sup>. On the contrary, in a study like Trivedi, *et al.*<sup>26</sup>, methylxanthines were prescribed the most. Though, SABAs are preferred bronchodilators due to their rapid onset of action and easy availability but their frequent administration suggests poor control of asthma and necessitates employment of controller therapy<sup>29</sup>. Moreover, excessive usage of relievers in intermittent asthma patients in this study depicts inappropriateness in prescription pattern and requires initiation of controller therapy.

The current GINA guidelines recommend the use of controllers like inhalational corticosteroids in persistent asthma to prevent severe exacerbations, reduce hospital admissions and death<sup>1</sup>. On the same lines, inhaled corticosteroids (budesonide) were prescribed more in children with persistent asthma than in intermittent asthma ( $p=0.001$ ) in this study.

Another significant finding was that patients with intermittent asthma received LTRA (montelukast) as a controller more often as compared to those with persistent asthma ( $p=0.001$ ). Its rapid onset of action and excellent safety profile provides a sound rationale for its use in intermittent asthma in children<sup>30</sup>. A study by Bisgaard, *et al.*<sup>31</sup> also observed a favourable effect of using montelukast in 2-5-year-old children diagnosed with mild intermittent asthma. The study showed significant reduction in asthma exacerbations associated with respiratory tract infections in them<sup>31</sup>.

A short course of oral steroids may be effective as add on therapy in severe asthma patients with poor symptom control and/or frequent exacerbations<sup>1</sup>. In this study, as compared to intermittent asthma, patients with severe persistent asthma received oral prednisolone more frequently and difference was significant ( $p=0.001$ )

Antihistamines, cough suppressants, nasal decongestants, etc. were used less that indicates awareness among physicians regarding standard treatment guidelines.

However, it was a single centre study and its results might not be extrapolated to general population. Moreover,

this study analysed prescription pattern in outpatient departments which will differ greatly from drug use in admitted patients. The study also lacked documentation of asthma action plan, non-pharmacological measures and cost of drugs used. Despite these limitations, the present study contributes to the understanding of usage of anti-asthmatic drugs among children and can form a basis to develop future studies as well as design interventions that would improvise management of paediatric asthma.

## 5. Conclusion

This study enabled to describe current prescribing trends in paediatric patients of bronchial asthma in a private set up. The findings of the study suggested a rational approach in providing anti-asthmatic pharmacotherapy to children. Health care professionals seemed to be well versed with the current treatment guidelines. Only matter of concern is prescribing with brand names. Prescribing by generic names should be promoted because it enables easy access to cost-effective medicines which can reduce economic burden as well as improve patient compliance. Further, health care prescribers should be encouraged to attend regular Continuing Medical Education (CME) and workshops to update their knowledge regarding revised treatment guidelines.

## 6. Ethical Clearance

Obtained clearance from the Institutional Ethical committee.

## 7. Source of Funding

Self-funded project.

## 8. Conflicts of interest

None declared.

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