Section: Paediatrics

Original Research Article

MANAGEMENT OF ASTHMA IN PEDIATRIC POPULATION AT TERTIARY CARE CENTER

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Abstract

Background: Asthma is a chronic respiratory illness that requires regular medications to control the symptoms and to prevent exacerbation. Many treatment options are available for the treatment of asthma. Children with asthma are more prone and vulnerable for repeated acute exacerbations. This study was aimed to study drug prescription patterns among pediatric asthma patients attending OPD in tertiary health care centre. **Materials and Methods:** This prospective study was conducted in the Department of Respiratory Medicine and Paediatrics in a tertiary care Teaching Hospital. The identified patients (i.e., <14 years of age) with a primary diagnosis of asthma who encountered pediatric OPD during the study period was enrolled. Records were then reviewed to document compliance with the GINA guidelines. Descriptive statistics, including mean, standard deviations and frequencies were used to summarize information. **Result:** Majority of the cases, 57.7% (52/90) belonged to 5-11 years age group. 35.5% (32/90) cases belonged to 1- 4 yr and 6.6% (6/90) belonged to 12-14 years age group. The mean age of children with asthma was 6.42 years. Most of the cases were from urban areas. Out of 90 cases, 54.4% (49/90) were from urban area and 45.5% (41/90) cases were from rural area. In the study, 60% cases belonged to middle class, 33.3% cases belonged to lower class and 6.7% cases belonged to upper class. **Conclusion:** To conclude, this study provides few insights into the drug use patterns in a pediatric outpatient department of a tertiary care center. The prescribing of drugs according to the severity of asthma was good, the use of injections was low and there is a scope for improvement if the drug prescribed is concordant with the guidelines.

INTRODUCTION

Asthma is a chronic illness that requires regular monitoring. Adherence to asthma control medications is related with greater asthma control, a lower risk of asthma exacerbations, and fewer hospitalizations.[1] Asthmatic patient evaluations and follow-ups required a detailed medical history, physical examination, peak flow measurement, and spirometry monitoring. Some of these assessments are easily available via telemedicine.[2,3]

Asthma among pediatric populations is a significant health concern globally. Here are some key points regarding pediatric asthma.[4] Asthma is one of the most common chronic diseases in childhood, affecting millions of children worldwide. The prevalence varies by region, but it's generally high in developed countries.[5]

Several Risk factors contribute to the development of asthma in children, including genetic predisposition, environmental factors (such as exposure to tobacco smoke, air pollution, and allergens), respiratory infections during early childhood, and premature birth.[6] Symptoms of asthma in children can include wheezing, coughing (especially at night), shortness of breath, and chest tightness. However, symptoms can vary widely among individuals and may change over time.[7]

Diagnosing asthma in children can be challenging, particularly in younger children who may not be able to articulate their symptoms well. It often involves a combination of medical history, physical examination, lung function tests (such as spirometry), and sometimes allergy testing.[8] The goal of asthma management in children is to achieve and maintain good control of symptoms while minimizing the risk of exacerbations and side effects from medication.[9] This typically involves a combination of medication (such as inhaled corticosteroids, bronchodilators, and leukotriene receptor antagonist) and non-

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pharmacological measures (such as avoiding triggers and maintaining a healthy lifestyle).[10]

It's essential to educate both children and their caregivers about asthma, including how to recognize symptoms, how to use inhalers correctly, and when to seek medical help. Asthma action plans can help guide management and empower families to manage the condition effectively.[11] Asthma can have a significant impact on a child's quality of life, affecting their ability to participate in physical activities, attend school regularly, and sleep well. Addressing asthma comprehensively can help minimize these impacts.[12]

While asthma cannot be cured, steps can be taken to prevent exacerbations and reduce the severity of symptoms. This includes avoiding known triggers, ensuring good indoor air quality, promoting breastfeeding, and encouraging regular physical activity.[13] Overall, managing pediatric asthma requires a comprehensive approach that addresses both medical and environmental factors while providing support and education to children and their families.[14]

MATERIALS AND METHODS

This prospective study was conducted in the Department of Respiratory Medicine and Paediatrics in a tertiary care Teaching Hospital. Eligible subjects included all children who were <14 years of age with a primary diagnosis of asthma. Asthma was considered the primary diagnosis if it was the principal reason for the pediatric OPD encounter. The primary outcome measure was compliance with the GINA asthma management guidelines.

Data collection: The study was carried out in childrens attending pediatric OPD in a Tertiary care center. A total of 90 childrens with primary diagnosis of asthma were enrolled in the study. Data was manually reviewed from the OPD record for every patient seen during the study period and identified eligible subjects with the discharge diagnosis of asthma, reactive airways disease or related conditions (e.g., status asthmaticus, bronchial asthma, exercise-induced asthma).

Investigators reviewed the hospital medical records of all eligible patients identified and documented patient demographics; triage level and asthma severity score; nursing documentation (including vital signs, level of consciousness, weight, medications and peak expiratory flow rate); OPD treatments (including agent, dose, route, number of doses used and time of administration for steroids, beta-agonists and anticholinergics); and OPD disposition (discharge, admit, transfer, ED observation, death). This information was used to determine compliance with the guidelines,[7] consensus statements and critical pathways.[6,14]

Asthma severity was determined by correlating clinical documentation from the triage and initial patient assessment with asthma severity descriptions specified in the NHLBI guideline document [Table 3]. Patients were placed into the highest severity class for which they had features. Guideline compliance was based on determining whether physicians provided all components of acute treatment recommended for the relevant asthma severity category.

Data was abstracted and entered data into a commercially available database. Discrepancies were resolved by consensus. The final results were exported to a newly created database. If the data element was not found in the patient record, no entry was made in the field and that particular aspect of care was considered not to have been carried out.

Data analysis Descriptive statistics for continuous variables were summarized by the mean and standard deviation. Categorical variables were summarized as frequencies. Interobserver reliability of agreement for asthma severity and data elements required in determining guideline compliance was computed using the kappa statistic.

RESULTS

Out of 90 cases of bronchial asthma, 51 were boys and remaining 39 were girls. This difference is not statistically significant (p value 0.75). Demographic details of cases are given in [Table 1].

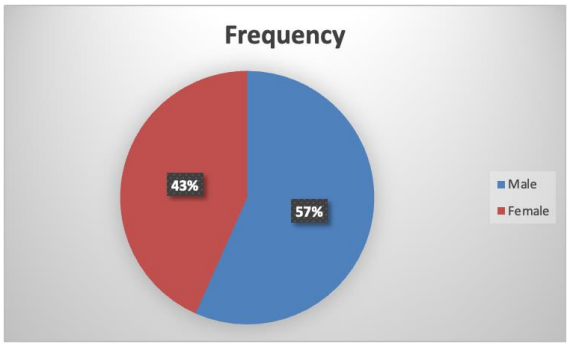

Figure 1: Distribution of Gender

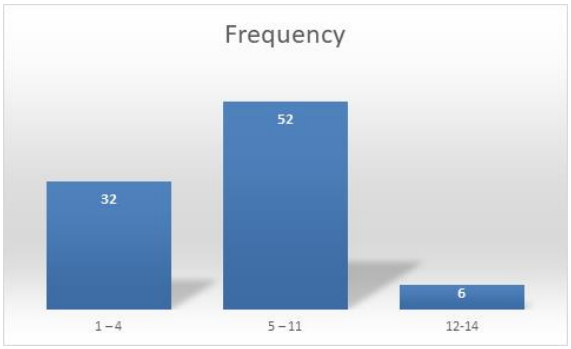

Figure 2: Distribution of Age Group

Majority of the cases, 56.7% (51/90) belonged to 5-11 years age group. 35.6% (32/90) cases belonged to 1- 4 yr and 6.7% (6/90) belonged to 12-14 years age group. The mean age of children with asthma was 6.42 years. Most of the cases were from urban areas .Out of 90 cases, 54.4% (49/100) were from urban area and 45.6% cases were from rural area. In the

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study, 60% cases belonged to middle class, 33.3% cases belonged to lower class and 6.7% cases belonged to upper class.

Out of 90 cases, 69 cases were previously diagnosed and being treated for bronchial asthma and 21 cases were newly diagnosed. 40% cases had family history of atopic diseases like asthma or allergic rhinitis. Maximum number of cases were reported in rainy and winter seasons ie in the months of August (15%), September (14%), October (19%) and November (10%). In the present study, presenting symptoms were cough, wheeze and difficulty in breathing. Cough was the predominant symptom found in 94.4% of cases followed by wheeze seen in 90% and difficulty in breathing in 80% of cases. In children of 14 years and 5-11 years, cough was more common than wheeze whereas in children in 12-14 years age wheeze was the commonest presenting symptom as depicted in [Table 2].

Majority (33.3%) of the cases of bronchial asthma were of moderate persistent severity. intermittent type of asthma was found in 26.7%, mild persistent asthma in 27.8% of cases and Severe persistent asthma in 12.2% of cases as shown in [Table 3].

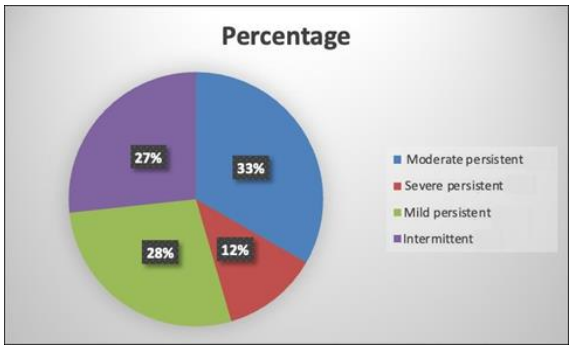

Figure 3: Asthma Severity Classification

Table 1: Demographic details of Asthmatic children.

Demographic feature	Number(90)
Gender	
Male	51
Female	39
Age (years)	
1 – 4	32
5 – 11	52
12 -14	6
Residence	
Rural	41
Urban	49
Socioeconomic status	
Upper	6
Middle	54
Lower	30
Time of Diagnosis	
Previously diagnosed	69
Newly diagnosed	21

Table 2: Presenting symptoms of bronchial asthma

Symptoms	1-4years	5-11 years	12 and above	Total
Cough	32	50	3	85(94.4%)
Wheeze	30	45	6	81(90%)
Difficulty in breathing	30	40	2	72(80%)

Table 3: Classification of children with bronchial asthma based on severity

Asthma severity	1-4 years	5-11years	12-14 years	Total
Intermittent	7/32(21.9%)	17/52(32.7%)	0	24/90(26.7%)
Mild persistent	9/32(28.1%)	15/52(28.8%)	1/6(16.7%)	25/90(27.8%)
Moderate persistent	14/32(43.7%)	13/52(25%)	3/6(50%)	30/90(33.3%)
Severe persistent	2/32(6.3%)	7/52(13.5%)	2/6(33.3%)	11/90(12.2%)
Total	32/90	52/90	6/90	90

DISCUSSION

Asthma is a chronic inflammatory disease of airway. Number of patients suffering from asthma is increasing day by day. Treatment of asthma comprises of multiple therapeutic options. Drug utilization evaluation is most important for the promotion of rational uses of drug.[15] Recommendation of various international bodies on asthma will help to improve prescribing practises of physician and make availability of standard guidelines. Irrational use of drug and inappropriate prescribing is the two-common phenomenon in the developing countries, which cause a big problem for providing the effective health care facilities.[15] Rational use of drug requires that patient receiving medications appropriate to their clinical needs in their individual required dose, for adequate period of time at lowest cost. This upsurges the need for pharmacotherapeutic studies.[16]

The present study was thus conducted with a view to assess the drug usage pattern in paediatrics asthma patients attending the paediatrics department in a

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tertiary care hospital. The study included 90 asthma patients suffering from asthma with male preponderance. In this study, majority of prescriptions (60.0%) were for male children aged 5 years – 8 years (52.2%). This may be due to the fact that these age groups are more vulnerable and morbidities are commoner than older children and hence attendance to OPD is more. Proper health education is required to convince the patients.[17]

Prescription pattern shows that maximum number of patients (41.1%) was prescribed betaagonists, more specifically salbutamol, making it the preferred choice for asthma management. This finding is further reinforced by some previous studies in other countries.[15] It is from the group Short Acting Beta Agonist (henceforth SABA), and the main reason for its use is rapid onset and low cost. In addition, salbutamol does not increase exacerbation rates and provides instant symptomatic relief.[18]

In our study, steroid consist the second largest prescribed drugs. This finding is reinforced by a similar study from India.[16] Corticosteroids (inhaled and oral) are one of the mainstay therapies for asthma. In addition to reduction of severity and exacerbation, they reduce airway hyper-responsiveness. They also help in reducing inflammation by inhibiting the activation and recruitment of T cells, macrophages, and dendritic cells, by decreasing mast cells survival, and by inhibiting the release of inflammatory mediators.[17] In addition, they reduce hospitalization, improve quality of life, and reduce overall mortality and morbidity.[18]

Previous studies reported equivocal results regarding comparative efficacy of different steroids by various route of administration, as discussed below. Budesonide has shown better pharmacological profile as compared to prednisolone, however, prednisolone is cheap and available for oral administration.[19] Another study documented the preference of budesonide over prednisolone in pediatric acute moderate asthmatic attacks. [20] However, a study by volovitz et al. reported comparable efficacy for budesonide and prednisolone.[21]

Our results indicated that a small fraction of patients was prescribed montelukast, a leukotriene receptor antagonist as compared to other previous studies. It may be partially explained by a better asthma control with already prescribed ICS and SABA. Another reason may be a slightly higher cost. Montelukast improves PEF, FEV1, and other parameters, reduces nocturnal symptoms, and may decrease the concomitant doses of ICS and SABA/LABA.[22]

There are equivocal results regarding the route of administration for steroids, for example, prednisolone oral versus hydrocortisone intravenous showed similar efficacy.[23] However, a trial studying comparison of sequential therapy discovered that PEF, FEV1, and asthma scores are far better in the group prescribed IV methylprednisolone after oral methylprednisolone compared to the group given IV hydrocortisone after oral methylprednisolone.[24] In another study, oral prednisolone and IV methylprednisolone were found equally efficacious in children.[25]

There are also well-established reports concerning the superiority of combination of Inhalational Corticosteroids (henceforth ICS) and Long Acting Beta Agonist (hereafter LABA) against individual therapy. A study in Brazil concluded that a combination of budesonide + salbutamol is better than oral prednisolone. Cochrane review database also supports these reports. However, mutual comparison between different ICS and LABA combinations revealed equivocal results.[26]

Recently introduced SMART (Single Inhaler Maintenance and Reliever Therapy) or SiT (Single Inhaler Therapy) approach has produced good results regarding the quality of life and dose reduction of both ICS and LABA as compared to ICS alone, however, there are few incidences of flare ups in children; hence, a controversy is ongoing regarding the long-term benefits, especially in pediatric age group.[27] However, a systematic review found fewer exacerbations but associated poor symptom control, which was supported by two other studies advocating its use based on cost effectiveness and achievement of greater asthma control. Still trials are going on to establish the superiority of single inhaler treatment on "as needed" basis.[28] In our study, most of the patients were on more than two drugs but subanalysis revealed that ICS+LABA SiT were restricted to few and that too mainly in adult population. This is in accordance with recent updates.

Inhalational route is the choice for asthmatic patients as it delivers the maximum amount of drug with minimal systemic side effects. A previous study showed similar percentage.[29] However, medication by oral route becomes essential in case of inability to use the inhaler efficiently in an appropriate manner, especially in pediatric and geriatric population. They may not be able to coordinate the inspiration timing with inhaler puff. One solution is provided by nebulization that does not require coordination and works with normal tidal respiration but it is needs longer periods and mainly used in emergency for termination of acute attack. Oral medications do not depend on the technique, and a study reported a higher compliance of tablets than inhaled medications for asthma. IV route also produces quick relief with 100% bioavailability and less airway irritation. Few studies have compared the efficacy of these regimens; however, there is a need for well-designed studies to explore the issue of route further.[30]

CONCLUSION

Asthma, a common chronic disease has multiple therapeutic options. Guidelines like Global Initiative for Asthma (GINA) have enlightened physicians about the rational prescribing in asthmatic patients.

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The usage pattern as assessed in our study was in conformation to GINA guidelines. Various asthma education programs would benefit to improve knowledge and increase awareness regarding current asthma management paradigms in the medical community. Effective patient education measures and awareness campaigns in the community can also help in achieving better outcomes.

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