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Original Research Article

Pharmacological Aspects Regarding the Drug used in Asthma for Pediatric

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Abstract:
This descriptive, observational study assessed the pharmacological treatments used for pediatric asthma at Patna Medical College & Hospital between October 2015 and November 2017. A total of 97 patients aged 1 to 18 years, diagnosed with asthma per American Thoracic Society guidelines, were included. The study aimed to evaluate the efficacy, safety, and developmental appropriateness of asthma medications. Inhaled corticosteroids were the most frequently prescribed treatment, followed by beta-agonists and leukotriene receptor antagonists, with a notable use of combination inhalers. The study found significant improvements in asthma control, with well-controlled asthma status increasing from 20% at baseline to 70% at the study's conclusion. The frequency of asthma exacerbations notably decreased from an average of 3.2 to 0.9 episodes per year. Medications were generally well-tolerated, with minor side effects such as throat irritation from inhaled corticosteroids and transient increases in heart rate from beta-agonists. Statistical analysis confirmed significant enhancements in asthma management and a reduction in exacerbations, underscoring the effectiveness of the pharmacological treatments employed. This study highlights the importance of targeted pharmacotherapy in managing pediatric asthma and improving patient outcomes.

Keywords: Pediatric Asthma, Pharmacological Treatment, Inhaled Corticosteroids, Asthma Management

Introduction

Asthma remains one of the most common chronic diseases affecting children worldwide, posing significant challenges for both patients and healthcare systems [1]. The complexity of asthma management in pediatric patients is heightened due to the physiological differences between children and adults and the need for tailored therapeutic approaches. This paper delves into the pharmacological aspects of asthma medications specifically used in pediatric populations. It aims to provide a comprehensive overview of the current drug therapies available, their mechanisms of action, and their developmental appropriateness [2,3].

The prevalence of asthma in children necessitates a nuanced understanding of both the disease pathology and the pharmacokinetics and pharmacodynamics of asthma medications in young bodies. Children are not merely "small adults," and their ongoing development can significantly influence asthma treatments' efficacy and safety [4,5]. Therefore, it is crucial to evaluate the therapeutic options with a lens that considers the unique challenges presented by pediatric patients [6].

This introduction sets the stage for a detailed examination of various drug classes used in pediatric asthma, including quick-relief medications (such as beta-agonists and anticholinergics) and long-term control medicines (including corticosteroids and leukotriene modifiers). The discussion will extend to newer therapeutic agents and explore potential future directions in pediatric asthma care, emphasizing the importance of individualized treatment plans that promote optimal respiratory health and quality of life for affected children [7-9].

This study aims to comprehensively evaluate the pharmacological treatments available for managing asthma in pediatric patients, focusing on the efficacy, safety, and appropriateness of various drug therapies. This investigation seeks to delineate the mechanisms of action, dosage forms, and potential side effects of asthma medications, with an emphasis on their suitability for children of different age groups. By exploring both established and emerging therapies, the study intends to provide valuable insights that can guide clinicians in optimizing asthma management strategies tailored specifically to pediatric patients, ultimately

enhancing treatment outcomes and improving the quality of life for this vulnerable population.

Methodology

Study Design

This study employed a descriptive, observational design to assess the pharmacological treatments used for asthma in pediatric patients. The focus was on evaluating the efficacy, safety, and developmental appropriateness of these medications.

Participants

The study involved a sample of 97 pediatric patients diagnosed with asthma, recruited from the Pediatrics Department at Patna Medical College & Hospital. Inclusion criteria included patients aged between 1 and 18 years who had been clinically diagnosed with asthma as per the American Thoracic Society guidelines. Exclusion criteria excluded patients with other significant pulmonary disorders, those who had been part of another clinical trial within the last 30 days, or those with known allergies to the study medications.

Study Duration and Location

The study was conducted over a period from October 2015 to November 2017. All assessments, interventions, and follow-ups took place in the Pediatrics Department at Patna Medical College & Hospital, providing a controlled environment for consistent data collection.

Data Collection

Data were collected through a combination of medical record reviews, patient interviews, and direct clinical assessments. Key variables recorded included the type and dosage of asthma medication administered, frequency of use, therapeutic outcomes, side effects, and any changes in asthma control status as defined by the Global Initiative for Asthma (GINA) guidelines.

Statistical Analysis

Descriptive statistics were used to summarize demographic and clinical characteristics of the study population. The efficacy and safety of the pharmacological treatments were analyzed using inferential statistics, including chi-square tests for categorical data and t-tests or ANOVA for continuous variables, depending on the distribution of the data. A p-value of less than 0.05 was considered statistically significant.

Results

The study included 97 pediatric patients diagnosed with asthma, with a balanced gender distribution (49% female, 51% male). The age of participants ranged from 2 to 17 years, with a median age of 10 years. The majority of the patients (68%) were diagnosed with mild to moderate asthma, while 32% had severe asthma according to the classification criteria.

Analysis of the pharmacological treatment patterns revealed that inhaled corticosteroids (ICS) were the most commonly prescribed medication, used by 82% of the patients, followed by beta-agonists (76%), and leukotriene receptor antagonists (45%). Combination inhalers containing both a corticosteroid and a long-acting beta-agonist were used by 30% of the participants.

Post-treatment assessments showed significant improvement in asthma control among the participants. Based on the Asthma Control Test (ACT) scores, the number of patients achieving well-controlled asthma status increased from 20% at baseline to 70% at the end of the study period. The average frequency of asthma exacerbations decreased from 3.2 to 0.9 episodes per year per patient.

The treatment was well-tolerated with minimal adverse effects reported. The most common side effects associated with ICS were throat irritation and hoarseness, reported by 15% of those using these medications. Beta-agonists were associated with transient increases in heart rate in some patients, with 10% reporting this side effect, but these were not clinically significant.

Statistical analysis indicated that the improvements in asthma control were statistically significant ($p < 0.01$). There was also a significant reduction in the frequency of asthma exacerbations ($p < 0.05$). The use of combination therapy was correlated with higher rates of asthma control compared to monotherapy ($p < 0.05$).

Table 1: Demographics and Clinical Characteristics of Participants

Characteristic	Total Participants (n=97)	Details
Gender		
- Female	48 (49%)	
- Male	49 (51%)	
Age Range	2 to 17 years	Median Age: 10 years
Asthma Severity		
- Mild to Moderate	66 (68%)	
- Severe	31 (32%)	

Table 2: Pharmacological Treatment Patterns

Medication Type	Patients Using (n=97)	Percentage
Inhaled Corticosteroids (ICS)	80	82%
Beta-Agonists	74	76%
Leukotriene Receptor Antagonists	44	45%
Combination Inhalers	29	30%

Table 3: Treatment Outcomes

Outcome Measure	Baseline	End of Study	Improvement
Asthma Control Test (ACT) Score	20% well-controlled	70% well-controlled	50% increase
Average Asthma Exacerbations	3.2 episodes/year	0.9 episodes/year	2.3 episodes decrease

Table 4: Adverse Effects and Safety

Medication Type	Reported Side Effects	Patients Affected (n=97)	Percentage
Inhaled Corticosteroids	Throat irritation, hoarseness	15	15%
Beta-Agonists	Transient increase in heart rate	10	10%

Table 5: Statistical Analysis of Treatment Efficacy

Measurement	p-Value
Improvement in Asthma Control	<0.01
Reduction in Asthma Exacerbations	<0.05
Combination Therapy vs. Monotherapy	<0.05

Discussion

The findings of this study underscore the efficacy of current pharmacological interventions in managing pediatric asthma within the structured environment of Patna Medical College & Hospital's Pediatrics Department [10]. The significant increase in the proportion of patients achieving well-controlled asthma, from 20% to 70%, highlights the effectiveness of personalized asthma management plans, particularly those incorporating a combination of inhaled corticosteroids and beta-agonists. These results are consistent with existing literature that supports the use of combination inhalers for improving asthma control and reducing exacerbations in pediatric populations [11,12].

The reduction in the frequency of asthma exacerbations further substantiates the benefit of ongoing and adjusted pharmacological treatment [13]. This outcome not only improves the quality of life for pediatric patients but also potentially reduces the overall healthcare burden associated with asthma emergencies [14]. Despite the high efficacy of the treatments, the study also sheds light on the side effects associated with asthma medications, particularly inhaled corticosteroids and beta-agonists. The reported side effects were generally mild and consistent with those documented in other studies, indicating that while the drugs are effective, monitoring for adverse effects remains crucial [15-16].

The significant correlations found in this study, including the association between combination therapy and higher asthma control rates, suggest that more aggressive initial treatment strategies might be warranted in pediatric patients with poorly controlled symptoms. This approach could be particularly beneficial in settings similar to that of the study, where routine monitoring and adjustments can be effectively managed. The study reaffirms the importance of tailored asthma management strategies and provides a compelling argument for the use of combination therapies in pediatric asthma care. Future studies should aim to explore long-term outcomes and the potential impacts of these pharmacological treatments on pediatric growth and development, ensuring that the benefits of asthma control are balanced with the risk of side effects [17-20].

Conclusion

The study conducted at the Pediatrics Department of Patna Medical College & Hospital has demonstrated substantial effectiveness in the pharmacological management of pediatric asthma, with a significant improvement in asthma control and a reduction in exacerbation frequency among the treated patients. The use of inhaled corticosteroids, beta-agonists, and combination therapies has proven beneficial, aligning with global guidelines and reinforcing the value of tailored treatment plans. Although the treatments were generally well-tolerated, ongoing vigilance for potential side effects is essential. These findings advocate for the continued use of personalized, evidence-based pharmacological strategies to enhance the quality of life for children with asthma, emphasizing the need for future research to focus on optimizing treatment protocols while minimizing adverse effects.

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