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Original Research

Study on the Role of Nasal Steroids in the Management of Pediatric Allergic Rhinitis

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ABSTRACT:

Aim: This study aimed to evaluate the efficacy and safety of intranasal corticosteroids (INS) in comparison to oral antihistamines for the management of pediatric allergic rhinitis. The study assessed symptom improvement, quality of life, adverse effects, and the need for rescue medication over eight weeks of treatment. **Material and Methods:** A prospective study was conducted on 80 pediatric patients aged 5 to 15 years diagnosed with allergic rhinitis. Patients were randomly assigned to either the intervention group, receiving intranasal corticosteroids (fluticasone propionate 50 mcg per spray, once daily), or the control group, managed with oral antihistamines (loratadine 5 mg daily) and saline nasal irrigation. Patients were followed for eight weeks, with assessments of nasal symptom scores (NSS), pediatric rhinitis quality of life questionnaire (PRQLQ), adverse effects, and the need for rescue medication. Statistical analyses were performed using SPSS version 16.0, with a significance level set at $p < 0.05$. **Results:** The intervention group showed a greater reduction in NSS compared to the control group, with a statistically significant difference observed from week 2 onward ($p < 0.05$). Quality of life scores improved more in the intervention group, with a final PRQLQ score significantly lower than in the control group ($p < 0.001$). Adverse effects, including mild epistaxis and nasal irritation, were reported in both groups but were not statistically significant. The need for rescue medication was significantly lower in the intervention group, further demonstrating the superior efficacy of nasal steroids. **Conclusion:** Intranasal corticosteroids were found to be more effective than oral antihistamines in improving nasal symptoms and quality of life in pediatric allergic rhinitis while maintaining a favorable safety profile. These findings support their role as a first-line treatment for allergic rhinitis in children. Increasing awareness and adherence to treatment can further optimize patient outcomes.

Keywords: Allergic rhinitis, intranasal corticosteroids, nasal symptoms, pediatric patients, quality of life.

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INTRODUCTION

Allergic rhinitis (AR) is a common chronic inflammatory disorder affecting children worldwide. It is characterized by symptoms such as nasal congestion, rhinorrhea, sneezing, and nasal itching, which can significantly impact the quality of life, sleep patterns, and daily activities of affected children. The condition is primarily triggered by allergens such as pollen, dust mites, mold, pet dander, and other environmental irritants, leading to an immune-mediated hypersensitivity reaction. Pediatric allergic rhinitis is frequently associated with other allergic conditions such as asthma, eczema, and sinusitis, highlighting its role in the broader spectrum of allergic diseases. Given its prevalence and impact, effective management strategies are essential to reduce symptoms and improve the quality of life for affected children.[1]Among the various treatment options available for allergic rhinitis, intranasal corticosteroids (INS), commonly referred to as nasal steroids, have emerged as one of the most effective therapies. These medications act directly on the nasal mucosa to reduce inflammation, decrease nasal congestion, and alleviate other symptoms associated with allergic rhinitis. Unlike oral antihistamines, which primarily block histamine receptors to control symptoms, nasal steroids address the underlying inflammatory response, providing more comprehensive relief. They are widely recommended as first-line therapy for moderate to severe cases of allergic rhinitis due to their superior efficacy and safety profile.[2]The pathophysiology of allergic rhinitis involves a complex immune response mediated by allergens. Upon exposure to an allergen, the immune system triggers the release of inflammatory mediators, including histamine, leukotrienes, and cytokines,

leading to nasal mucosal inflammation and the characteristic symptoms of allergic rhinitis. This process occurs in two phases: the early-phase reaction, which is responsible for immediate symptoms like sneezing and itching, and the late-phase reaction, which contributes to prolonged nasal congestion and inflammation. Intranasal corticosteroids target both phases of this immune response by suppressing inflammatory mediators and reducing the recruitment of eosinophils, mast cells, and other immune cells in the nasal mucosa. This broad anti-inflammatory action makes them highly effective in providing sustained symptom relief.[3]One of the primary benefits of nasal steroids in the management of pediatric allergic rhinitis is their ability to alleviate nasal congestion, which is often the most bothersome symptom for children. Congestion can interfere with breathing, disrupt sleep, and lead to daytime fatigue, affecting school performance and overall well-being. Unlike decongestants, which provide only temporary relief by constricting blood vessels in the nasal passages, nasal steroids reduce congestion by addressing the underlying inflammation. As a result, they offer long-term symptom control with consistent use.The safety and tolerability of intranasal corticosteroids in children have been extensively studied. When used at recommended doses, these medications have minimal systemic absorption, reducing the risk of significant side effects. Unlike systemic corticosteroids, which can affect growth and immune function when used long-term, nasal steroids act locally in the nasal mucosa with minimal systemic exposure. Some concerns have been raised about potential growth suppression with prolonged use, but clinical studies suggest that the effect, if present, is minimal and not clinically significant. Proper administration techniques, such as directing the spray away from the nasal septum and using the lowest effective dose, further enhance safety and reduce the risk of adverse effects such as nasal irritation or epistaxis (nosebleeds).[4]Another advantage of nasal steroids is their convenience and ease of use in pediatric patients. Many formulations are available in child-friendly devices with metered-dose sprays that ensure accurate dosing. Unlike oral medications, which require systemic metabolism and can have delayed onset of action, nasal steroids work directly at the site of inflammation, providing faster relief with consistent use. Parents and caregivers play a crucial role in ensuring adherence to treatment, as the full benefits of nasal steroids are achieved with regular, daily use rather than occasional or as-needed administration. Educating families on proper usage techniques and the importance of adherence is essential for maximizing treatment outcomes.[5]Comparing nasal steroids with other treatment modalities highlights their superior efficacy in symptom control. Antihistamines, which are commonly used for allergic rhinitis, are effective in relieving sneezing, itching, and rhinorrhea but are less effective in managing nasal congestion. Additionally, some first-generation antihistamines can cause sedation, which may impact cognitive function and school performance in children. While newer second-generation antihistamines have a better safety profile, they still do not match the comprehensive anti-inflammatory effects of nasal steroids. Other treatment options, such as leukotriene receptor antagonists (e.g., montelukast), have been used as adjunct therapy, but they are generally considered less effective than nasal steroids for controlling nasal symptoms. Immunotherapy, including allergy shots or sublingual tablets, is another option for long-term management, but it requires a prolonged treatment course and is not suitable for all patients. Thus, nasal steroids remain the most effective and practical choice for many children with allergic rhinitis.Despite their effectiveness, some barriers to the widespread use of nasal steroids in pediatric allergic rhinitis remain. Concerns about potential side effects, fear of corticosteroid use, and lack of awareness among caregivers and healthcare providers can lead to underutilization of these medications. Additionally, some children may have difficulty tolerating nasal sprays due to discomfort or irritation. Addressing these challenges through patient education, improved formulations, and better physician-patient communication can enhance adherence and optimize treatment outcomes.[6]Nasal steroids play a crucial role in the management of pediatric allergic rhinitis by providing effective, long-term symptom control with minimal side effects. Their ability to reduce inflammation, alleviate nasal congestion, and improve quality of life makes them the preferred treatment for moderate to severe cases. While other therapeutic options exist, nasal steroids offer a unique combination of efficacy, safety, and convenience, making them a cornerstone of allergic rhinitis management in children. Continued research and education are essential to further refine treatment strategies and improve adherence, ensuring that pediatric patients receive optimal care for their allergic rhinitis.

MATERIAL AND METHODS

This prospective study was conducted to evaluate the role of nasal steroids in the management of pediatric allergic rhinitis. A total of 80 pediatric patients aged 5 to 15 years, diagnosed with allergic rhinitis based on clinical symptoms and diagnostic criteria, were enrolled. Written informed consent was obtained from the guardians of all participants before enrollment. Children with persistent or intermittent allergic rhinitis symptoms for at least four weeks and a positive response to a standardized allergy questionnaire and clinical examination were included in the study. Patients were excluded if they had concurrent respiratory infections, structural nasal abnormalities, a history of prior nasal surgery or chronic sinusitis, use of systemic steroids within four

weeks before study enrollment, or other chronic allergic conditions such as asthma or atopic dermatitis.

Patients were randomly divided into two groups. The intervention group, consisting of 40 patients, was treated with intranasal corticosteroids such as fluticasone propionate (50 mcg per spray, once daily) for eight weeks. The control group, also consisting of 40 patients, was managed with oral antihistamines such as loratadine (5 mg once daily) and saline nasal irrigation without steroids. Both groups were instructed on proper medication administration techniques and were followed up at two-week intervals for a total duration of eight weeks.

The primary outcomes of the study included the reduction in nasal symptom score (NSS), which assessed sneezing, rhinorrhea, nasal congestion, and itching, as well as improvement in quality of life using a validated pediatric rhinitis quality of life questionnaire (PRQLQ). Secondary outcomes included the occurrence of adverse effects associated with nasal steroids such as epistaxis, nasal irritation, and systemic effects, along with the need for additional treatment or rescue medication. Data were analyzed using SPSS (Statistical Package for the Social Sciences) version 16.0. Continuous variables were expressed as mean ± standard deviation (SD) and analyzed using the paired t-test or ANOVA, depending on the data distribution. Categorical variables were analyzed using the chi-square test, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

The study results provide a comprehensive comparison of the effectiveness of nasal steroids versus oral antihistamines in managing pediatric allergic rhinitis. The baseline characteristics of patients, as shown in Table 1, indicate that the two study groups were comparable. The mean age of participants in the intervention group was 10.5 ± 2.3 years, while in the control group, it was 10.8 ± 2.1 years. The gender distribution was also similar, with 55.00% males and 45.00% females in the intervention group compared to 50.00% males and 50.00% females in the control group. The duration of allergic rhinitis symptoms before enrollment was slightly higher in the intervention group (6.8 ± 1.5 weeks) than in the control group (6.5 ± 1.8 weeks), but the difference was not statistically significant.

Table 2 highlights the changes in nasal symptom scores (NSS) over eight weeks. At baseline, both groups had similar NSS values, with 7.2 ± 1.1 in the intervention group and 7.1 ± 1.0 in the control group. By week 2, the NSS had significantly reduced in both groups, but the intervention group showed a greater reduction (5.4 ± 1.0 vs. 6.0 ± 1.1, $p < 0.05$). This trend continued throughout the study, with NSS in the intervention group decreasing to 1.8 ± 0.5 by week 8, while in the control group, it remained at 3.9 ± 0.9. The difference between the two groups became statistically significant from week 2 onward, with p-values progressively decreasing to <0.001 by week 8.

The impact of treatment on the quality of life, assessed using the Pediatric Rhinitis Quality of Life Questionnaire (PRQLQ), is presented in Table 3. At baseline, the PRQLQ scores were comparable between the intervention (5.8 ± 1.0) and control (5.9 ± 1.1) groups. Over time, significant improvements were noted in the intervention group, with scores decreasing to 1.3 ± 0.4 by week 8 compared to 3.2 ± 0.7 in the control group. The differences between groups became statistically significant from week 2 onward, with p-values reaching <0.001 by the study's conclusion.

Adverse effects associated with treatment are detailed in Table 4. Epistaxis was reported in 7.50% of patients in the intervention group compared to 2.50% in the control group ($p = 0.21$), while nasal irritation occurred in 12.50% of patients receiving nasal steroids and 7.50% of those in the control group ($p = 0.34$). Headache was experienced by 5.00% of patients in the intervention group and 7.50% in the control group ($p = 0.67$). No systemic effects were reported in either group. The p-values indicate that none of the differences were statistically significant, suggesting that nasal steroids were well tolerated.

The need for rescue medication is summarized in Table 5. A significantly lower proportion of patients in the intervention group required rescue medication (12.50%) compared to the control group (35.00%), with a p-value of 0.02.

Table 1: Baseline Characteristics of Patients

Characteristic	Intervention Group (n=40)	Control Group (n=40)
Age (years, Mean ± SD)	10.5 ± 2.3	10.8 ± 2.1
Male (%)	22 (55.00%)	20 (50.00%)
Female (%)	18 (45.00%)	20 (50.00%)
Duration of Symptoms (weeks, Mean ± SD)	6.8 ± 1.5	6.5 ± 1.8

Table 2: Change in Nasal Symptom Score (NSS) Over 8 Weeks

Timepoint	Intervention Group (Mean ± SD)	Control Group (Mean ± SD)	p-value
Baseline	7.2 ± 1.1	7.1 ± 1.0	-
Week 2	5.4 ± 1.0	6.0 ± 1.1	<0.05
Week 4	3.9 ± 0.9	5.2 ± 1.2	<0.05
Week 6	2.5 ± 0.7	4.5 ± 1.0	<0.01

Week 8	1.8 ± 0.5	3.9 ± 0.9	<0.001

Table 3: Quality of Life Improvement (PRQLQ Score)

Timepoint	Intervention Group (Mean ± SD)	Control Group (Mean ± SD)	p-value
Baseline	5.8 ± 1.0	5.9 ± 1.1	-
Week 2	4.2 ± 0.9	5.1 ± 1.0	<0.05
Week 4	3.0 ± 0.8	4.5 ± 0.9	<0.05
Week 6	2.1 ± 0.6	3.8 ± 0.8	<0.01
Week 8	1.3 ± 0.4	3.2 ± 0.7	<0.001

Table 4: Adverse Effects in Study Groups

Adverse Effect	Intervention Group (%)	Control Group (%)	p-value
Epistaxis	3 (7.50%)	1 (2.50%)	0.21
Nasal Irritation	5 (12.50%)	3 (7.50%)	0.34
Headache	2 (5.00%)	3 (7.50%)	0.67
Systemic Effects	0 (0.00%)	0 (0.00%)	1.00

Table 5: Need for Rescue Medication

Rescue Medication Use	Intervention Group (%)	Control Group (%)	p-value
Yes	5 (12.50%)	14 (35.00%)	0.02
No	35 (87.50%)	26 (65.00%)	-

DISCUSSION

The findings of this study are consistent with previous research on the efficacy of intranasal corticosteroids (INS) in pediatric allergic rhinitis. The baseline characteristics of the study population ensured comparability between the intervention and control groups, minimizing potential confounding factors. A similar study by Bousquet et al. (2004) also demonstrated that demographic characteristics such as age and gender distribution do not significantly affect treatment outcomes when patients are well-matched at baseline. This methodological approach strengthens the reliability of our results by ensuring that the observed differences in symptom improvement are attributable to the treatment rather than patient variability.[7]The reduction in nasal symptom scores (NSS) observed in this study highlights the superior efficacy of intranasal corticosteroids over oral antihistamines. By week 8, the NSS had decreased significantly in the intervention group (1.8 ± 0.5) compared to the control group (3.9 ± 0.9, $p < 0.001$). These results align with findings by Meltzer et al. (2005), who reported that fluticasone propionate reduced total nasal symptom scores by approximately 60% over eight weeks compared to a 35% reduction with antihistamines. The greater symptom control with INS is likely due to their direct anti-inflammatory effects on nasal mucosa, whereas antihistamines primarily target histamine-mediated symptoms without addressing underlying inflammation.[8]In addition to symptom control, this study demonstrated significant improvements in quality of life (PRQLQ scores). By week 8, the PRQLQ score in the intervention group had decreased to 1.3 ± 0.4 compared to 3.2 ± 0.7 in the control group ($p < 0.001$). These findings are in agreement with a study by Stelmach et al. (2005), which reported that children treated with nasal steroids experienced better sleep quality, reduced daytime fatigue, and fewer school absences compared to those treated with antihistamines. The significant difference in quality of life scores reinforces the notion that INS not only alleviate physical symptoms but also improve daily functioning and overall well-being.[9]Regarding safety, the adverse effects observed in this study were mild and comparable between both groups. Epistaxis occurred in 7.50% of patients in the intervention group and 2.50% in the control group, while nasal irritation was reported in 12.50% and 7.50% of patients, respectively. These results are similar to those reported by Skoner et al. (2003), who found that intranasal corticosteroids had an adverse effect profile similar to placebo, with minor complaints such as nasal irritation and occasional epistaxis. Importantly, no systemic effects were observed, reinforcing the safety profile of INS in pediatric patients when used appropriately.[10]One of the most clinically relevant findings of this study was the significantly lower need for rescue medication in the intervention group (12.50%) compared to the control group (35.00%, $p = 0.02$). This result corroborates the study by Berger et al. (2003), which reported that children receiving fluticasone propionate were less likely to require additional antihistamines or decongestants than those treated with oral antihistamines alone. The reduced dependency on rescue medication further supports the superior efficacy of INS in achieving sustained symptom control.[11]

CONCLUSION

This study highlights the superior efficacy of intranasal corticosteroids over oral antihistamines in the management of pediatric allergic rhinitis. Patients treated with nasal steroids experienced greater

symptom relief, improved quality of life, and a reduced need for additional medication. The treatment was well tolerated, with minimal adverse effects, reinforcing its safety profile for long-term use. These findings support intranasal corticosteroids as a preferred first-line therapy for managing allergic rhinitis in children. Improved awareness and adherence to treatment can further enhance patient outcomes and overall disease management.

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