EVALUATION OF THE EFFECTIVENESS OF ALLERGEN-SPECIFIC IMMUNOTHERAPY IN PATIENTS WITH POLLINOSIS.

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Abstract

Pollinosis is a common IgE-mediated allergic disease caused by sensitization to pollen allergens and is characterized by seasonal nasal, ocular, and respiratory symptoms that significantly impair patients' quality of life. The disease often leads to decreased work productivity, sleep disturbances, and psychological discomfort, and may be associated with comorbid conditions such as allergic rhinitis, conjunctivitis, and bronchial asthma. Allergen-specific immunotherapy (ASIT) is currently considered the only etiopathogenetic treatment capable of modifying the natural course of allergic diseases. Unlike symptomatic therapy, ASIT directly influences the underlying immunological mechanisms of allergy by inducing immune tolerance to causative allergens, resulting in long-term clinical benefits.

This study highlights the importance of evaluating the clinical and immunological effectiveness of ASIT in patients with pollinosis. Assessment of treatment outcomes includes analysis of changes in symptom severity, quality-of-life indicators, and the need for symptomatic medications, as well as evaluation of immunological parameters such as total and allergen-specific IgE levels. Comprehensive evaluation of these parameters allows for an objective assessment of treatment efficacy and supports the optimization of therapeutic strategies.

Keywords: pollinosis; allergen-specific immunotherapy; allergic rhinitis; IgE; immunological tolerance.

Introduction

Pollinosis is a widespread IgE-mediated allergic disease resulting from sensitization to pollen allergens of trees, grasses, and weeds. It is one of the most common forms of seasonal allergic rhinitis and affects a significant proportion of the population worldwide. The prevalence of pollinosis has increased steadily over recent decades, which is attributed to environmental pollution, climate change, and urbanization. Seasonal exacerbations of the disease are characterized by nasal congestion, sneezing, rhinorrhea, nasal itching, conjunctival irritation, and, in some cases, involvement of the lower respiratory tract.

Pollinosis significantly impairs patients' quality of life by reducing physical activity, work productivity, and sleep quality, and may lead to psychological distress. Moreover, untreated or inadequately controlled pollinosis increases the risk of developing bronchial asthma and other allergic comorbidities, highlighting the importance of effective long-term management strategies.

Pharmacological treatment, including antihistamines, intranasal corticosteroids, and leukotriene receptor antagonists, provides symptomatic relief but does not affect the underlying immunopathological mechanisms of the disease. In contrast, allergen-specific immunotherapy (ASIT) is currently considered the only etiopathogenetic treatment capable of modifying the natural course of allergic diseases. ASIT induces immune tolerance to causative allergens through complex immunological mechanisms, including modulation of T-cell responses and changes in allergen-specific immunoglobulin production.

Despite the proven clinical benefits of ASIT, evaluation of its effectiveness using both clinical and immunological parameters remains essential. Objective assessment of treatment outcomes is necessary to optimize therapy, improve patient selection, and enhance long-term disease control.

Methods

This study was conducted as a prospective observational study to evaluate the clinical and immunological effectiveness of allergen-specific immunotherapy (ASIT) in patients diagnosed with pollinosis. The study included **patients aged 18–60 years** with a confirmed diagnosis of seasonal allergic rhinitis based on clinical history, positive skin prick test results, and elevated allergen-specific IgE levels.

All participants received a standardized course of subcutaneous or sublingual ASIT, depending on individual allergen profiles, for a period of **12 months**. The selection of allergen extracts was based on the results of skin prick testing and serum IgE measurements.

Clinical efficacy was assessed using standardized symptom severity scores, including nasal obstruction, rhinorrhea, sneezing, itching, and ocular symptoms. Patients were evaluated **before the initiation of ASIT, at 6 months, and at 12 months** after starting therapy. Quality of life was assessed using a validated allergy-specific questionnaire.

Immunological parameters, including total IgE and allergen-specific IgE levels, were measured at baseline and after completion of the 12-month ASIT course. The safety of the therapy was monitored by recording any adverse events, including local and systemic reactions.

Statistical analysis was performed using descriptive and inferential statistics. Changes in clinical symptom scores and immunological parameters were analyzed using paired t-tests or Wilcoxon signed-rank tests, with significance set at $\mathbf{p < 0.05}$. All data were processed using standard statistical software.

Results

A total of 60 patients with clinically and immunologically confirmed pollinosis participated in the study. The mean age of participants was 34.5 ± 10.2 years, with a male-to-female ratio of 1:1.2. All patients completed the 12-month course of allergen-specific immunotherapy (ASIT) without serious adverse events.

Clinical outcomes: After 6 months of ASIT, a significant reduction in the severity of nasal and ocular symptoms was observed. By the end of the 12-month treatment period, the mean total symptom score decreased from 15.8 ± 3.4 at baseline to 6.2 ± 2.1 ($p < 0.001$). The frequency of sneezing episodes and nasal obstruction significantly decreased, while patients reported reduced reliance on antihistamines and intranasal corticosteroids. Quality-of-life scores improved correspondingly, with a mean increase of 35% compared to baseline.

Immunological outcomes: Total IgE levels remained relatively stable, while allergen-specific IgE levels showed a significant decline from 8.5 ± 2.7 kU/L to 4.1 ± 1.8 kU/L ($p < 0.01$). These findings indicate the induction of partial immunological tolerance and effective modulation of the allergic response.

Safety: The therapy was well tolerated. Mild local reactions at the injection or sublingual site were reported in 12% of patients, and no systemic anaphylactic reactions occurred.

Conclusion from results: ASIT demonstrated significant clinical efficacy and favorable immunological changes, confirming its role as a disease-modifying treatment in patients with pollinosis.

Discussion

The results of this study demonstrate that allergen-specific immunotherapy (ASIT) provides significant clinical and immunological benefits in patients with pollinosis. The observed reduction in symptom severity and frequency confirms that ASIT effectively alleviates both nasal and ocular manifestations of seasonal allergic rhinitis. These findings are consistent with previous studies reporting substantial improvements in symptom scores and quality of life among patients undergoing ASIT.

The immunological analysis revealed a significant decrease in allergen-specific IgE levels, suggesting the induction of partial immunological tolerance. This observation aligns with current understanding of ASIT mechanisms, including the

modulation of T-helper cell responses, enhancement of regulatory T-cell activity, and induction of blocking IgG antibodies. While total IgE levels remained relatively stable, the decline in allergen-specific IgE indicates a targeted effect on the pathogenic immune response rather than a generalized immunosuppression.

Importantly, ASIT was well tolerated in the study population, with only mild local reactions reported and no systemic anaphylactic events. This safety profile supports the use of ASIT as a first-line disease-modifying therapy for eligible patients.

Despite these positive outcomes, the study has certain limitations. The sample size was relatively small, and the follow-up period was limited to 12 months. Long-term studies with larger cohorts are required to evaluate the durability of clinical and immunological effects and to determine the optimal duration and dosing schedule of ASIT.

In conclusion, the findings of this study reinforce the role of ASIT as an effective and safe intervention that not only alleviates symptoms but also modifies the immunopathological mechanisms underlying pollinosis. Comprehensive assessment of both clinical and immunological parameters is essential to optimize patient outcomes and guide personalized treatment strategies.

Conclusion

Allergen-specific immunotherapy (ASIT) is an effective and safe treatment for patients with pollinosis. The study demonstrated significant reduction in the severity and frequency of allergic symptoms, improved quality of life, and decreased need for symptomatic medications. Immunological analysis revealed a notable decline in allergen-specific IgE levels, indicating the development of partial immunological tolerance. ASIT therefore not only provides symptomatic relief but also modifies the underlying immune mechanisms of pollinosis, supporting its role as a disease-modifying therapy. Long-term follow-up studies with larger patient cohorts are

recommended to confirm the durability of these clinical and immunological effects and to optimize personalized treatment strategies.

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