

ALLERGIC RHINITIS: MODERN PERSPECTIVES ON PATHOGENESIS, DIAGNOSIS, AND MANAGEMENT IN OTORHINOLARYNGOLOGY

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Abstract

Allergic rhinitis is one of the most prevalent chronic diseases encountered in otorhinolaryngology and allergy practice. It is an immunoglobulin E (IgE)-mediated inflammatory disorder of the nasal mucosa that develops following exposure to environmental allergens in sensitized individuals. The disease affects hundreds of millions of people worldwide and is associated with substantial impairment in quality of life, educational performance, work productivity, and sleep quality. Common symptoms include nasal congestion, rhinorrhea, sneezing, itching, and postnasal drip. Allergic rhinitis frequently coexists with asthma, chronic rhinosinusitis, otitis media, and conjunctivitis, highlighting its systemic nature. Advances in immunology, molecular diagnostics, and targeted therapies have significantly improved understanding of disease mechanisms and management strategies. This article reviews contemporary concepts regarding the epidemiology, pathogenesis, clinical manifestations, diagnostic evaluation, treatment approaches, and preventive measures related to allergic rhinitis in modern otorhinolaryngology.

Keywords: Allergic rhinitis, nasal allergy, immunoglobulin E, allergen sensitization, nasal obstruction, antihistamines, intranasal corticosteroids, immunotherapy, otorhinolaryngology.

1. Introduction

Allergic rhinitis is a chronic inflammatory disease of the upper respiratory tract characterized by an exaggerated immune response to otherwise harmless environmental substances. It represents one of the most common allergic disorders worldwide and continues to increase in prevalence, particularly in urbanized and industrialized regions. Epidemiological studies estimate that allergic rhinitis affects approximately 20–30% of the global population, making it a significant public health concern. The disease develops when genetically predisposed individuals become sensitized to airborne allergens such as pollen, house dust mites, mold spores, animal dander, and occupational allergens. Upon repeated exposure, these allergens trigger immunological reactions mediated by IgE antibodies, leading to the release of histamine, leukotrienes, cytokines, and other inflammatory mediators. These substances produce the characteristic symptoms of allergic rhinitis and contribute to persistent

mucosal inflammation.

Traditionally, allergic rhinitis was considered a localized nasal disorder. However, contemporary evidence demonstrates that it represents part of a systemic allergic process involving both upper and lower airways. The concept of “one airway, one disease” highlights the close relationship between allergic rhinitis and bronchial asthma. Patients with allergic rhinitis frequently exhibit increased risk of asthma development, while effective management of nasal symptoms may contribute to improved asthma control.

The impact of allergic rhinitis extends beyond physical symptoms. Chronic nasal obstruction and sleep disturbances can impair concentration, cognitive performance, academic achievement, and workplace productivity. Emotional distress, fatigue, and social limitations are also commonly reported.

Consequently, timely diagnosis and effective treatment are essential for reducing disease burden and improving patient well-being.

Recent advances in molecular allergy diagnostics, immunotherapy, and biologic medications have transformed clinical management. Understanding the mechanisms underlying allergic inflammation allows clinicians to implement personalized therapeutic strategies and optimize long-term outcomes.

2. Materials and Methods

This study was conducted through a comprehensive review of contemporary scientific literature addressing allergic rhinitis and its management within the field of otorhinolaryngology. Relevant publications were identified using electronic databases including PubMed, Scopus, Web of Science, Embase, and Google Scholar.

The review included randomized controlled trials, observational studies, systematic reviews, meta-analyses, and international clinical guidelines published between 2010 and 2025. Articles focusing on epidemiology, immunopathogenesis, clinical manifestations, diagnostic approaches, pharmacological treatments, immunotherapy, and preventive strategies were selected for detailed analysis.

Data extraction involved evaluation of patient demographics, allergen profiles, symptom severity, diagnostic accuracy, treatment effectiveness, quality-of-life outcomes, and long-term disease control. Comparative analysis was performed to identify current trends and evidence-based recommendations in allergic rhinitis management.

Studies with inadequate methodological quality, insufficient clinical relevance, or limited scientific rigor were excluded. The collected information was synthesized to provide a comprehensive overview of modern concepts and practices related to allergic rhinitis.

3. Results

Analysis of the reviewed literature demonstrated that allergic rhinitis remains one of the leading causes of chronic nasal symptoms worldwide. The incidence was particularly high among children, adolescents, and young adults, although the condition affected individuals across all age groups. House dust mites, grass pollen, tree pollen, weed pollen, molds, and animal dander were identified as the most common allergens responsible for sensitization. Environmental pollution, tobacco smoke exposure, climate change, and urbanization were found to contribute significantly to increasing disease prevalence and symptom severity.

The most frequently reported clinical manifestations included repetitive sneezing, watery rhinorrhea, nasal itching, nasal congestion, postnasal drainage, and ocular symptoms such as tearing and itching. Many patients experienced seasonal exacerbations corresponding to allergen exposure patterns, while others exhibited persistent symptoms throughout the year.

Diagnostic evaluation relied primarily on detailed medical history, physical examination, and allergy testing. Skin prick testing demonstrated high sensitivity and specificity for identifying allergen sensitization. Measurement of serum-specific IgE antibodies provided additional diagnostic information, particularly in patients unable to undergo skin testing.

Nasal endoscopy frequently revealed pale edematous mucosa, excessive secretions, and turbinate hypertrophy. Advanced molecular diagnostic techniques improved allergen identification and facilitated personalized treatment planning.

Intranasal corticosteroids consistently demonstrated the highest efficacy among pharmacological therapies. Significant improvements were observed in nasal obstruction, rhinorrhea, sneezing

frequency, and overall symptom control. Second-generation antihistamines effectively reduced histamine-mediated symptoms while minimizing sedative effects. Allergen-specific immunotherapy emerged as the only treatment capable of modifying the natural course of allergic disease. Both subcutaneous and sublingual immunotherapy produced long-term symptom reduction and decreased medication requirements. Several studies reported sustained clinical benefits even after completion of treatment.

4. Discussion

The findings of this review confirm that allergic rhinitis is a multifactorial inflammatory disease influenced by genetic, immunological, and environmental factors. The increasing prevalence observed globally reflects complex interactions between hereditary susceptibility and changing environmental conditions.

The immunological basis of allergic rhinitis involves activation of T-helper type 2 lymphocytes and production of allergen-specific IgE antibodies. Subsequent allergen exposure triggers mast cell degranulation and release of inflammatory mediators responsible for acute symptoms. Chronic exposure promotes persistent inflammation, tissue remodeling, and heightened nasal sensitivity. The strong association between allergic rhinitis and asthma underscores the importance of comprehensive airway evaluation. Inflammatory processes affecting the nasal mucosa may extend to lower respiratory structures, contributing to bronchial hyperresponsiveness and asthma exacerbations. Therefore, integrated management approaches targeting both upper and lower airways are increasingly recommended.

Pharmacological therapy remains the cornerstone of symptom management. Intranasal corticosteroids provide superior anti-inflammatory effects and remain the first-line treatment for moderate-to-severe disease. Combination therapy involving antihistamines and corticosteroids often enhances therapeutic outcomes.

Immunotherapy represents a major advancement in allergy treatment. Unlike symptomatic medications, allergen-specific immunotherapy addresses underlying immunological mechanisms and may alter disease progression. The ability to reduce future asthma development and prevent new allergen sensitizations further highlights its clinical significance.

Emerging biologic therapies targeting IgE and inflammatory cytokines offer promising options for patients with severe or treatment-resistant disease. Ongoing research continues to explore precision medicine approaches aimed at optimizing therapeutic effectiveness while minimizing adverse effects.

5. Conclusion

Allergic rhinitis is a highly prevalent chronic inflammatory disease with significant medical, social, and economic consequences. The condition results from IgE-mediated immune responses to environmental allergens and frequently affects both upper and lower airways. Comprehensive diagnosis involving clinical assessment and allergy testing is essential for accurate identification of causative allergens and development of individualized treatment plans. Intranasal corticosteroids and antihistamines remain the foundation of pharmacological management, while allergen-specific immunotherapy offers long-term disease modification. Early diagnosis, environmental control measures, patient education, and evidence-based therapeutic strategies are critical for achieving optimal symptom control and improving quality of life. Continued advances in immunology and personalized medicine are expected to further enhance future management of allergic rhinitis.

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