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Original Article

Beyond The Sneezes: Allergic Rhinitis at A Tertiary Care Hospital - A Cross-Sectional Study

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ABSTRACT

Background: Allergic rhinitis (AR) is a common chronic IgE-mediated inflammatory disorder of the nasal mucosa characterized by sneezing, rhinorrhea, nasal obstruction, and nasal itching. It significantly affects quality of life and is frequently associated with other allergic disorders. Identification of clinical patterns and allergen sensitivity is important for effective management and prevention of disease progression. Objectives: To study the clinical profile of patients with allergic rhinitis attending a tertiary care hospital and to identify the allergens using skin prick testing. **Materials and Methods**: A hospital-based cross-sectional observational study was conducted in the Department of Otorhinolaryngology of a tertiary care hospital from January 2024 to December 2025. Ninety-two clinically diagnosed allergic rhinitis patients aged 18–60 years were included. Detailed history, clinical examination, laboratory investigations including absolute eosinophil count, peripheral eosinophil count, serum IgE estimation, diagnostic nasal endoscopy, and skin prick testing were performed. A total of 57 allergens comprising pollens, fungi, dust mites, dust allergens, insect allergens, dander allergens, and food allergens were tested. Data were analyzed using SPSS version 20, and $p<0.05$ was considered statistically significant. **Results**: The majority of patients belonged to the 30–39 years age group (33.7%), with female predominance (57.6%). Sneezing (76.1%), watery rhinorrhea (71.7%), and nasal obstruction (67.4%) were the most common presenting symptoms. Blocker phenotype was observed in 64.1% of patients, while moderate/severe persistent allergic rhinitis was the most common ARIA category (32.6%). Inferior turbinate hypertrophy (65.2%) and pale/boggy nasal mucosa (59.8%) were the predominant clinical findings. Skin prick test positivity was observed in 65.2% of patients and was significantly associated with urban residence ($p=0.002$) and elevated serum IgE levels ($p<0.001$). Dust mites were the most common allergen category (93.3%), followed by pollens (85.0%), house dust and occupational dust allergens (73.3%), fungal allergens (55.0%), insect allergens (51.7%), dander allergens (40.0%), and food allergens (13.3%). **Conclusion**: Allergic rhinitis predominantly affected young and middle-aged adults and commonly presented with sneezing, rhinorrhea, and nasal obstruction. Dust mites and pollens were the most commonly identified allergens. Significant associations of skin prick test positivity with urban residence and elevated serum IgE highlight the importance of allergen identification and targeted management strategies. Early recognition of allergen profiles and associated comorbidities may facilitate improved patient outcomes.

Keywords: Allergic rhinitis, Skin prick test, Aeroallergens, Dust mite, Serum IgE, Allergen sensitivity, ARIA classification.

INTRODUCTION

Allergic rhinitis (AR) is a common chronic inflammatory disorder of the nasal mucosa mediated by immunoglobulin E (IgE)-dependent hypersensitivity following exposure to environmental allergens. It commonly presents with sneezing, rhinorrhea, nasal itching, nasal obstruction, and may be associated with ocular symptoms such as itching, watering, and redness. Although often considered a minor illness, AR has important clinical relevance because of its chronicity, increasing prevalence, impact on quality of life, and association with other allergic airway diseases [1].

Globally, allergic rhinitis affects nearly 10–25% of the population, with considerable geographic variation due to genetic, environmental, climatic, socioeconomic, and lifestyle-related factors [2]. Rapid urbanization, industrialization, rising air pollution, altered housing conditions, and reduced microbial exposure have contributed to the increasing burden of allergic diseases worldwide [3]. In India, allergic rhinitis represents a substantial proportion of allergic disorders, with studies suggesting that nearly 20–30% of the population may experience allergic symptoms [4]. However, it remains underdiagnosed and undertreated, as many patients initially neglect recurrent sneezing, nasal discharge, and nasal blockage until symptoms interfere with sleep, work, or daily activities.

The clinical pattern of AR in India is influenced by diverse climatic conditions, prolonged pollen seasons, high environmental pollution, overcrowding, indoor allergens such as house dust mites, and occupational exposure to agricultural and industrial allergens. Seasonal worsening, especially during post-monsoon and winter periods, is frequently observed. These regional variations make local evaluation of clinical features and allergen profiles important for effective diagnosis and management [5].

The pathogenesis of allergic rhinitis involves interaction between inhaled allergens and the host immune system. In sensitive individuals, allergens bind to specific IgE antibodies on mast cells, triggering degranulation and release of mediators such as histamine, leukotrienes, prostaglandins, and cytokines. The early allergic response produces sneezing, itching, and watery rhinorrhea, while the late-phase response contributes to nasal congestion, mucosal edema, and persistent inflammation [6].

Clinically, patients may present with different symptom-dominant patterns. Some mainly experience sneezing, nasal itching, and watery rhinorrhea and are described as “sneezers-runners,” whereas others predominantly complain of nasal blockage, postnasal drip, thick secretions, and reduced smell and are categorized as “blockers.” This distinction is useful because it reflects variation in disease expression and may influence treatment planning [7]

The traditional classification of AR into seasonal and perennial forms has limitations because many patients are exposed to both seasonal and perennial allergens. Therefore, the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines classify AR as intermittent or persistent and further grade it as mild or moderate-to-severe based on symptom duration, sleep disturbance, impairment of daily activities, and effect on work or school performance [8]. Indian studies have shown that many patients present with persistent and moderate-to-severe disease, suggesting delayed diagnosis and inadequate early management [9].

Allergic rhinitis is also closely linked with bronchial asthma, chronic rhinosinusitis, allergic conjunctivitis, and atopic dermatitis, supporting the concept of “united airway disease.” Hence, comprehensive evaluation of comorbidities is important in patients presenting with AR [10]. In addition to clinical assessment, investigations such as skin prick testing, serum IgE estimation, eosinophil evaluation, and diagnostic nasal endoscopy help characterize disease pattern and identify relevant allergens. Skin prick testing remains an important tool for detecting IgE-mediated sensitivity and guiding allergen avoidance and immunotherapy decisions.

Considering the growing burden of allergic rhinitis, regional differences in allergen exposure, and the need for local clinical data, the present study was undertaken to evaluate the clinical profile of patients with allergic rhinitis attending a tertiary care hospital, including demographic characteristics, symptom pattern, allergen sensitivity, laboratory parameters, endoscopic findings, and associated comorbidities.

MATERIALS AND METHODS-

The present study was conducted as a hospital-based cross-sectional observational study in the Department of Otorhinolaryngology (ENT) of a tertiary care teaching hospital over a period of two years, from January 2024 to December 2025. The study aimed to evaluate the clinical profile of patients diagnosed with allergic rhinitis. Consecutive patients attending the ENT outpatient department who fulfilled the eligibility criteria were recruited after obtaining written informed consent.

Patients aged 18–60 years with a clinical diagnosis of allergic rhinitis and willing to undergo skin prick testing were included. Participants were required to discontinue antihistaminic medications for at least five days before evaluation. Patients with dermatological disorders affecting skin prick testing, severe hypersensitivity reactions, immunocompromised states, use of beta-blockers or systemic steroids, and known drug or food allergies were excluded. The sample size was

calculated using a prevalence of sinusitis of 39.8% reported in a previous Indian study, yielding a minimum sample size of 92 patients.

Clinical data were collected using a pre-designed structured proforma. Detailed history regarding nasal symptoms, ocular manifestations, family history of atopy, quality-of-life impairment, and associated comorbidities such as asthma, sinusitis, snoring, mouth breathing, otitis media, and nasal polyps was recorded. A comprehensive ENT examination was performed, and characteristic signs of allergic rhinitis, including allergic shiners, Dennie–Morgan lines, nasal crease, and mouth breathing, were documented.

Laboratory investigations included complete blood count, differential leukocyte count, peripheral smear eosinophil count, absolute eosinophil count, and total serum IgE estimation. Diagnostic nasal endoscopy was performed to assess mucosal changes, turbinate hypertrophy, septal deviation, discharge, and nasal polyps. Skin prick testing using a standardized panel of 57 allergens was conducted to identify allergen sensitivity. A wheal measuring at least 3 mm more than the negative control was considered positive. Data were analyzed using SPSS version 20. Descriptive statistics and Chi-square tests were applied, with $p \leq 0.05$ considered statistically significant. Ethical approval was obtained prior to commencement of the study.

RESULTS

A total of 92 clinically diagnosed cases of allergic rhinitis were included in the present cross-sectional study. Demographic characteristics, duration of symptoms, clinical symptomatology, ARIA classification, clinical examination findings, comorbidities, laboratory parameters, diagnostic nasal endoscopy findings, and skin prick test (SPT)-based allergen sensitivity patterns were analyzed.

The demographic profile of the study population is shown in Table 1. The highest proportion of patients belonged to the 30–39 years age group (31 patients; 33.7%), followed by the 20–29 years age group (28 patients; 30.4%). Thus, nearly two-thirds of the patients were in the 20–39 years age group. Females constituted 53 patients (57.6%), while males accounted for 39 patients (42.4%). Rural patients formed a slightly higher proportion of the study population (52 patients; 56.5%) compared to urban patients (40 patients; 43.5%). With respect to duration of symptoms, 40 patients (43.5%) had symptoms for more than three years, 34 patients (37.0%) had symptoms for 1–3 years, and 18 patients (19.6%) had symptoms for less than one year, indicating a predominantly chronic disease pattern.

Table 1. Demographic profile and duration of symptoms among study participants (n = 92)

Variable	Category	Frequency (n)	Percentage (%)
Age group	18–19 years	5	5.4
	20–29 years	28	30.4
	30–39 years	31	33.7
	40–49 years	18	19.6
	50–60 years	10	10.9
Sex	Male	39	42.4
	Female	53	57.6
Residence	Urban	40	43.5
	Rural	52	56.5

The presenting symptom profile is summarized in Figure 1. Sneezing, particularly paroxysmal sneezing, was the most common symptom and was reported by 70 patients (76.1%). Watery rhinorrhea was present in 66 patients (71.7%), followed by nasal obstruction in 62 patients (67.4%) and nasal pruritus in 50 patients (54.3%). Ocular symptoms such as itching, redness, and lacrimation were reported by 36 patients (39.1%). Postnasal drip was present in 28 patients (30.4%), while throat irritation or cough was reported by 22 patients (23.9%).

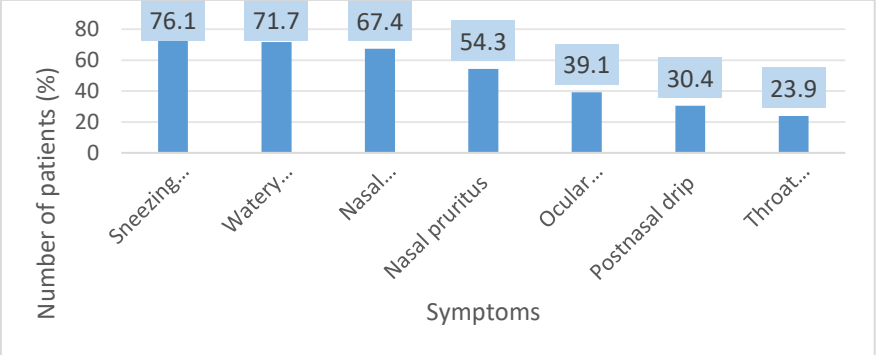


Figure 1: Distribution of patients according to Presenting symptom profile

The symptom pattern and clinical classification of allergic rhinitis are shown in Figure 1. Morning predominance of symptoms was observed in 41 patients (44.6%), whereas night predominance was reported by 18 patients (19.6%). No definite diurnal variation was noted in 33 patients (35.9%). Seasonal worsening was reported by 58 patients (63.0%), while 34 patients (37.0%) had perennial symptoms. Based on clinical phenotype, the blocker phenotype was more common and was observed in 59 patients (64.1%), while 33 patients (35.9%) were categorized as sneezers–runners. As per ARIA classification, moderate/severe persistent allergic rhinitis was the most common category, seen in 30 patients (32.6%), followed by mild persistent disease in 24 patients (26.1%), moderate/severe intermittent disease in 23 patients (25.0%), and mild intermittent disease in 15 patients (16.3%).

Table 2. Symptom pattern, clinical phenotype, and ARIA classification (n = 92)

Variable	Category	Frequency (n)	Percentage (%)
Diurnal pattern	Morning predominance	41	44.6
	Night predominance	18	19.6
	No clear diurnal variation	33	35.9
Seasonal pattern	Seasonal worsening	58	63
	Perennial symptoms	34	37
Clinical phenotype	Blockers	59	64.1
	Sneezers–Runners	33	35.9
ARIA classification	Mild intermittent	15	16.3
	Moderate/Severe intermittent	23	25
	Mild persistent	24	26.1
	Moderate/Severe persistent	30	32.6

Table 3. Clinical examination findings and comorbidities

Variable	Finding / Comorbidity	Frequency (n)	Percentage (%)
Clinical examination	Inferior turbinate hypertrophy	60	65.2
	Pale/boggy nasal mucosa	55	59.8
	Deviated nasal septum	50	54.3
	Allergic shiners	38	41.3
	Postnasal discharge	26	28.3
	Nasal crease / salute sign	24	26.1
	Nasal polyp	7	7.6
Comorbidities	Bronchial asthma	46	50
	Sinusitis	37	40.2
	Atopic dermatitis/eczema	20	21.7
	Allergic conjunctivitis	14	15.2
	Recurrent ear symptoms/otitis tendency	9	9.8

Laboratory findings and SPT positivity are shown in Table 3. Skin prick test positivity was observed in 60 patients (65.2%), while 32 patients (34.8%) were SPT-negative. Elevated total serum IgE was seen in 57 patients (62.0%). Peripheral eosinophilia greater than 6% was noted in 32 patients (34.8%), and absolute eosinophil count greater than 600/mm³ was observed in 28 patients (30.4%).

Table 4. Laboratory profile and SPT positivity (n = 92)

Parameter	Frequency (n)	Percentage (%)
Absolute eosinophil count >600/mm³	28	30.4
Peripheral eosinophilia >6%	32	34.8
Total serum IgE elevated	57	62
SPT positive	60	65.2
SPT negative	32	34.8

The detailed allergen-wise distribution is summarized in Table 6. Among pollen allergens, Argemone mexicana was the most frequently identified allergen, seen in 13 patients (21.67%), followed by Parthenium hysterophorus in 8 patients (13.33%). Prosopis juliflora and Xanthium strumarium were observed in 6 patients each (10.0%), while Cyperus rotundus was detected in 5 patients (8.33%).

Table 5. Distribution of major allergen categories identified by SPT among SPT-positive patients (n = 60)

Major allergen category	Frequency (n)	Percentage (%)
Dust mites	56	93.33

Pollens	51	85
House dust & occupational dust	44	73.33
Fungal/mould allergens	33	55
Insect allergens	31	51.67
Dander allergens	24	40
Food allergens	8	13.33

Table 6. Detailed allergen-wise sensitivity among SPT-positive patients (n = 60)

Allergen category	Most common allergens	Frequency (n)	Percentage (%)
Pollens	Argemone mexicana	13	21.67
	Parthenium hysterophorus	8	13.33
	Prosopis juliflora	6	10
	Xanthium strumarium	6	10
	Cyperus rotundus	5	8.33
	Amaranthus species	4	6.67
	Cynodon dactylon	4	6.67
	Brassica nigra	2	3.33
	Others	3	5
Fungal/mould allergens	Aspergillus niger	7	11.67
	Aspergillus fumigatus	6	10
	Aspergillus flavus	5	8.33
	Alternaria alternata	5	8.33
	Penicillium species	4	6.67
	Curvularia lunata	3	5
	Candida albicans	3	5
Dust mites	Dermatophagoides pteronyssinus	21	35
	Dermatophagoides farinae	18	30
	Blomia tropicalis	17	28.33
House dust & occupational dust	Paper dust	10	16.67
	Cotton dust	9	15
	House dust	8	13.33
	Wheat dust	7	11.67
	Hay dust	4	6.67
	Saw dust	4	6.67
	Spider dust	2	3.33
Insect allergens	Mosquito	11	18.33
	Cockroach	9	15
	Housefly	4	6.67
	Honeybee	4	6.67
	Ant	2	3.33
	Moth	1	1.67
Dander allergens	Cat dander	7	11.67
	Pigeon feather	5	8.33
	Dog dander	4	6.67
	Sheep wool	4	6.67
	Buffalo dander	3	5
	Human dander	1	1.67
Food allergens	Milk	3	5
	Citrus	2	3.33
	Peanut	1	1.67
	Mushroom	1	1.67
	Egg	1	1.67
	Wheat	0	0

Image 1: Skin prick test (SPT) procedure showing application of multiple allergen extracts

Image 2: Allergen extract panel used for skin prick testing, showing multiple standardized allergen vials along with measuring scale for wheal assessment.

Image 3: Allergen extract panel used for skin prick testing, showing multiple standardized allergen vials along with measuring scale for wheal assessment.

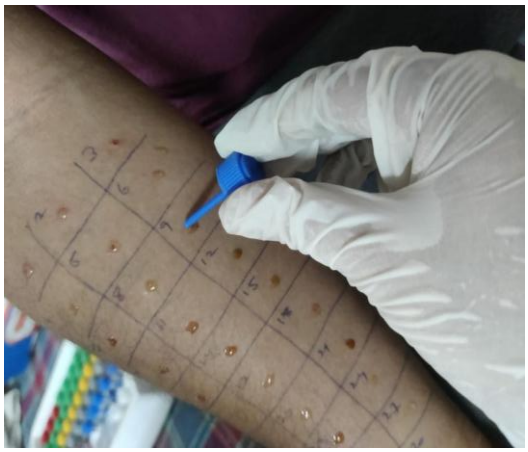
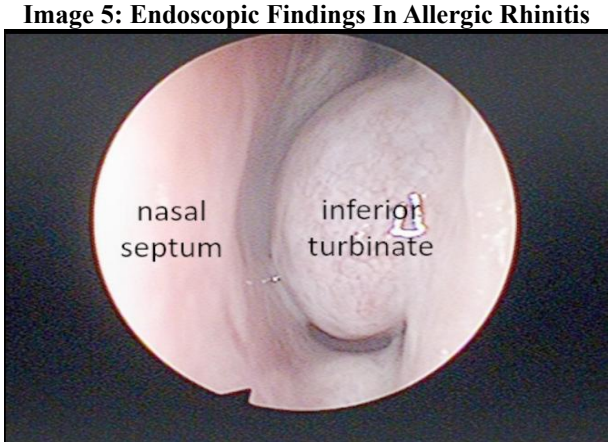
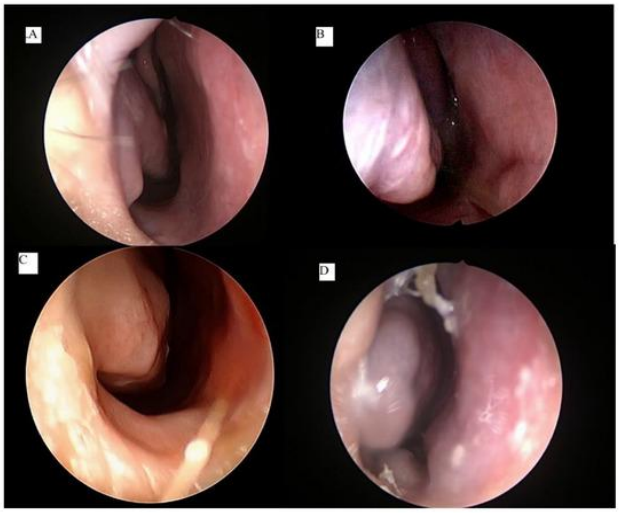


Image 4: Procedure of skin prick testing being performed in a clinical setting, demonstrating patient positioning, allergen application, and standardized technique under aseptic precautions.

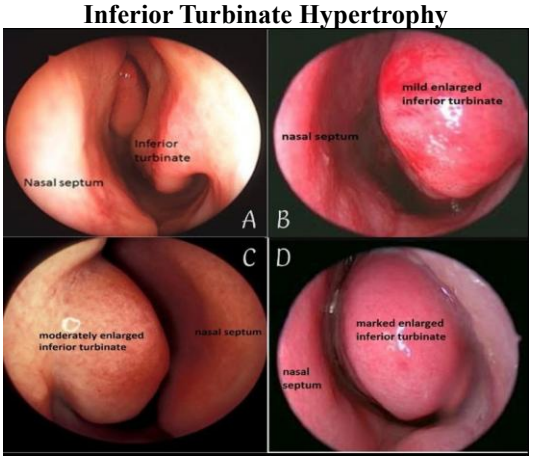
Image 5: Endoscopic Findings In Allergic Rhinitis



Pale Boggy Nasal Mucosa



Inferior Turbinate Hypertrophy



Narrowed nasal airway due to mucosal edema and turbinate enlargement.

DISCUSSION

The present study evaluated the clinical profile, allergen sensitivity patterns, and associated factors among 92 patients with allergic rhinitis attending a tertiary care hospital. The disease predominantly affected young and middle-aged adults, with the highest proportion of patients in the 30–39 years age group, followed by the 20–29 years group, findings comparable to previous studies [11–14]. A slight female predominance was observed, similar to that reported by Deb et al. [11], although variations in gender distribution have been documented across different populations [12,15,16]. While a greater proportion of patients were from rural areas, skin prick test (SPT) positivity was significantly higher among urban residents, supporting observations by Cingi et al. [17], Guner et al. [18], and Christensen et al. [25]. These findings suggest that urbanization, environmental pollution, indoor allergen exposure, and lifestyle-related factors may contribute to increased allergen sensitivity despite comparable disease prevalence in rural populations.

Sneezing, watery rhinorrhoea, and nasal obstruction were the most common symptoms, followed by nasal itching and ocular manifestations. These findings are consistent with the classical clinical presentation of allergic rhinitis reported in earlier studies [12,19,20]. A substantial proportion of patients reported symptoms persisting for more than one year, indicating the chronic and recurrent nature of the disease. Seasonal exacerbations and morning predominance of symptoms were frequently observed, reflecting the influence of environmental allergens and climatic variations [16,19,21]. The blocker phenotype predominated over the sneezer–runner phenotype, similar to the findings of Deb et al. [11], suggesting that chronic mucosal inflammation and turbinate enlargement contribute significantly to symptom burden.

According to ARIA classification, moderate/severe persistent allergic rhinitis was the most common category, corroborating previous reports [11,12,20,22]. This observation indicates that patients presenting to tertiary care institutions often have more severe and persistent disease requiring long-term medical management. Clinical examination revealed inferior turbinate hypertrophy, pale and boggy nasal mucosa, deviated nasal septum, allergic shiners, and occasional nasal polyps, all of which are characteristic manifestations of chronic allergic inflammation [12,13,20].

SPT positivity was observed in 65.2% of patients, comparable to rates reported by Yuen et al. [19] and Rasool et al. [23]. Elevated serum IgE levels showed a significant association with SPT positivity, consistent with findings from Kalantari et al. [14], Yuen et al. [19], and Rasool et al. [23]. These findings support the role of IgE-mediated mechanisms in allergic rhinitis while emphasizing that clinical assessment and allergen testing should be interpreted together for accurate diagnosis.

Dust mites emerged as the predominant allergen category, with Dermatophagoides pteronyssinus being the most common individual allergen. Pollens, particularly Parthenium hysterophorus and Argemone mexicana, also demonstrated high sensitivity rates. Additional sensitivity was observed to fungal allergens, house dust, occupational dusts, insects, dander, and food allergens [11,13,14,19,21,24]. The predominance of dust mites and pollens highlights the importance of indoor and outdoor aeroallergens in the pathogenesis of allergic rhinitis and underscores the value of allergen avoidance strategies. Bronchial asthma and sinusitis were the most common comorbidities identified in the study, supporting the concept of united airway disease and the close relationship between upper and lower airway inflammation [11,16,23,26]. Overall, the findings demonstrate that allergic rhinitis is a chronic inflammatory disorder with substantial allergen sensitivity and associated respiratory comorbidities. Early identification of allergen profiles, assessment of disease severity, and recognition of associated conditions can facilitate individualized management strategies, improve symptom control, reduce disease burden, and enhance the overall quality of life of affected patients.

CONCLUSION

Allergic rhinitis in the present study predominantly affected young and middle-aged adults and was more frequent among females. Most patients had chronic symptoms, with sneezing, watery rhinorrhea, and nasal obstruction being the commonest presenting complaints. The blocker phenotype and moderate/severe persistent allergic rhinitis were the predominant clinical patterns, indicating a considerable burden of persistent disease among patients attending the tertiary care hospital.

Skin prick test positivity was observed in nearly two-thirds of patients, confirming IgE-mediated sensitivity in a substantial proportion of clinically diagnosed cases. Urban residence showed a significant association with SPT positivity, suggesting greater allergen sensitivity among urban patients. Elevated serum IgE was also significantly associated with SPT positivity, supporting its role as an adjunctive marker of allergic sensitivity.

Dust mites were the most common allergens, followed by pollens, house dust and occupational dust, fungal allergens, insect allergens, dander allergens, and food allergens. The predominance of inhalant aeroallergens highlights the importance of environmental exposure in the pathogenesis of allergic rhinitis. Food allergens contributed minimally.

Bronchial asthma and sinusitis were the leading comorbidities, supporting the concept of allergic rhinitis as part of a broader unified airway disease spectrum. Identification of clinical phenotype, comorbidities, and region-specific allergen sensitivity patterns may help in targeted allergen avoidance, rational pharmacotherapy, and selection of suitable patients for allergen-specific immunotherapy.

Conflict Of Interest: None To Declare

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