

Original article

Prevalence and Risk Factors of Allergic Rhinitis Among Adolescents: A Cross-Sectional Study in an Urban Population

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Abstract

Background: Allergic rhinitis is an IgE-mediated chronic inflammatory condition of the nasal mucosa triggered by allergen exposure. It significantly affects quality of life, sleep, school performance, daily activity, and social functioning among adolescents. Despite being common, it is often underdiagnosed and undertreated.

Objective: To assess the prevalence of allergic rhinitis among adolescents and to identify associated risk factors in an urban population attending an ENT outpatient department.

Materials and Methods: A cross-sectional study was conducted among 400 adolescents aged 10–19 years over a period of 6 months. Diagnosis of allergic rhinitis was made using Allergic Rhinitis and its Impact on Asthma guidelines based on clinical criteria. Data regarding demographic profile, symptom pattern, environmental exposure, family history, and disease severity were collected using a structured questionnaire. Statistical analysis included frequency distribution and chi-square test for association.

Results: Among 400 participants, 124 (31.0%) were diagnosed with allergic rhinitis. The most common symptoms were sneezing (89.5%), nasal obstruction (78.2%), rhinorrhea (71.0%), and nasal itching (67.7%). Significant risk factors included positive family history of allergy, exposure to indoor dust, and use of air conditioners. Moderate-to-severe persistent allergic rhinitis was found in 26 (20.9%) affected cases, while persistent allergic rhinitis was observed in 49 (39.5%) cases.

Conclusion: Allergic rhinitis is common among adolescents and is associated with both genetic and modifiable environmental risk factors. Use of standardized clinical criteria helps in proper diagnosis and classification. Early diagnosis, patient education, allergen avoidance, and appropriate treatment are essential to reduce morbidity and prevent progression to asthma.

Keywords- Adolescents, Allergic Rhinitis, ARIA Guidelines, ENT, Indoor Allergens, Nasal Allergy.

Introduction

Allergic rhinitis is a common chronic inflammatory disorder of the nasal mucosa characterized by sneezing, nasal obstruction, rhinorrhea, nasal itching, and post-nasal drip. It is usually mediated by immunoglobulin E response to inhaled allergens and is associated with inflammation of the upper airway. Although not life-threatening, allergic rhinitis has a considerable impact on daily functioning, sleep quality, school performance, cognitive activity, and quality of life among adolescents.¹

The global burden of allergic rhinitis has increased over recent decades due to urbanization, environmental pollution, indoor allergen exposure, changing lifestyle, and increased recognition of allergic airway disease.

Adolescents are an important group because allergic rhinitis during this age may affect academic performance, outdoor activities, sleep, and psychosocial development.²

The symptoms of allergic rhinitis may be intermittent or persistent and may vary from mild to moderate-severe disease. Common symptoms include repeated sneezing, blocked nose, watery nasal discharge, itching of nose, throat irritation, post-nasal drip, and eye symptoms such as watering or itching. Persistent nasal obstruction may lead to mouth breathing, disturbed sleep, snoring, daytime fatigue, and poor concentration.³

The Allergic Rhinitis and its Impact on Asthma classification is widely used for diagnosis and severity assessment. It classifies allergic rhinitis into intermittent and persistent types, and into mild or moderate-severe forms depending on symptom duration and impact on sleep, daily activity, school performance, and quality of life. This classification is clinically useful because it guides treatment intensity and follow-up.⁴

Allergic rhinitis is closely related to asthma and other allergic disorders. The concept of united airway disease emphasizes that the upper and lower airways are part of a continuous inflammatory system. Many patients with allergic rhinitis may have coexisting asthma, and untreated rhinitis may worsen asthma symptoms. Early identification of allergic rhinitis is therefore important not only for nasal symptom control but also for prevention of lower airway morbidity.⁵

Several risk factors are associated with allergic rhinitis. These include family history of allergy, exposure to indoor dust, house dust mites, pets, molds, pollen, air pollution, tobacco smoke, use of air conditioners, and indoor dampness. Genetic predisposition and environmental exposure interact to influence disease occurrence and severity. Identification of modifiable risk factors is essential for preventive counseling.⁶

Allergic rhinitis is frequently underdiagnosed because symptoms may be mistaken for recurrent cold, sinusitis, or nonspecific nasal irritation. Many adolescents may use over-the-counter medications without proper diagnosis. Inadequate treatment can lead to persistent symptoms, sleep disturbance, school absenteeism, and reduced quality of life.

The present study was conducted to determine the prevalence of allergic rhinitis among adolescents attending an ENT outpatient department in an urban setting and to identify associated risk factors, including family history, indoor dust exposure, air conditioner use, pet exposure, and parental smoking.

Materials and Methods

This was a hospital-based cross-sectional study conducted over a 6-month period in the Department of ENT, in collaboration with Pediatrics and Community Medicine departments.

A total of 400 adolescents aged 10–19 years attending the ENT outpatient department were recruited through consecutive sampling. Written informed consent was obtained from guardians, and assent was taken from participants.

Adolescents aged 10–19 years who were willing to participate and had no current upper respiratory infection were included. Patients with nasal polyps, sinusitis, deviated nasal septum, recent nasal surgery or trauma, and immunocompromised status were excluded.

Data were collected using a structured questionnaire. The questionnaire included demographic details, symptom history, duration and frequency of symptoms, impact on sleep and daily activity, family history of allergy, and environmental exposures. Symptoms assessed included sneezing, nasal obstruction, rhinorrhea, nasal itching, and post-nasal drip.

Environmental risk factors assessed included exposure to indoor dust, pets at home, use of air conditioners, and parental smoking. Family history of allergy was also recorded. Clinical evaluation was performed to support diagnosis and exclude other nasal conditions.

Diagnosis of allergic rhinitis was made based on ARIA clinical criteria. Presence of two or more symptoms for more than one hour per day for more than two weeks was considered suggestive of allergic rhinitis. Patients were further classified as intermittent or persistent and mild or moderate-severe according to duration and impact on daily activity and sleep.

Data were analyzed using SPSS version 22. Descriptive statistics were used for frequency distribution. Chi-square test was applied to assess association between allergic rhinitis and potential risk factors. A p-value less than 0.05 was considered statistically significant.

Results

A total of 400 adolescents were included in the study. Among them, 222 (55.5%) were males and 178 (44.5%) were females. The mean age of participants was 14.8 ± 2.4 years.

Table 1: Demographic Characteristics of Study Participants

Variable	Frequency (%)
Total participants	400 (100.0)
Male	222 (55.5)
Female	178 (44.5)
Mean age	14.8 ± 2.4 years

Male predominance was observed among the study participants. Adolescents represent a clinically important group because allergic rhinitis may interfere with school performance, sleep, sports activity, and quality of life.

Table 2: Prevalence of Allergic Rhinitis

Parameter	Frequency (%)
Allergic rhinitis present	124 (31.0)
Allergic rhinitis absent	276 (69.0)
Intermittent allergic rhinitis	75 (60.5)
Persistent allergic rhinitis	49 (39.5)

The prevalence of allergic rhinitis among adolescents was 31.0%. Among affected cases, intermittent allergic rhinitis was observed in 75 (60.5%) patients, while persistent allergic rhinitis was observed in 49 (39.5%) patients. The high proportion of persistent cases highlights the need for proper diagnosis and long-term symptom control.

Table 3: Common Symptoms Among Allergic Rhinitis Patients

Symptom	Number (%) of AR Patients
Sneezing	111 (89.5)
Nasal obstruction	97 (78.2)
Rhinorrhea	88 (71.0)
Nasal itching	84 (67.7)
Post-nasal drip	38 (30.6)

Sneezing was the most common symptom, present in 111 (89.5%) allergic rhinitis patients, followed by nasal obstruction in 97 (78.2%) and rhinorrhea in 88 (71.0%). Nasal itching was present in 84 (67.7%) patients. These findings are consistent with the typical symptom pattern of allergic rhinitis.

Table 4: ARIA Classification of Allergic Rhinitis

Type	Number (%)
Mild intermittent	52 (41.9)
Moderate-severe intermittent	23 (18.6)
Mild persistent	23 (18.6)
Moderate-severe persistent	26 (20.9)

Mild intermittent allergic rhinitis was the most common type, observed in 52 (41.9%) patients. Moderate-severe persistent allergic rhinitis was observed in 26 (20.9%) cases. Patients with moderate-severe or persistent disease require more careful follow-up because symptoms may affect sleep, daily activity, and academic performance.

Table 5: Risk Factors Associated with Allergic Rhinitis

Risk Factor	AR Present (%)	AR Absent (%)	p-value
Family history of allergy	78 (62.9)	34 (12.3)	0.001
Indoor dust exposure	89 (71.8)	165 (59.8)	0.008
Use of air conditioners	72 (58.0)	105 (38.1)	0.03
Pets at home	26 (20.9)	38 (13.8)	0.12
Parental smoking	19 (15.3)	38 (13.8)	0.78

Positive family history of allergy showed highly significant association with allergic rhinitis. Indoor dust exposure and use of air conditioners were also significantly associated. Pet exposure and parental smoking were more common among allergic rhinitis patients but did not reach statistical significance in the present study.

Discussion

The present cross-sectional study assessed the prevalence and risk factors of allergic rhinitis among adolescents attending an ENT outpatient department. The prevalence of allergic rhinitis was 31.0%. The most common symptoms were sneezing, nasal obstruction, rhinorrhea, and nasal itching. Family history of allergy, indoor dust exposure, and use of air conditioners were significantly associated with allergic rhinitis. Persistent allergic rhinitis was observed in 39.5% of affected cases.

Asher et al. reported global variation in symptoms of asthma, allergic rhinoconjunctivitis, and eczema among children and adolescents through the International Study of Asthma and Allergies in Childhood.⁷ The prevalence observed in the present study is comparable with the finding that allergic rhinitis symptoms are common among school-going age groups and vary according to region and environmental exposure.

Ait-Khaled et al. reported that symptoms of allergic rhinoconjunctivitis among children vary considerably between centers and are influenced by environmental and regional factors.⁸ In the present study, the 31.0% prevalence among urban adolescents suggests that urban environmental exposure may contribute to allergic rhinitis burden.

Bousquet et al. emphasized that allergic rhinitis has a major impact on asthma and quality of life, and recommended standardized classification for diagnosis and management.⁹ In the present study, ARIA criteria

helped classify patients into intermittent, persistent, mild, and moderate-severe groups, thereby identifying patients requiring more regular treatment.

Brożek et al. updated ARIA recommendations and emphasized evidence-based management of allergic rhinitis according to symptom severity and duration.¹⁰ In the present study, moderate-severe persistent allergic rhinitis was observed in 20.9% cases, indicating the need for stepped management and follow-up.

Meltzer reported that allergic rhinitis significantly affects sleep, daily activity, school or work performance, and overall quality of life.¹¹ In the present study, persistent allergic rhinitis was observed in 39.5% affected patients, which may contribute to sleep disturbance, reduced concentration, and impaired school performance.

Skoner described allergic rhinitis as a common disorder with characteristic symptoms of sneezing, congestion, rhinorrhea, and nasal itching.¹² The present study showed a similar symptom profile, with sneezing as the most common symptom followed by nasal obstruction and rhinorrhea.

Wallace et al. provided practice parameters for diagnosis and management of rhinitis and emphasized clinical assessment, identification of triggers, and appropriate treatment.¹³ In the present study, family history, indoor dust, and air conditioner use were important associated factors, supporting the need for trigger identification during clinical evaluation.

Salo et al. reported that exposure to indoor allergens, including dust mite allergens, is an important contributor to allergic sensitization and rhinitis symptoms.¹⁴ In the present study, indoor dust exposure showed significant association with allergic rhinitis, highlighting the importance of environmental control measures.

Codispoti et al. studied environmental risk factors for allergic rhinitis in childhood and reported that indoor exposures may influence disease development.¹⁵ In the present study, use of air conditioners was significantly associated with allergic rhinitis. Poorly maintained air conditioners may increase exposure to dust, molds, and indoor allergens.

Sneezing was the most commonly reported symptom. Recurrent sneezing is a classical symptom of allergic rhinitis and usually reflects nasal mucosal hypersensitivity to allergens. Nasal obstruction was also common and is clinically important because it can interfere with sleep and breathing comfort.

Rhinorrhea and nasal itching were reported by a large proportion of affected adolescents. These symptoms help differentiate allergic rhinitis from infective rhinitis when associated with repeated episodes, family history, and allergen exposure. Post-nasal drip was less frequent but may contribute to throat clearing and cough.

Family history of allergy was the strongest risk factor in the present study. This finding supports the role of genetic predisposition in allergic rhinitis. Adolescents with family history of asthma, allergic rhinitis, eczema, or other allergic disorders should be considered at higher risk.

Indoor dust exposure showed significant association with allergic rhinitis. Dust may contain house dust mites, fungal spores, insect particles, fibers, and other irritants. Regular cleaning, reduction of dust accumulation, washing of bedding, and proper ventilation should be advised.

Use of air conditioners was also significantly associated with allergic rhinitis. Air conditioning may contribute by recirculating indoor allergens if filters are not cleaned regularly. It may also reduce humidity and irritate nasal mucosa in some individuals. Proper maintenance and cleaning of filters should be recommended.

Pet exposure and parental smoking did not show statistically significant association in the present study, though both have been reported as potential risk factors in other studies. The lack of significance may be due to sample size, exposure duration, type of pets, ventilation, reporting bias, or differences in environmental setting.

The presence of moderate-severe persistent disease in 20.9% allergic rhinitis patients is clinically relevant. These patients may require regular pharmacological therapy, allergen avoidance, and follow-up. Patient education regarding correct use of nasal sprays and avoidance of triggers is essential.

The present study has certain limitations. It was hospital-based and may not represent the true community prevalence. Diagnosis was based on clinical ARIA criteria, and allergen testing was not performed. Seasonal variation was not studied in detail. Future community-based studies with allergy testing and follow-up would provide more comprehensive evidence.

Conclusion

Allergic rhinitis is a common and under-recognized problem among adolescents. In the present study, the prevalence of allergic rhinitis was 31.0%. Sneezing, nasal obstruction, rhinorrhea, and nasal itching were the most common symptoms. Family history of allergy, indoor dust exposure, and use of air conditioners showed significant association with allergic rhinitis. Persistent and moderate-severe disease was present in a considerable proportion of affected adolescents. Use of ARIA criteria helps in standardized diagnosis and classification. Early diagnosis, allergen avoidance, patient education, environmental control, and appropriate treatment are essential to reduce morbidity and prevent progression to asthma.

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