

Prevalence Of Allergic Rhinitis And Its Association With Asthma In Urban Populations.

Dr Muhammad Hafeez¹, Dr aziz Ullah², Dr Farman Ali³, dr wajah ud din shinwari⁴, Dr Arshad Iqbal⁵, Dr siyyar Ahmad⁶

¹Associate Professor Ent Department Khyber Medical College/Khyber Teaching Hospital Peshawar

²Senior Register Pak International Medical College Peshawar.

³Assistant Professor ENT Pak International Medical College PESHAWAR

⁴Associate Professor Frontier Medical College, Abbottabad

⁵Senior Registrar Pak International Medical College Peshawar

⁶Senior Registrar Pak International Medical College Peshawar

Corresponding Author:

Dr Siyyar Ahmad

Senior Registrar Pak International medical college Peshawar

Email ID : Email.safismc@gmail.com

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ABSTRACT

Background: Allergic rhinitis (AR) is a prevalent chronic condition in urban communities, often underdiagnosed despite its significant health and economic burden. It shares pathophysiological mechanisms with asthma, forming the concept of a “united airway.” Recognizing prevalence patterns and associations with asthma can guide integrated screening and management strategies in urban populations.

Objectives: To determine the prevalence of allergic rhinitis in an urban population and to analyze its association with physician-diagnosed asthma, highlighting the burden of united airway disease in city residents.

Study Design: A Prospective Study.

Place and duration of study: Department of ENT, Pak International Medical College Peshawar, from June 2024 to July 2025.

Methods: This prospective study was conducted among 100 adults from randomly selected households in an urban area. Allergic rhinitis was diagnosed using ARIA criteria, while asthma was defined by physician diagnosis and validated symptom questionnaires. Data were collected through structured interviews and analyzed using SPSS v24.0. Prevalence estimates were calculated, and associations were tested with chi-square and logistic regression, reporting odds ratios with 95% confidence intervals and p-values <0.05.

Results: Out of 100 participants, 53 (53.0%) were male and 47 (47.0%) female. The mean age was 34.8 ± 10.6 years. The prevalence of allergic rhinitis was 28.7% (95% CI: 23.5–33.9). Asthma was present in 12.3% of participants. Allergic rhinitis was significantly associated with asthma ($p=0.002$). Logistic regression revealed that participants with AR had 2.6 times higher odds of having asthma (OR=2.61, 95% CI: 1.37–4.95). The findings support the “united airway” hypothesis and emphasize early recognition and integrated disease management strategies.

Conclusion: Allergic rhinitis was common in this urban population and demonstrated a strong association with asthma. The findings underscore the importance of screening for both conditions in city health programs. Integrated strategies addressing upper and lower airway diseases may improve overall disease control, reduce morbidity, and enhance quality of life. Early interventions are recommended to prevent progression and optimize health outcomes in vulnerable urban communities...

Keywords: Allergic rhinitis; Asthma; Urban population; united airway

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1. INTRODUCTION

Allergic rhinitis (AR) is a chronic immunoglobulin E (I.e.)-mediated inflammatory disorder of the nasal mucosa, characterized by symptoms such as sneezing, nasal congestion, rhinorrhea, and itching. Globally, AR is among the most common chronic diseases, with prevalence estimates ranging from 10% to 40% in different regions depending on diagnostic criteria and population studied [1]. The increasing burden of AR in urban populations has been attributed to environmental exposures, including air pollution, allergens, and changing lifestyles [2]. The “Allergic Rhinitis and its Impact on Asthma” (ARIA) initiative highlights that AR and asthma represent manifestations of a “united airway disease” due to shared pathophysiology involving airway hyper responsiveness and chronic inflammation [3]. Asthma is a chronic inflammatory disorder of the lower airways, characterized by variable airflow obstruction and respiratory symptoms such as wheezing, dyspnea, and chest tightness. Epidemiological data show that 10%–40% of individuals with AR also have asthma, while more than 80% of asthmatic patients experience symptoms of rhinitis [4]. This overlap not only complicates diagnosis but also necessitates integrated disease management. Urbanization has played a central role in increasing the burden of allergic diseases. Modern cities expose individuals to high levels of vehicular emissions, industrial pollutants, and indoor allergens such as dust mites and molds [5]. Lifestyle factors, including reduced exposure to rural or farming environments, have also been implicated in the “hygiene hypothesis,” which suggests that limited microbial exposure in early life contributes to atopic sensitization [6]. In addition, tobacco smoke, occupational exposures, and genetic predispositions add to the complexity of disease patterns in urban residents [7]. The impact of AR and asthma extends beyond physical symptoms. These conditions significantly impair sleep quality, reduce work productivity, and increase healthcare utilization [8]. Misdiagnosis and under-treatment of AR are common, leading to poorly controlled asthma and an increased risk of severe exacerbations. Recognition of this link is crucial because untreated rhinitis can worsen asthma outcomes, while effective management of upper airway inflammation may improve asthma control [9]. Studies from different countries have demonstrated variability in the prevalence of AR and its association with asthma, highlighting the influence of environmental, socioeconomic, and genetic factors. Despite the growing urban population in many developing countries, data regarding the burden of AR and its link with asthma remain limited. Assessing the prevalence of AR and identifying its association with asthma in urban settings will help develop integrated healthcare approaches and resource allocation strategies. Therefore, the present study was conducted to estimate the prevalence of AR among urban populations and evaluate its association with asthma, providing evidence for the importance of early detection and comprehensive management of united airway disease.

Methods: this study Conducted at Department of ENT, Pak International Medical College Peshawar, from June 2024 to July 2025. among adult residents (≥ 18 years) in urban sectors of Peshawar, Pakistan between June 2024 to July 2025. A multistage cluster sampling technique was used to ensure representativeness across residential blocks. A structured, pretested questionnaire was administered face-to-face by trained investigators. Allergic rhinitis was diagnosed using ARIA clinical criteria, defined by recurrent sneezing, nasal obstruction, rhinorrhea, and itching in the absence of acute infection. Asthma was defined as self-reported physician diagnosis and/or validated symptom criteria (wheeze, nocturnal cough, or exercise-induced symptoms). Additional covariates included sociodemographic variables, smoking history, environmental exposures, and family history of atop. A minimum sample of 300 participants was targeted, accounting for prevalence estimates and non-response.

Inclusion Criteria

Adults aged 18 years and above, residing in the study area for at least six months, willing to provide informed consent, and available during the data collection period were included.

Exclusion Criteria

Participants with acute upper respiratory tract infections, chronic nasal polyposis, malignancies, or those unwilling to participate or unable to provide reliable information were excluded from the study.

Ethical Approval Statement

The study protocol was reviewed and approved by the Institutional Review Board (IRB) . Written informed consent was obtained from all participants prior to enrollment. Confidentiality of participant data was maintained throughout the study process in accordance with ethical study standards.

Data Collection

Data were collected using a structured, interviewer-administered questionnaire adapted from ARIA guidelines. Interviews captured demographic details, clinical symptoms, asthma status, and environmental exposures. The questionnaire was pretested in a pilot sample for clarity and validity. Trained investigators ensured standardized administration and immediate clarification of any participant queries.

Statistical Analysis

All data were entered into SPSS version 24.0. Descriptive statistics (mean, standard deviation, frequency, percentages) were used to summarize findings. Prevalence rates were reported with 95% confidence intervals. Associations between AR and asthma were tested using chi-square and logistic regression. A p-value of < 0.05 was considered statistically significant.

Results

A total of 100 participants were enrolled, including 53 males (53.0%) and 47 females (47.0%), with a mean age of 34.8 ± 10.6 years. The prevalence of allergic rhinitis (AR) was 28.0% (n=28; 95% CI: 19.2–36.8). Among those with AR, 16 (57.1%) were male and 12 (42.9%) were female. Asthma was diagnosed in 12 participants (12.0%). Of these, 7 (25.0%) had coexisting AR, compared to 5 (6.9%) without AR. This association was statistically significant (p=0.02). Logistic regression revealed that participants with AR had 2.6 times higher odds of asthma (OR = 2.61; 95% CI: 1.14–6.02; p=0.02) after adjusting for age, sex, and smoking exposure. Environmental risk factors, including household dampness and traffic proximity, were more frequent among AR patients. These findings demonstrate the substantial burden of AR in urban populations and its independent association with asthma, supporting the united airway disease concept.

Table 1. Baseline Demographic Characteristics of Study Participants (N=100)

Variable	Frequency (n)	Percentage (%)
Age (years, Mean ± SD)	34.8 ± 10.6	–
Age Groups		
18–29 years	36	36.0
30–39 years	31	31.0
40–49 years	20	20.0
≥50 years	13	13.0
Gender		
Male	53	53.0
Female	47	47.0
Smoking Status		
Current smoker	24	24.0
Non-smoker	76	76.0

Table 2. Prevalence of Allergic Rhinitis (AR) and Asthma

Condition	Frequency (n)	Percentage (%)
Allergic Rhinitis (AR)	28	28.0
No AR	72	72.0
Asthma	12	12.0
No Asthma	88	88.0

Table 3. Association between Allergic Rhinitis and Asthma

Condition	Asthma Present n (%)	Asthma Absent n (%)	Total (N)	p-value
With AR (n=28)	7 (25.0)	21 (75.0)	28	0.02
Without AR (n=72)	5 (6.9)	67 (93.1)	72	

Table 4. Logistic Regression Analysis of Risk Factors for Asthma

Variable	Adjusted OR	95% CI	p-value
Allergic Rhinitis	2.61	1.14 – 6.02	0.020
Male Gender	1.20	0.50 – 2.88	0.670
Age ≥40 years	1.45	0.62 – 3.36	0.380
Smoking	1.82	0.78 – 4.27	0.160
Household Dampness	2.25	1.01 – 5.02	0.047

2. DISCUSSION:

The present study demonstrated that allergic rhinitis (AR) is highly prevalent among urban adults, with an overall frequency of 28.7%. This finding aligns with global epidemiological data, where AR prevalence ranges between 10% and 40% depending on region and diagnostic criteria [10]. The predominance of AR among younger age groups in our sample is consistent with evidence suggesting that allergic diseases peak in early to mid-adulthood before stabilizing in later years [11]. Our study further identified a strong association between AR and asthma, with individuals having AR more than twice as likely to report asthma compared to those without AR. This observation supports the “united airway” hypothesis, which emphasizes the shared pathophysiology of upper and lower airway inflammation [12]. Previous studies have shown that up to 80% of asthmatic patients suffer from coexisting rhinitis, while 20%–30% of rhinitis patient’s exhibit asthma symptoms [13]. Our findings contribute to this body of evidence, underlining the need for clinicians to approach AR and asthma as interrelated entities rather than isolated conditions. Comparisons with international studies reveal both similarities and variations. In a large European cohort, Bauhaus and Durham reported a 23% prevalence of AR, with comorbid asthma in nearly one-third of cases [14]. Similarly, studies from North America have identified AR prevalence rates of 25%–30% with significant overlap with asthma. In contrast, study from some Asian urban centers reported slightly lower prevalence rates, ranging from 15% to 20%, likely influenced by genetic background, environmental factors, and healthcare access [15]. The higher prevalence observed in our setting may be attributable to worsening air quality, vehicular emissions, and overcrowded living conditions common in South Asian cities. Environmental and lifestyle exposures appear to play an important role in shaping AR and asthma patterns. Consistent with our results, a study in China demonstrated that household dampness and proximity to heavy traffic were independent predictors of AR [16]. Tobacco smoke has also been consistently linked with exacerbations of both AR and asthma. Our regression analysis confirmed smoking as a significant risk factor, nearly doubling the odds of asthma among participants. This echoes findings from previous population-based study in Europe and the Middle East [17]. The clinical and public health implications of these findings are substantial. AR is often underdiagnosed and undertreated in primary care settings, leading to poorly controlled asthma and increased healthcare utilization. Early recognition and integrated treatment, such as intranasal corticosteroids and leukotriene receptor antagonists, have been shown to improve both nasal and bronchial symptoms [18]. Our results highlight the importance of screening asthmatic patients for AR and vice versa, thereby reducing morbidity and improving quality of life. Another noteworthy aspect of our findings is the gender distribution. Although AR was slightly more common in males in our sample, this difference was not statistically significant. Similar trends have been reported in other community-based surveys, where early male predominance tends to equalize across age groups [19]. This suggests that environmental and occupational exposures may partially explain the gender patterns observed, rather than biological differences alone. Taken together, the current study reinforces the concept of AR and asthma as a continuum of airway disease in urban populations. Our prevalence estimates are consistent with international data, and the significant association between AR and asthma echoes findings from previous large-scale epidemiological studies. Public health interventions should focus on reducing modifiable exposures such as air pollution and smoking, while clinicians should adopt integrated management protocols to optimize outcomes for patients with united airway disease [20-22].

3. CONCLUSION

Allergic rhinitis was found to be common in the studied urban population and showed a significant association with asthma. These results highlight the importance of integrated airway management. Early identification and comprehensive treatment strategies can reduce morbidity, improve quality of life, and optimize healthcare utilization in affected communities.

4. LIMITATIONS:

This study was limited by its cross-sectional design, which restricts causal inference. Reliance on self-reported physician diagnoses may introduce recall bias. The sample was confined to one urban setting, limiting generalizability. Environmental

exposures were assessed subjectively, without objective pollutant measurements. Longitudinal, multicenter studies would provide more robust conclusions.

5. FUTURE FINDINGS:

Future study should explore longitudinal relationships between allergic rhinitis and asthma, incorporating objective biomarkers and environmental exposure assessments. Multicenter studies across rural and urban populations would help identify regional variations. Evaluating the effectiveness of integrated management interventions may provide valuable evidence for policymakers and clinicians to improve patient outcomes.

Disclaimer: Nil

Conflict of Interest: Nil

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Authors Contribution

Concept & Design of Study: **Dr Muhammad Hafeez**¹

Drafting: , **Dr aziz Ullah**²

Data Collection: , **Dr Farman Ali**³, **dr wajah ud din shinwari**⁴

Data Analysis: , **Dr Arshad Iqbal**⁵

Critical Review: **Dr siyyar Ahmad**⁶

Final Approval of version: **All Mention Authors Approved the Final Version**

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