

PREVALENCE AND RISK FACTORS OF ALLERGIC RHINITIS IN URBAN POPULATION

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ABSTRACT

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Background: Allergic rhinitis (AR) is a frequent chronic condition that leads to sneezing, congestion, and itchy eyes, impacting daily activities and productivity. Factors that contribute to risk encompass genetics, allergens, environmental pollution, and city life. Management includes allergen avoidance, medication, and immunotherapy. Although urban areas show a higher prevalence, data in Bangladesh remain scarce. **Objective:** This research investigates the occurrence of AR and its associated risk factors within the urban population of Bangladesh. **Materials and Method:** A cross-sectional study involving 250 adults at Bangladesh Medical University (January–June 2025) evaluated AR symptoms, risk factors, and family history through a questionnaire and clinical assessment. An ENT specialist diagnosed AR. Data were examined employing descriptive statistics, Chi-square tests, and raw odds ratios. Approval for ethical standards and informed consent were secured. **Results:** Out of 250 participants, 92 (36.8%) experienced allergic rhinitis, with sneezing (87%), runny nose (80.4%), nasal congestion (76.1%), and itchy eyes (65.2%) as the prevalent symptoms. Seasonal symptoms were noted in 55 (59.8%) patients, and 50 (54.3%) had a familial allergy history. Exposure to dust (OR = 2.12), having pets (OR = 1.91), and a familial history (OR = 1.77) notably raised the likelihood of AR, whereas smoking had no significant impact (OR = 1.36). **Conclusion:** Allergic rhinitis impacted 36.8% of subjects, with frequent sneezing, rhinorrhea, and nasal blockage; dust, pets, and genetic predisposition heightened risk, but smoking did not influence it.

Keywords: Prevalence, Risk Factors, Allergic Rhinitis, Urban Population.

INTRODUCTION

Allergic rhinitis (AR) is a prevalent chronic disorder triggered by an immunoglobulin E (IgE)-mediated inflammatory reaction in the nasal lining. It hinders work and study efficiency and leads to considerable economic and healthcare costs^{1,2}. AR is a common and long-term condition, with an estimated worldwide occurrence varying from 10% to 40% among adults in 2025³. It adversely affects everyday activities, sleep quality, job or educational performance, and mental health^{4,5}. It is marked by nasal inflammation resulting in discharge, sneezing, congestion, and itchy, red eyes⁶.

Allergic rhinitis arises from IgE-mediated reactions to irritants such as pollen, dust mites, and pet dander, with risk increased by genetics, pollution, tobacco smoke, and urban living⁷. Allergic rhinitis (AR) is diagnosed via history, examination, and sometimes allergen-specific IgE testing. Management includes allergen avoidance, H1-antihistamines, intranasal corticosteroids, and immunotherapy, which may alter disease progression and reduce asthma risk^{8,9}.

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A comprehensive evaluation and quantitative synthesis conducted in China reported that allergic rhinitis remains highly prevalent and is linked to several risk factors, including environmental exposures, family history of atopy, and urban residence, highlighting its growing public health significance¹⁰. A cross-sectional study conducted in Guangzhou found an AR prevalence of 8.32% among urban inhabitants compared to 3.43% in rural residents, emphasizing the influence of urban environmental and lifestyle elements¹¹. An Indian cross-sectional study using the Score for Allergic Rhinitis (SFAR) questionnaire demonstrated a significant occurrence of allergic rhinitis among individuals exhibiting nasal symptoms in clinical settings, emphasizing the significance of systematic screening for accurate diagnosis¹².

A retrospective study carried out in Dhaka indicated that the majority of children exhibiting AR symptoms were found to have allergic rhinitis, especially those residing in urban settings. Key risk factors involved family history, significant environmental exposure, and secondhand smoke, along with frequent comorbidities like asthma and eczema/atopic dermatitis¹³. Another study reported that a significant connection between allergic rhinitis and asthma, as numerous patients with AR indicated symptoms and diagnoses of asthma, emphasizing their shared clinical impact¹⁴.

Despite the growing burden of allergic rhinitis worldwide, comprehensive epidemiological data from Bangladesh remain limited, particularly regarding urban populations. There is a paucity of well-designed studies exploring prevalence patterns, associated risk factors, comorbidities, and clinical characteristics in this setting. Therefore, this study aims to determine the occurrence of allergic rhinitis and determine its related risk factors among the urban population of Bangladesh, thereby contributing evidence to support targeted safeguarding and administration strategies.

MATERIALS AND METHOD

This cross-sectional descriptive study was conducted at the Otolaryngology–Head & Neck Surgery Department of Bangladesh Medical University over a six-month period from January 2025 to June 2025. The study's population consisted of adult participants who were 18 years old and older who attended the department during this period and were willing to participate. Both male and female participants from diverse occupational and socio-economic backgrounds were considered. A total of 250 participants were selected through purposive sampling. Individuals suffering from long-term respiratory conditions other than allergic rhinitis or those unwilling to participate were excluded from the study.

Data was gathered through a structured questionnaire combined with clinical evaluation. The questionnaire captured socio-demographic features such as age, sex, occupation, and family income, as well as clinical features of allergic rhinitis such as sneezing, rhinorrhea, nasal obstruction, itchy eyes, seasonal or perennial symptom patterns, and family history of allergy. Environmental and personal risk factors, including smoking habits, dust exposure, and pet ownership, were also recorded. The diagnosis of allergic rhinitis was confirmed by an ENT specialist based on history and physical examination.

The dependent variable was the presence or absence of allergic rhinitis, while independent variables included socio-demographic factors and environmental or personal risk factors. Data were entered and analyzed using SPSS software. Descriptive statistics were used to present socio-demographic characteristics, prevalence, and clinical features. Bivariate analysis using the Chi-square test was performed to assess the association between risk factors and allergic rhinitis, and crude odds ratios with 95% confidence intervals were calculated to determine the strength of these associations. Statistical significance was set at $p < 0.05$.

Ethical consent was secured from the Institutional Review Board of Bangladesh Medical University, and written consent was acquired from all participants involved prior to data collection. The confidentiality and privacy of every participant were rigorously upheld during the entire study.

RESULTS

Socio-Demographic Characteristics

Table 1 shows a total of 250 participants took part in the study. The majority were aged 30–44 years (38.0%), followed by 18–29 years (32.0%), 45–59 years (22.0%), and ≥ 60 years (8.0%). There were slightly more males (54.0%) than females (46.0%). Regarding occupation, 36.0% were office workers, 24.0% were students, 22.0% were engaged in business, 12.0% were homemakers, and 6.0% were categorized as others. Monthly family income was $>40,000$ BDT in 46.0% of participants, 20,000–40,000 BDT in 38.0%, and $<20,000$ BDT in 16.0%.

Table 1: Socio-Demographic Characteristics of Participants (n = 250)

Variables	Frequency (n)	Percentage (%)
Age Group (years)		
18–29	80	32.0
30–44	95	38.0
45–59	55	22.0
≥ 60	20	8.0
Gender		
Male	135	54.0
Female	115	46.0
Occupation		
Office worker	90	36.0
Student	60	24.0
Business	55	22.0
Homemaker	30	12.0
Others	15	6.0
Monthly Family Income (BDT)		
$<20,000$	40	16.0
20,000–40,000	95	38.0
$>40,000$	115	46.0

BDT- Bangladeshi Taka.

Prevalence of Allergic Rhinitis

Figure 1 shows the prevalence of allergic rhinitis. Among the study population, 92 participants were identified with allergic rhinitis, yielding a prevalence of 36.8%, while 158 participants (63.2%) did not have the condition.

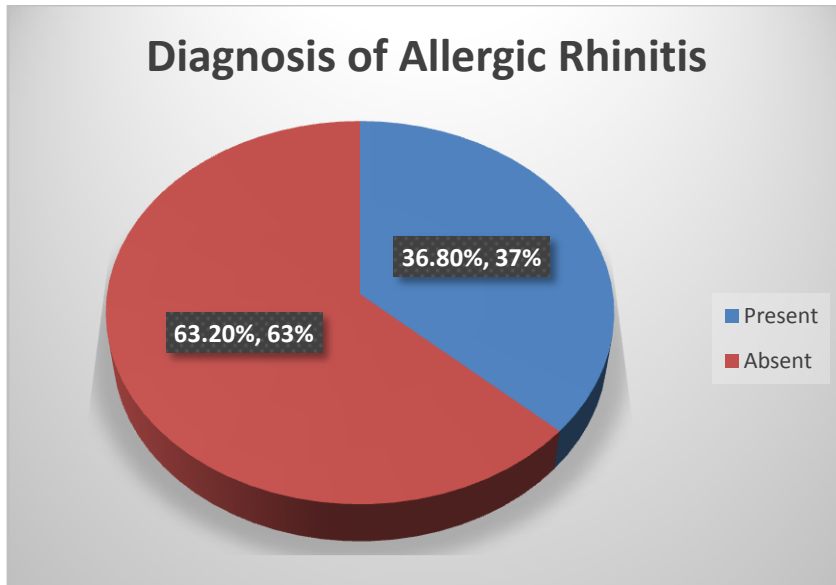


Figure 1: Prevalence of Allergic Rhinitis (AR) (n = 250)

Clinical Characteristics of AR Patients

Table 2 presents among the 92 participants with allergic rhinitis, the symptoms that were reported most frequently included sneezing (87.0%), rhinorrhea (80.4%), nasal obstruction (76.1%), and itchy eyes (65.2%). Seasonal symptoms were observed in 59.8% of patients, whereas 40.2% reported perennial symptoms. Additionally, 54.3% had a family history of allergy.

Table 2: Clinical Characteristics Among AR Patients (n = 92)

Variables	Frequency (n)	Percentage (%)
Common Symptoms		
Sneezing	80	87.0
Nasal obstruction	70	76.1
Rhinorrhea	74	80.4
Itchy eyes	60	65.2
Seasonal pattern	55	59.8
Perennial symptoms	37	40.2
Family history of allergy	50	54.3

Factors Contributing to Allergic Rhinitis

Table 3 shows Bivariate Analysis was conducted to evaluate the relationship between possible risk factors and allergic rhinitis. Smoking showed no significant association with allergic rhinitis ($\chi^2 = 0.59$, $p = 0.44$). However, exposure to dust was significantly linked to allergic rhinitis, with 47.0% of exposed participants having AR compared to 27.8% of unexposed participants ($\chi^2 = 9.89$, $p = 0.002$). The ownership of pets was also notably linked to AR ($\chi^2 = 4.66$, $p = 0.031$), with 48.4% of participants owning pets reporting allergic rhinitis. Family history of allergy showed a moderate yet notable connection with AR ($\chi^2 = 4.82$, $p = 0.028$).

Table 3: Factors That Contribute to Allergic Rhinitis(Bivariate Analysis)

Risk Factors	AR Present n (%)	AR Absent n (%)	Chi-square	p-value
Smoking			0.59	0.44
Yes (n=85)	34 (40.0%)	51 (60.0%)		
No (n=165)	58 (35.2%)	107 (64.8%)		
Dust Exposure			9.89	0.002*
Yes (n=117)	55 (47.0%)	62 (53.0%)		
No (n=133)	37 (27.8%)	96 (72.2%)		
Pet Ownership			4.66	0.031*
Yes (n=62)	30 (48.4%)	32 (51.6%)		
No (n=188)	62 (33.0%)	126 (67.0%)		
Family History of Allergy			4.82	0.028*
Yes (n=90)	42 (46.7%)	48 (53.3%)		
No (n=160)	50 (31.3%)	110 (68.7%)		

*Statistically significant at $p < 0.05$

Crude Odds Ratios for Risk Factors

Table 4 shows crude odds ratios for allergic rhinitis. Individuals exposed to dust had over double the likelihood of developing AR in comparison to those not exposed (OR = 2.12; 95% CI: 1.29–3.49; $p = 0.003$). Having pets was linked to 1.9 times greater chances of AR (OR = 1.91; 95% CI: 1.03–3.55; $p = 0.039$). Likewise, a family history of allergy raised the probability of AR by 1.8 times (OR = 1.77; 95% CI: 1.07–2.92; $p = 0.026$). Smoking did not have a considerable effect on the likelihood of developing allergic rhinitis (OR = 1.36; 95% CI: 0.78–2.37; $p = 0.28$).

Table4: Crude Odds Ratio (OR) of Risk Factors for Allergic Rhinitis

Risk Factors	AR+ / AR-	Crude OR	95% CI	p-value
Smoking	Yes: 34 / 51 No: 58 / 107	1.36	0.78–2.37	0.28
Dust Exposure	Yes: 55 / 62 No: 37 / 96	2.12	1.29–3.49	0.003*
Pet Ownership	Yes: 30 / 32 No: 62 / 126	1.91	1.03–3.55	0.039*
Family History of Allergy	Yes: 42 / 48 No: 50 / 110	1.77	1.07–2.92	0.026*

*Statistically significant at $p < 0.05$

DISCUSSION

This study involving 250 participants showed that the frequency of allergic rhinitis (AR) was affected by age, gender, occupation, and socioeconomic status. The majority of participants were young adults, consistent with previous studies suggesting the highest AR prevalence among those aged 20 to 40 years ¹. Males were slightly more numerous, although gender disparities in AR frequently differ among populations. This research discovered that allergic rhinitis occurred more frequently among office workers and students, as well as in individuals with higher family income, indicating the impact of occupational and socioeconomic factors. These findings correspond with previous studies indicating a greater prevalence of AR in urban, affluent communities ^{16,17}.

The rate of allergic rhinitis in this research was 36.8%, signifying a significant impact. This corresponds with urban adult demographics, where prevalence varies from 18–37% and is affected by lifestyle factors and environmental exposures ^{18,19}.

In the group of 92 AR patients, the most prevalent symptoms were sneezing, rhinorrhea, nasal blockage, and itchy eyes, consistent with earlier studies ²⁰. Most of the patients experienced symptoms that appeared seasonally, aligning with additional clinical findings indicating that seasonal and perennial cases differ according to allergen exposure and location ²¹. Over fifty percent of the patients indicated a family history of allergies, reinforcing the notion that hereditary atopy is a notable risk component for allergic rhinitis development ^{21,22}.

This study linked dust exposure and having pets to an increased risk of allergic rhinitis, emphasizing the impact of environmental allergens. A history of allergies in the family was also associated with AR, reinforcing the role of genetic predisposition ^{1,22}. Although smoking is widely acknowledged as a respiratory irritant, our research did not show a statistically significant link between smoking and allergic rhinitis. Eriksson et al. similarly reported a negative relationship between cigarette smoking and allergic rhinitis in men, while noting a higher prevalence of chronic rhinitis among smokers ²³. These results indicate that smoking may have complex immunomodulatory effects rather than a straightforward allergic association. Variations in demographic structure, cultural smoking behaviors, and study design may account for discrepancies across studies.

CONCLUSION

Allergic rhinitis is common among the urban population studied, with a prevalence of 36.8%. Sneezing, rhinorrhea, and nasal obstruction were the most frequent symptoms. Dust exposure, pet ownership, and allergy background in the family were identified as significant risk factors, while smoking showed no significant association. These results emphasize the significance of environmental control and early identification of at-risk individuals to prevent and manage allergic rhinitis effectively.

CONFLICT OF INTEREST

There is no conflict of interest.

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