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Original Research Article

Prevalence and risk factors of allergic rhinitis in pediatric population

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ABSTRACT

Background: Allergic rhinitis (AR) significantly affects the pediatric population, with rising prevalence rates and substantial impacts on quality of life. The purpose of this study was to evaluate the prevalence of allergic rhinitis in children and identify key risk factors contributing to its development. The aim of the study was to evaluate the prevalence and identify the risk factors of allergic rhinitis in the pediatric population.
Methods: This retrospective observational study involved 150 pediatric patients with allergic rhinitis symptoms at the Department of Otolaryngology-Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, and the Department of Pediatric Medicine, Bashundhara Ad-din Medical College and Hospital, Dhaka, Bangladesh, from July 1, 2023 to June 30, 2024. Inclusion criteria comprised children aged 1 to 18 years with allergic rhinitis symptoms. Demographic data, risk factors, and comorbidities were collected and analyzed using SPSS 22.0.
Result: The study included 150 pediatric patients, predominantly male (64.00%), with the majority aged 6-12 years (46.67%) and residing in urban areas (69.33%). Allergic rhinitis was present in 70.00% of the patients, with a significant association to family history, high environmental exposure, and passive smoke exposure. Among those diagnosed with allergic rhinitis, comorbidities were common, with 45.71% having asthma, 50.00% having eczema or atopic dermatitis, and 24.29% having conjunctivitis.
Conclusion: This study shows that 70% of pediatric patients with allergic rhinitis are mainly males aged 2 to 12 years, with significant risk factors being family history and environmental exposure, alongside common comorbidities like asthma and eczema.

Keywords: Allergic rhinitis, Prevalence, Risk factors, Pediatric population, Atopic diseases

INTRODUCTION

Allergic rhinitis (AR) is characterized by episodes of sneezing, rhinorrhea and nasal congestion, often accompanied by itching in the eyes, nose and palate.[1-3] It represents a significant public health concern, affecting both developed and developing nations. Prevalence rates range from 10% to 30% in adults and exceed 40% in children.[4] When left untreated or inadequately managed, AR can severely impair the quality of life for both the affected child and their family, highlighting its profound impact on pediatric health.[5] The global rise in AR prevalence mirrors the increasing burden of childhood allergic diseases, so much so that these conditions are now often referred to as an "allergic epidemic."[6]

Investigating AR in children is essential because of its potential long-term consequences if not adequately addressed. These conditions predominantly affect the nose, eyes, skin and lungs.[7] AR not only compromises the well-being of children but also imposes a financial strain on healthcare systems, with both direct and indirect costs.[8] The rising prevalence of allergic conditions among children underscores the need for a better understanding of these challenges in pediatric populations. Risk factors

for AR include both genetic and environmental components. Research indicates variations in allergic sensitization across ethnic groups, suggesting that environmental factors may sometimes play a more significant role than genetic predisposition.[9,10] The hygiene hypothesis proposes that lower exposure to microbes during early childhood increases the likelihood of developing immunoregulatory disorders such as AR.

Moreover, passive exposure to cigarette smoke and a family history of allergies are well-recognized contributors to AR.[11] However, there are gaps in the literature, particularly regarding pediatric populations in low- and middle-income countries (LMICs), where the development of atopic diseases may follow different patterns compared to high-income countries (HICs).[12,13]

Current research highlights the growing global prevalence of AR, with some regions reporting that over 50% of their population is affected.[14] Large-scale studies like the International Study of Asthma and Allergies in Childhood (ISAAC) have been pivotal in revealing the widespread impact of atopic diseases.[15] However, region-specific data, particularly in pediatric populations, remain limited.

This is especially critical in areas with diverse environmental exposures, where industrialization has been linked to rising AR rates, although the specific contributing factors remain unclear. The rapid increase in allergic diseases in developing nations necessitates more focused investigations. Therefore, the purpose of this study evaluates the prevalence of allergic rhinitis in children and to identify the key risk factors contributing to its development within the pediatric population.

The aim of the study was to evaluate the prevalence and identify the risk factors of allergic rhinitis in the pediatric population.

METHODS

Study type

This was a retrospective observational study.

Study place

was conducted at the Department of Otolaryngology-Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, and the Department of Pediatric Medicine, Bashundhara Ad-din Medical College and Hospital, Dhaka, Bangladesh.

Study duration

The study was conducted from July 1, 2023 to June 30, 2024.

Sample size

The study involved 150 pediatric patients during this period.

Inclusion criteria

Children aged 1 to 18 years with allergic rhinitis symptoms, defined by the presence of sneezing, nasal congestion, itchy eyes, and nasal obstruction supported by medical evaluation. Patients whose guardians provided informed consent for participation in the study.

Exclusion criteria

Children with known immunodeficiencies or congenital anomalies that could affect the study results. Patients receiving ongoing treatment for allergic rhinitis.

Informed consent was obtained from all participants, ensuring confidentiality and voluntary participation. Data collection involved administering a structured questionnaire to gather demographic information, including age, gender, residence, and potential risk factors for allergic rhinitis, such as family history, environmental exposure, and passive smoke exposure.

Statistical analysis was performed using SPSS version 22.0, with descriptive statistics summarizing demographic characteristics and prevalence rates. Chi-square tests evaluated associations between risk factors and the presence of allergic rhinitis, with p values<0.05 considered statistically significant. The study protocol was approved by the hospital authority of Bangabandhu Sheikh Mujib Medical University and Bashundhara Ad-din Medical College and Hospital, ensuring ethical compliance and patient confidentiality. Primary outcomes included the prevalence of allergic rhinitis and the identification of significant risk factors, while secondary outcomes involved assessing comorbid conditions associated with allergic rhinitis in the study population.

RESULTS

The gender distribution of the study patients revealed a male predominance, with 96 (64.00%) males and 54 (36.00%) females. The age distribution indicated that the majority of patients were aged 6-12 years, accounting for 70 (46.67%). The next largest group comprised 65 (43.33%) patients aged 2-5 years, while fewer patients were in the ≥13 years category (11, 7.33%) and the <2 years group (4, 2.67%). Additionally, the majority of patients resided in urban areas (104, 69.33%), compared to 46 (30.67%) from rural areas.

The prevalence of allergic rhinitis among the study population was observed, with 105 patients (70.00%) diagnosed with allergic rhinitis, while 45 patients (30.00%) did not have the condition. Family history emerged as a significant risk factor for allergic rhinitis,

with 70 (66.67%) of patients with allergic rhinitis reporting a family history compared to 15 (33.33%) of those without allergic rhinitis (p<0.001). Environmental exposure was also notably associated; 63 (60.00%) patients with allergic rhinitis reported high exposure, while 15 (33.33%) of non-allergic patients indicated high exposure (p<0.01). Additionally, passive smoke exposure was significant, with 42 (40.00%) patients with allergic rhinitis being exposed, compared to 9 (20.00%) of those without allergic rhinitis (p<0.05). Among patients with allergic rhinitis, the prevalence of comorbidities was as follows: asthma was present in 32 patients (45.71%), eczema or atopic dermatitis in 35 patients (50.00%), and conjunctivitis in 17 patients (24.29%).

Table 1: Demographic characteristics of the study patients (n=150).

Variables		Frequency	%
Gender	Male	96	64.00
	Female	54	36.00
Age (in years)	<2	4	2.67
	2-5	65	43.33
	6-12	70	46.67
	≥13	11	7.33
Residence	Urban	104	69.33
	Rural	46	30.67

Table 2: Prevalence of allergic rhinitis among study patients (n=150).

Prevalence	Frequency	%
Allergic rhinitis present	105	70.00
Allergic rhinitis absent	45	30.00

Table 3: Risk factors for allergic rhinitis in study patients (n=150).

Risk factor		Allergic rhinitis		No allergic rhinitis		P value
		(n=105)	%	(n=45)	%	
Family history	Yes	70	66.67	15	33.33	<0.001
	No	35	33.33	30	66.67	
Environmental exposure	High exposure	63	60.00	15	33.33	<0.01
	Low exposure	42	40.00	30	66.67	
Passive smoke exposure	Yes	42	40.00	9	20.00	<0.05
	No	63	60.00	36	80.00	

Table 4: Comorbidities in patients with allergic rhinitis (n=105).

Comorbidity	Allergic rhinitis (n=105)	%
Asthma	32	45.71
Eczema/atopic dermatitis	35	50.00
Conjunctivitis	17	24.29

DISCUSSION

The increasing prevalence of allergic rhinitis (AR) in pediatric populations has emerged as a critical concern for public health, prompting the need for comprehensive evaluation and understanding of its risk factors. Given that AR can significantly impact children's quality of life, educational performance, and overall well-being, identifying both genetic and environmental contributors is essential for effective management and prevention strategies. The insights gained from this study will not only enhance our understanding of the epidemiology of allergic rhinitis but also inform targeted interventions that could mitigate its effects on affected children. By exploring the prevalence and associated risk factors, we aim to provide a clearer picture of AR in pediatric populations, paving the way for future research and better healthcare practices. In our study, the gender distribution indicated a male predominance, with 96 (64.00%) males compared to 54 (36.00%) females. This finding is consistent with the study by Chiang et al, which also reported a male-to-female ratio of 64% to 36%.[16] This male predominance suggests that allergic rhinitis may be more prevalent in males, warranting further investigation into potential gender-specific risk factors. Additionally, our age distribution showed that the largest group of

patients was aged 6-12 years (70, 46.67%), which aligns with another study's findings that indicated a significant prevalence of allergic rhinitis among preschool children (69.3%).[16] Furthermore, the drop in prevalence post-adolescence, as noted in existing literature, emphasizes the need for continuous monitoring and tailored intervention strategies throughout different developmental stages. The majority of patients in our study resided in urban areas (104, 69.33%), which mirrors findings from García-Almaraz et al, where 69.4% of schoolchildren with allergic rhinitis lived in urban environments.[17] This trend highlights urban living as a potential risk factor for allergic conditions, likely due to increased exposure to environmental allergens, pollution, and lifestyle differences, while rural residents may benefit from lower allergenic exposure, offering a protective effect against allergic rhinitis.

In our study, the prevalence of allergic rhinitis (AR) was 70.00%, with 105 patients diagnosed with AR out of the 150 total participants. This finding aligns closely with the prevalence reported by Cingi et al, further supporting the consistency of allergic rhinitis rates across various populations.[18] Such a high prevalence underscores the significance of AR as a common condition, particularly in pediatric populations, necessitating ongoing awareness and preventive measures. The relatively elevated prevalence observed across studies highlights the need for further exploration into region-specific risk factors and potential preventive strategies that could mitigate the impact of AR, especially in vulnerable pediatric groups.

In our study, family history emerged as a significant risk factor for allergic rhinitis, with 66.67% of patients diagnosed with the condition reporting a familial history, compared to 33.33% of those without allergic rhinitis ($p<0.001$). This finding aligns with the results of Alsowaidi et al, which emphasized the crucial role of family history in the prevalence of allergic rhinitis among children.[19] Furthermore, environmental exposure was notably associated with allergic rhinitis in our cohort, with 60.00% of affected children reporting high allergen exposure compared to 33.33% of non-allergic children ($p<0.01$), reinforcing the understanding that environmental factors significantly contribute to the risk of developing allergic rhinitis.

Additionally, our results indicated that 40.00% of children with allergic rhinitis were exposed to passive smoke, in contrast to 20.00% of those without the condition ($p<0.05$). This observation mirrors Alsowaidi et al, emphasis on the detrimental impact of environmental tobacco smoke on respiratory health.[19] Collectively, these findings highlight the importance of considering family history, environmental exposure, and passive smoke exposure when assessing risk factors for allergic rhinitis in pediatric populations, underscoring the need for targeted prevention and intervention strategies.

In our study, comorbidities such as asthma, eczema or atopic dermatitis, and conjunctivitis were prevalent among patients with allergic rhinitis, with asthma affecting 45.71%, eczema or atopic dermatitis present in 50.00%, and conjunctivitis observed in 24.29% of patients. These findings align closely with those reported by Chiang et al, where asthma was present in 30.5%, allergic dermatitis in 33.9%, and allergic conjunctivitis in 16.1% of the study population.[16] The higher prevalence of comorbidities in our cohort reinforces the established link between allergic rhinitis and these associated conditions, suggesting that pediatric patients with allergic rhinitis are often predisposed to multiple allergic diseases. This comorbidity profile underscores the importance of comprehensive management strategies that target not only allergic rhinitis but also associated allergic conditions, to improve patient outcomes and quality of life. Overall, these findings underscore the need for comprehensive management strategies that address not only allergic rhinitis but also its associated comorbidities to improve patient outcomes. Future research should focus on region-specific risk factors and long-term prevention strategies to better address the unique needs of pediatric populations.

This study had several limitations like small sample size may limit the generalizability of the findings. Findings may not be generalizable due to the specific population studied. The study's limited geographic scope may introduce sample bias, potentially affecting the broader applicability of the findings.

CONCLUSION

In conclusion, this retrospective observational study demonstrates that 70% of pediatric patients diagnosed with allergic rhinitis are predominantly male, with most aged 2 to 12 years. Significant risk factors include a family history of allergic conditions, high environmental exposure, and passive smoke exposure. Additionally, comorbidities such as asthma, eczema, and conjunctivitis were common among affected patients. These findings highlight the need for targeted interventions and early management strategies in pediatric populations at risk for allergic rhinitis.

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