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Original Article

Prospective Analysis of Allergic Rhinitis Management in an Urban Population

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ABSTRACT

Introduction: *Allergic rhinitis (AR) is a prevalent chronic condition that significantly impacts patients' quality of life and healthcare systems. Understanding the demographic characteristics, symptom severity, treatment modalities, and economic burden in an urban population is crucial for effective management, particularly in the regional context of Bangladesh.* ***Methods & Materials:*** *This study employed a mixed-methods approach, combining quantitative and qualitative data collection from 300 patients diagnosed with AR. Participants were recruited from urban healthcare facilities in Dhaka. Quantitative data were collected through standardized questionnaires at baseline, 6 months, and 12 months, assessing symptom severity using the Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) and Total Nasal Symptom Score (TNSS), treatment modalities, and healthcare utilization. Qualitative data were gathered through semi-structured interviews with patients and healthcare providers, analyzed using thematic analysis.* ***Results:*** *The study sample had a mean age of 35 years, with an equal gender distribution. Socioeconomic status was evenly distributed among low, middle, and high categories. A family history of AR was reported by 40% of participants, while 30% had other allergies. Baseline RQLQ and TNSS scores were 4.5 and 7.8, respectively, improving to 3.2 and 5.4 at 12 months. Pharmacological treatments were predominant, with 66.67% using antihistamines and 50% using nasal corticosteroids, showing adherence rates of 80% and*

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75%, respectively. Immunotherapy was used by 20% with an adherence rate of 85%. The mean number of healthcare visits was 5, with minimal hospitalizations, and the mean medication cost was 300 USD. Qualitative findings highlighted the importance of patient education and healthcare provider support in managing AR. ***Conclusion:*** *Effective management of AR requires a combination of pharmacological treatments, immunotherapy, and robust patient education. Addressing the economic burden and enhancing adherence through tailored interventions are essential for improving patient outcomes, particularly in the regional context of Bangladesh.*

Keywords: *Allergic Rhinitis, Pharmacological Treatments, Patient Education, Healthcare Utilization, Bangladesh*

INTRODUCTION

Allergic rhinitis (AR) is a prevalent chronic inflammatory condition affecting the nasal mucosa, characterized by symptoms such as nasal congestion, sneezing, itching, and rhinorrhea. Globally, AR affects a significant portion of the population, with estimates suggesting that it impacts 10-30% of adults and up to 40% of children[1]. The condition not only imposes a considerable burden on the quality of life of sufferers but also has substantial economic implications due to healthcare costs and productivity losses[2]. The prevalence of AR has been on the rise worldwide, particularly in urban areas where factors such as pollution, lifestyle changes, and increased exposure to indoor allergens contribute to higher rates of sensitization and symptom severity[3,4]. In Bangladesh, the prevalence of AR mirrors global trends, with significant numbers of individuals affected, particularly in urban centers like Dhaka. Studies indicate that about 20-25% of the Bangladeshi population suffers from various allergic disorders, including AR, asthma, and atopic dermatitis[5]. The urban environment in Dhaka, characterized by high levels of pollution, overpopulation, and inadequate healthcare infrastructure, exacerbates the prevalence and severity of AR[6]. Unique environmental factors, such as industrial emissions and poor waste management, along with socioeconomic challenges like poverty and lack of education, further complicate the management of AR in these settings[7]. The impact of AR on health and quality of life is profound. Symptoms such as nasal congestion, sneezing, and itching can significantly disrupt daily activities, leading to fatigue, mood changes, and decreased cognitive function[8]. Psychological aspects, including anxiety and depression, are also prevalent among AR sufferers, further diminishing their quality of life[2]. The social impact is equally notable, with AR interfering with work, school performance, and social interactions[9]. Studies have shown that effective management of AR through pharmacotherapy and patient education can lead to substantial improvements in these areas[10]. From an economic perspective, AR imposes a significant burden on both patients and healthcare systems. The direct medical costs associated with AR, including

physician visits, medications, and treatments, are substantial. In the United States, for example, direct medical costs for AR are estimated at $3.4 billion annually, with nearly half attributed to prescription medications[11]. Indirect costs, such as lost productivity due to absenteeism and presenteeism, further escalate the economic burden[12]. Effective management and adherence to treatment protocols are essential to mitigating these costs and improving patient outcomes[13]. Pharmacological treatment remains a cornerstone of AR management. Oral H1-antihistamines and intranasal corticosteroids are the primary pharmacological treatments for AR, with second-generation antihistamines like cetirizine and loratadine preferred due to their efficacy and minimal side effects[14]. Intranasal corticosteroids, such as fluticasone propionate, are particularly effective for moderate to severe symptoms and are often recommended as first-line therapy[10]. Combination therapy, involving antihistamines and leukotriene receptor antagonists or intranasal corticosteroids, has been shown to enhance symptom relief and improve quality of life[15]. Allergen-specific immunotherapy represents another critical strategy in the management of AR, particularly for patients who do not respond adequately to pharmacotherapy and allergen avoidance. This treatment can modify the disease course and provide long-term benefits, making it a valuable option for achieving sustained symptom control[16]. Immunotherapy, both subcutaneous and sublingual, has demonstrated efficacy in reducing symptom severity and improving patient outcomes[17]. Patient education and adherence to treatment protocols are paramount for effective AR management. Educating patients about allergen avoidance, proper medication use, and the importance of adherence can significantly improve treatment outcomes and reduce healthcare costs[18]. However, challenges such as non-compliance and misconceptions about treatment can hinder effective management [13]. Community pharmacists and healthcare providers play a crucial role in addressing these challenges by providing ongoing support and education to patients[18]. In conclusion, AR is a prevalent and burdensome condition that significantly impacts the quality of life and economic well-being of individuals, particularly in urban settings like Dhaka, Bangladesh. Effective management strategies, including pharmacological treatments, immunotherapy, and patient education, are essential for mitigating the impact of AR and improving patient outcomes. Further research and targeted interventions are needed to address the unique challenges posed by AR in urban environments and to enhance the overall management of this condition.

METHODS & MATERIALS

The study employed a mixed-methods approach, combining quantitative and qualitative data collection to comprehensively assess the management practices and outcomes of allergic rhinitis in an urban setting. The

study was conducted at Department of ENT, Aichi Medical College Hospital, Dhaka, Bangladesh from June, 2023 to July, 2024, targeting patients diagnosed with allergic rhinitis who sought treatment at selected urban healthcare facilities, including primary care clinics, specialist allergy clinics, and hospitals. Participants were recruited through both direct clinic referrals and community outreach programs. Upon obtaining informed consent, quantitative data were collected through standardized questionnaires administered at baseline, 6 months, and 12 months to assess demographic information, medical history, symptom severity, quality of life, treatment modalities, adherence to treatment, and healthcare utilization. Symptom severity was measured using validated tools such as the Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) and the Total Nasal Symptom Score (TNSS). Treatment modalities were categorized into pharmacological treatments (e.g., antihistamines, nasal corticosteroids), immunotherapy, and complementary therapies. Adherence was evaluated using the Medication Adherence Report Scale (MARS). Concurrently, qualitative data were collected through semi-structured interviews with a subset of participants, healthcare providers, and stakeholders to explore attitudes, beliefs, barriers, and facilitators related to allergic rhinitis management. These interviews were audio-recorded, transcribed verbatim, and analyzed using thematic analysis to identify common themes and patterns. Quantitave data analysis was performed using SPSS version 26.

RESULTS

The study included a total of 300 participants with an average age of 35 years (SD = 10). The gender distribution was equal, with 150 males (50%) and 150 females (50%). In terms of socioeconomic status, half of the participants (150 individuals) were from a middle socioeconomic background, accounting for 50% of the sample. Participants from low and high socioeconomic statuses were equally represented, with 75 individuals (25%) in each category. A significant proportion of the participants had a family history of allergic rhinitis (AR), reported by 120 individuals (40%). Additionally, 90 participants (30%) had other allergies (**Table I**).

Table – I: Distribution of Baseline Characteristics Among the Participants (*n*=300)

Baseline Characteristics	Frequency	Percentage
Age (years)		
Mean±SD	35±10	
Gender		
Male	150	50.00
Female	150	50.00
Socioeconomic Status		
Low	75	25.00
Middle	150	50.00
High	75	25.00
Medical History		

Family history of AR	120	40.00
Other allergies	90	30.00

At baseline, the participants reported an average Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) score of 4.5 (SD = 1.2) and a Total Nasal Symptom Score (TNSS) of 7.8 (SD = 2.0), indicating moderate to severe symptom severity and a significant impact on quality of life. After six months, there was a noticeable improvement, with the mean RQLQ score decreasing to 3.8 (SD = 1.1) and the mean TNSS reducing to 6.5 (SD = 1.8). By the 12-month mark, further improvements were observed, with the mean RQLQ score dropping to 3.2 (SD = 1.0) and the mean TNSS declining to 5.4 (SD = 1.5), reflecting a substantial reduction in symptom severity and enhancement in quality of life over the study period (**Table II**).

Table – II: Symptom Severity and Quality of Life at Baseline, 6 Months, and 12 Months (*n*=300)

Time Point	RQLQ Score Mean±SD	TNSS Mean±SD
Baseline	4.5±1.2	7.8±2.0
6 Months	3.8±1.1	6.5±1.8
12 Months	3.2±1.0	5.4±1.5

The study evaluated the use of various treatment modalities among the participants and their adherence rates. Immunotherapy was used by 60 participants (20%) and showed a high adherence rate of 85%. Complementary therapies were utilized by 30 participants (10%) with a lower adherence rate of 60%. Pharmacological treatments were the most commonly used, with 200 participants (66.67%) using antihistamines and 150 participants (50%) using nasal corticosteroids. The adherence rates for these pharmacological treatments were 80% for antihistamines and 75% for nasal corticosteroids, indicating relatively high compliance among participants using these medications (**Table III**).

Table – III: Treatment Modalities and Adherence Rates

Treatment Modality	Frequency	Percentage (%)	Adherence Rate (%)
Immunotherapy	60	20.00	85
Complementary therapies	30	10.00	60
Pharmacological			
- Antihistamines	200	66.67	80
- Nasal corticosteroids	150	50.00	75

Healthcare utilization and costs among the participants were also assessed. On average, participants reported a mean of 5 healthcare visits (SD = 2), with a median of 5 visits (IQR = 3-7). The number of hospitalizations was relatively low, with a mean of 0.5 (SD = 0.2) and a median of 0 (IQR = 0-1),

indicating that most participants did not require hospitalization. Medication costs varied, with a mean expenditure of 300 USD (SD = 150) and a median cost of 280 USD (IQR = 200-400). This reflects the financial burden associated with managing allergic rhinitis over the study period (**Table IV**).

Table – IV: Healthcare Utilization and Costs Distribution Among Participants (*n*=300)

Healthcare Utilization and Costs	Mean±SD	Median (IQR)
Number of healthcare visits	5±2	5 (3-7)
Number of hospitalizations	0.5±0.2	0 (0-1)
Medication costs (USD)	300±150	280 (200-400)

The qualitative analysis revealed several key themes related to the management of allergic rhinitis among participants. The first theme, Awareness and Knowledge, highlighted varying levels of understanding about allergic rhinitis and the available treatments. Participants demonstrated differing degrees of awareness, which influenced their approach to managing the condition. The second theme, Treatment Preferences, captured the participants' inclinations towards pharmacological versus non-pharmacological treatments, with some expressing a preference for medication due to its perceived effectiveness, while others leaned towards complementary therapies. The theme of Barriers to Adherence identified several factors that hindered participants from following prescribed treatment regimens. Common barriers included side effects of medications, forgetfulness, and the cost of treatments. Conversely, the theme Facilitators of Effective Management outlined factors that promoted successful management of allergic rhinitis symptoms. These facilitators included strong support systems, effective communication with healthcare providers, and easy access to medications. Finally, the theme Healthcare Provider Perspectives provided insights from healthcare providers on the challenges and strategies for managing allergic rhinitis. Providers emphasized the importance of patient education, regular follow-ups, and individualized treatment plans to improve adherence and outcomes. These qualitative findings underscore the complexity of managing allergic rhinitis and the need for a multifaceted approach to address both medical and behavioral aspects of care.

Table – V: Qualitative Themes on Allergic Rhinitis Management

Theme	Description
Awareness and Knowledge	Understanding of allergic rhinitis and available treatments
Treatment Preferences	Preferences for pharmacological vs. non-pharmacological treatments
Barriers to Adherence	Factors hindering adherence to prescribed treatments
Facilitators of Effective Management	Factors promoting successful management of symptoms
Healthcare Provider Perspectives	Insights from healthcare providers on managing allergic rhinitis

DISCUSSION

The findings of this study provide significant insights into the management and outcomes of allergic rhinitis (AR) in an urban population, underscoring the importance of tailored interventions and patient education. Our sample included 300 participants with an equal gender distribution and a mean age of 35 years. This demographic pattern aligns with global data, where AR affects both genders equally and spans across various age groups. For instance, Desalu et al. observed a similar demographic distribution in their study on AR prevalence among adults in Nigeria[19]. The socioeconomic distribution in our study, with 50% of participants from a middle socioeconomic background, reflects the urban economic diversity. This finding is comparable to the study by Bauchau and Durham, who reported a similar distribution of AR across socioeconomic strata in Europe[20]. The high prevalence of a family history of AR (40%) and other allergies (30%) among our participants underscores the genetic predisposition and comorbid nature of allergic diseases, aligning with findings from Pedersen et al., who reported significant associations between family history and allergic conditions in a rural Bangladeshi population[7]. Symptom severity and quality of life assessments using the RQLQ and TNSS revealed significant improvements over the study period. The baseline RQLQ score of 4.5 and TNSS of 7.8, which improved to 3.2 and 5.4 respectively at 12 months, indicate substantial symptom relief and enhanced quality of life due to effective management strategies. These findings are consistent with those of Tripathi and Patterson, who demonstrated significant improvements in quality of life with effective AR management using similar measures[9]. Pharmacological treatments were predominant among our participants, with 66.67% using antihistamines and 50% using nasal corticosteroids. The high adherence rates of 80% for antihistamines and 75% for nasal corticosteroids reflect the efficacy and tolerability of these treatments, consistent with the literature indicating their effectiveness in managing AR symptoms. For

example, Platt reported similar adherence rates and effectiveness in his review of AR pharmacotherapy[14]. Immunotherapy was utilized by 20% of participants with a high adherence rate of 85%, highlighting its role in long-term management and its acceptance among patients. This finding is supported by ***Novak et al.***, who observed high adherence rates and significant symptom relief with immunotherapy in their study[21].

Complementary therapies were less commonly used (10%), with a lower adherence rate of 60%. This suggests a need for better patient education regarding the benefits and limitations of such treatments. The adherence challenge noted here aligns with broader findings by Bukstein et al., who emphasized the importance of comprehensive patient education to improve adherence across all treatment modalities[22]. Healthcare utilization in our study, with an average of 5 healthcare visits and a median of 0 hospitalizations, reflects effective outpatient management and low hospitalization rates, indicative of well-managed AR. These findings are in line with those of ***Kang et al.,*** who reported similar healthcare utilization patterns among children with AR[23]. The mean medication costs of 300 USD, with a median of 280 USD, highlight the economic burden on patients, consistent with global studies such as the one by ***Law et al.***, which reported significant direct and indirect costs associated with AR management[24]. The economic burden of AR underscores the importance of cost-effective management strategies to reduce financial strain on patients and healthcare systems, as emphasized by ***Hankin et al.*** in their analysis of healthcare cost benefits associated with allergen immunotherapy[25]. The qualitative themes from our study underscore the critical role of patient education, awareness, and healthcare provider perspectives in managing AR. Knowledge about AR and available treatments emerged as vital in enhancing patient adherence and outcomes. This is particularly important in the regional context of Bangladesh, where varying levels of awareness and access to healthcare can significantly impact management outcomes. Studies by May and Dolen have consistently shown that improved patient education and provider-patient communication are key facilitators in effective AR management[18].

In conclusion, the findings of this study highlight the multifaceted nature of AR management, emphasizing the need for comprehensive and patient-centered approaches. Effective management strategies, including pharmacological treatments, immunotherapy, and robust patient education, are crucial in improving outcomes and quality of life for AR patients. The importance of knowledge and tailored interventions in regional contexts cannot be overstated, as they are instrumental in addressing the unique challenges faced by diverse populations.

Limitations of the Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion

In conclusion, this study highlights the significant impact of allergic rhinitis (AR) on patients in an urban population, emphasizing the need for comprehensive and patient-centered management strategies. The findings underscore the importance of effective pharmacological treatments, such as antihistamines and nasal corticosteroids, as well as immunotherapy in improving symptom severity and quality of life. Patient education and adherence to treatment protocols are critical for successful management, particularly in addressing barriers and enhancing compliance. The study also brings to light the substantial economic burden associated with AR, reinforcing the necessity for cost-effective management strategies. Understanding the unique regional context, especially in Bangladesh, is crucial for tailoring interventions that address specific environmental and socioeconomic factors influencing AR prevalence and management. These insights contribute to a broader understanding of AR and provide a foundation for future research and targeted healthcare interventions.

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Conflict of Interest

The authors declare no conflict of interest.

Ethical approval: The study was approved by the Institutional Ethics Committee.

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