Original Article

Assessment of Incidence of Allergic Rhinitis in Chronic Rhinosinusitis Patients: A Prospective Analysis

Mumtaz Ahmad Umar, Ayesha Jawad, Mirza Nasheed Baig, Nighat Arif,
Saira Iftikhar, Mohibullah Mushwani

ABSTRACT

Objective: The study aims to assess the incidence of allergic rhinitis and prevalent allergens among individuals with chronic rhinosinusitis.

Methodology: A prospective cross-sectional analysis was done at the Department of ENT at Akbar Niazi Teaching Hospital, Islamabad, from May 2022 to April 2023. Based on the inclusion criteria, 100 patients with chronic rhinosinusitis were enrolled in the study after obtaining ethical approval, using consecutive sampling technique. All patients met the diagnostic criteria for chronic rhinosinusitis based on their history, radiologic, and nasal endoscopy examinations. The skin prick method was used for the diagnosis of allergic rhinitis. The data analysis was performed using SPSS 25 and a p value ≤ 0.05 was considered as significant.

Results: The mean age of the patients was 38.3±14.4 years. The ratio of males to females was nearly equal, with a slight male predominance (53%). The polypoid chronic rhinosinusitis incidence was 55%, while non polypoid cases accounted for 45% of the total. Nearly 2/3 of patients with polypoid exhibited severe disease, as determined by CT scan findings and nasal endoscopy examinations. The major presenting symptoms were nasal discharge, affecting approximately 94% of patients, and nasal blockage, affecting around 90% of patients. The skin prick method revealed that 75% of patients had allergic rhinitis, and pet dander was identified as the most common allergen.

Conclusion: Chronic rhinosinusitis is a prevalent condition, with the majority of patients developing it as a secondary response to allergies. Early detection of allergic rhinitis, including the specific allergens identification and its effective management, can aid in preventing chronic rhinosinusitis.

KEYWORDS: Allergic, Polyposis, Rhinitis, Rhinosinusitis, Seasonal

INTRODUCTION

Acute and chronic rhinosinusitis, along with allergic rhinitis, are upper airway diseases that impose a significant burden on the global healthcare system.[1] Allergic rhinitis is an IgE-mediated allergic reaction of the nasal respiratory mucosa to allergens present in both indoor and outdoor air.[2] Allergic Rhinitis is marked by symptoms such as sneezing, nasal discharge, congestion, and itching.[3] Clinically, rhinosinusitis is described as inflammation of the nose and paranasal sinuses, marked by more than two symptoms such as nasal congestion, stuffiness, rhinorrhea (anterior or posterior), hyposmia, facial pain, along with diagnostic manifestations on CT scan or nasal endoscopy, as outlined by European position paper on rhinosinusitis and nasal polyps.[4]

Chronic rhinosinusitis (CRS) is estimated to affect about 12% of the global population, and its etiology is thought to involve fungal, bacterial, viral, and

Mumtaz Ahmad Umar,[1] *MBBS, FCPS, MCPS*
Associate Professor
Ayesha Jawad,[2] *MBBS, FCPS*
Assistant Professor
Mirza Nasheed Baig,[3] *MBBS, FCPS*
Associate Professor
Nighat Arif,[4] *MBBS, FCPS*
Associate Professor
Saira Iftikhar,[5] *MBBS, FCPS*
Assistant Professor
Mohibullah Mushwani,[6] *MS*
Assistant Professor
[1,6]Akbar Niazi Teaching Hospital Islamabad, Pak.
[2,5]Shifa College of Medicine, Islamabad, PAK.
[3]Khan Research Laboratories Hospital, Islamabad, PAK.
[4]Railway Hospital, Rawalpindi, PAK.

Correspondence
Dr. Mumtaz Ahmad Umar
dr.mumtaz222@gmail.com

immunological factors. Certain prompting factors, such as congenital anomalies of the nose, allergic rhinitis, and paranasal sinuses (such as paradoxical turbinate concha bullosa), genetic diseases (like immotile cilia syndrome and cystic fibrosis), smoking (active or passive), and certain neoplastic diseases, can contribute to the development of CRS.[4] The pathophysiology of the relationship between acute and chronic rhinosinusitis remains a topic of debate and represents a rich area for ongoing research in otolaryngology. One generally accepted theory is that allergic rhinitis induces swelling of the sinonasal mucosa. This swelling hinders mucociliary function, ultimately blocking the sinus ostia and leading to rhinosinusitis.[5] Another theory suggests that patients with allergic rhinitis experience notable inflammation of the nose and paranasal sinuses during the allergen season, as opposed to the non-allergen season.[6] The allergic rhinitis globally prevalent in patients with CRS varies between 25–75%, significantly higher than in the non-CRS individuals.[7] The study objective was to assess the allergic rhinitis incidence and identify prevalent allergens among individuals with chronic rhinosinusitis.

METHODOLOGY

Following approval from the hospital's ethics committee, vide letter No. 1.60. IMDC-2022, Dated: 04 June, 2022, this prospective cross-section analysis was done at the Department of ENT at Akbar Niazi Teaching Hospital, Islamabad between May 2022 and April 2023. A total of 100 cases diagnosed with chronic rhinosinusitis (CRS) were included in the study. WHO calculator of sample size was used, with a precision rate of 7% and a 95% confidence interval, at a significance level of 5%.[4] Patients were consecutively identified and enrolled after obtaining their consent. CRS was diagnosed by a consultant ENT surgeon. Patients were diagnosed based on their medical history, radiologic manifestations, clinical, and nasal endoscopy examinations. Patients were excluded from the study if CRS could not be confirmed, operated for CRS surgery, or if the data collection form was incomplete.

Nasal polyps were identified through endoscopy and categorized into three grades. Polyps limited to middle meatus were classified as grade 1, indicating a mild severity. Polyps that extended beyond the middle turbinate were classified as grade 2, indicating a moderate severity. Polyps that filled the nasal cavity or extended to or beyond the inferior turbinate were classified as grade 3, indicating a severe severity.[8]

The study outcomes were measured as follows: the distribution of age and gender, the number of signs, major and minor symptoms, the incidence of allergy and common allergens, the incidence of asthma, and smoking habits. Following the completion of the questionnaire and physical examination data sheet, endoscopy findings were recorded, and the results of the skin prick method for common allergens were obtained. The collected data was analyzed using SPSS v 25. The p value $\leq$ 0.05 was set as significant level.

RESULTS

In total, 100 individuals were enrolled in this study. The patients' ages varied from 16–60 years, and mean age was 38.3±14.4 years. The ratio of males to females was nearly equal, with a slight male predominance (53%). Following examination via nasal endoscopy, it was observed that 55% of patients with CRS developed polypoid changes, while non-polypoid changes were seen in 45% of patients.

Fig. 1: Gender dispersion

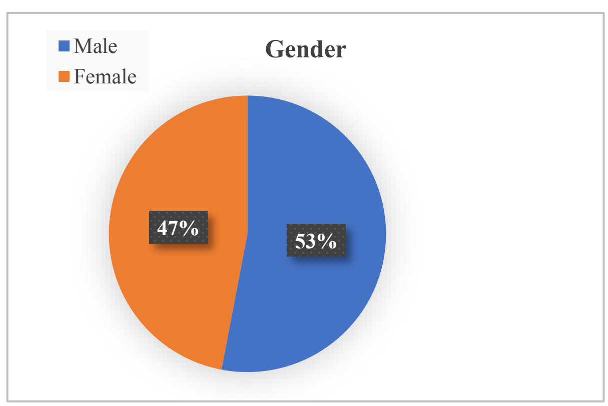


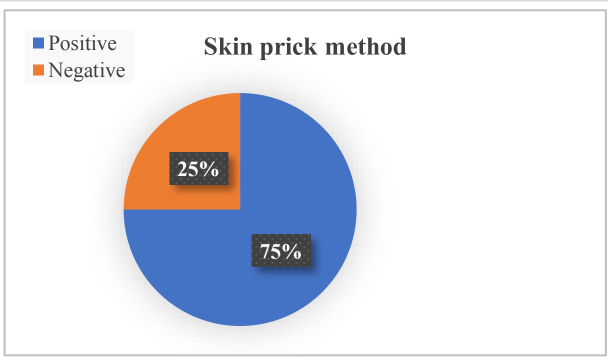
Table I: Incidence of polypoid vs non-polypoid CRS and its severity			
Types of CRS		**Frequency**	**Percentage**
Non-polypoid		45	45%
Polypoid		55	55%
Polypoid	Severe	41	74.5%
	Moderate	10	18.2%
	Mild	4	7.3%

Out of 55 patients with polypoid CRS, 74.5% exhibited severe disease, 18.2% had moderate disease, and 7.3% had mild disease (Table 1). The most frequently reported symptoms were nasal discharge (94%) and nasal blockage (90%). Less frequently reported symptoms included a diminished sense of smell and facial pressure, each reported by 60% of patients (Table 2).

Table II: Symptoms Experienced by Patients with CRS	
Symptoms	**Percentage**
Nasal discharge	94%
Obstruction	90%
Headache	85%
Sneezing	75%
Post nasal drip	70%
Diminished sense of smell	60%
Facial pressure	60%

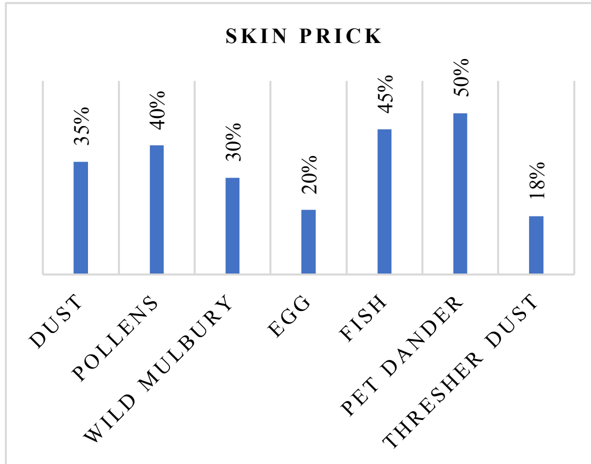
To assess the incidence of nasal allergy in patients, a skin prick procedure was conducted. The results showed that 75% of patients were diagnosed with allergic rhinitis, while the remaining 25% were suspected to have non-allergic rhinitis (Figure 2).

Fig. 2: The skin prick procedure



The results of the skin prick were further examined to identify the specific local allergens responsible. Among patients who tested positive, 50% were sensitive to pet dander, 45% to fish, and 40% to pollens. Wild mulberry, classified as an invasive species in this region, was found to trigger sensitivity in 1/3 of the patients who tested positive (Figure 3).

Fig. 3: Local allergens



DISCUSSION

Rhinosinusitis is a prevalent health condition that can meaningfully impact the quality of life of affected individuals. In this study, 55% of CRS cases were found to have nasal polyps. A study reported polypoid changes in 70% of CRS cases.[9] It was found that 45% of CRS patients had non-polypoid disease. The ratio of males to females was nearly equal in this study. Cheng et al found that the incidence of allergy in CRS patients was 22%, with insignificant difference between males and females.[10] CRS with or without polypoid is often regarded as the same disease. However, CRS and sinonasal polyposis are distinct diseases due to differences in their pathophysiological mechanisms and inflammatory mediators.[11]

In this study, a combination of sinonasal endoscopy and radiologic findings was utilized to objectively assess nasal patency as a measure of polypoid disease. The study observed that almost 2/3 of patients with polypoid CRS had severe disease, while the remaining 1/3 had moderate or mild disease. This finding is consistent with other studies investigating disease severity and its impact on quality of life.[12,13]

The frequent symptoms reported by CRS patients in this study were headache, nasal blockage, and discharge. Other studies have also reported headache and nasal blockage as primary complaints.[14,15] Two-thirds of CRS patients presented with post-nasal drip and sneezing, while 60% reported a diminished sense of smell and facial pressure. A study found a similar percentage of patients experiencing diminished sense of smell.[16]

All patients underwent a skin prick procedure, revealing that nearly 2/3 (75%) of CRS patients in this study were positive for allergic rhinitis based on results, while the remaining 25% tested negative. These results are consistent with a study conducted in Iran.[17] In our study, the frequent local allergen identified through the procedure was pet dander, affecting 50% of patients. Animal dander poses a significant challenge for allergic rhinitis patients worldwide. A study identified animal dander as the primary causative agent for allergic rhinitis,[18] which aligns with this study results. Fish (45%), pollen (40%), and dust allergens (35%) also tested positive in our cases. Similar percentages of allergen impact on individuals have been observed in other studies as well.[19,20]

CONCLUSION

Chronic rhinosinusitis (CRS) often develops secondary to allergic rhinitis. Early detection and management of allergies can help prevent CRS, highlighting the need to include allergic factors in early diagnostic tools.

Financial Disclosures: None

Conflict of Interest: None

REFERENCES

1. Arndal E, Sørensen AL, Lapperre TS, Said N, Trampedach C, Aanæs K, et al. Chronic rhinosinusitis in COPD: a prevalent but unrecognized comorbidity impacting health related quality of life. Respir Med. 2020;171(9):106092. https://doi.org/10.1016/j.rmed.2020.106092
2. Wang H, Song J, Pan LI, Yao Y, Deng YK, Wang ZC, et al. The characterization of chronic rhinosinusitis in hospitalized patients with COVID-19. J Allergy Clin Immunol Pract. 2020;8(10):3597-3599. https://doi.org/10.1016/j.jaip.2020.09.013
3. Xu Z, Huang Y, Delemarre T, Cavaliere C, Zhang N, Bachert C. Advances in chronic rhinosinusitis in 2020 and 2021. J Allergy Clin Immunol. 2022;149(3):854-866.https://doi.org/10.1016/j.jaci.2021.12.782
4. Azgaonkar SP, Dutta M, Kudalkar UN, Das S, Sinha R. The Anatomic Variations of the Nose and Paranasal Sinuses and Their Effect on Chronic Rhinosinusitis in Adult Patients. Indian J Otolaryngol Head Neck Surg. 2020;74(8):960-966. https://doi.org/10.1007/s12070-020-01975-x
5. Gilani S, Bhattacharyya N. Rethinking the relationships between chronic rhinosinusitis and asthma severity. Am J Otolaryngol. 2023;44(3):103814.https://doi.org/10.1016/j.amjoto.2023.103814
6. Meng Y, Wang C, Zhang L. Diagnosis and treatment of non-allergic rhinitis: focus on immunologic mechanisms. Expert Rev Clin Immunol. 2021;17(1):51-62.https://doi.org/10.1080/1744666X.2020.1858804
7. Sedaghat AR, Kuan EC, Scadding GK. Epidemiology of chronic rhinosinusitis: prevalence and risk factors. J Allergy Clin Immunol Pract. 2022;10(6):1395-1403.https://doi.org/10.1016/j.jaip.2022.01.016
8. Alanin MC, Hopkins C. Effect of functional endoscopic sinus surgery on outcomes in chronic rhinosinusitis. Curr Allergy Asthma Rep. 2020;20(2020):1-7.https://doi.org/10.1007/s11882-020-00932-6
9. La Mantia I, Ciprandi G, Varricchio A, Ragusa M, Cipolla F, Andaloro C. When rhinosinusitis is not just rhinosinusitis: Clinical characteristics and phenotypes of patients with type 2 chronic rhinosinusitis with nasal polyps. Acta Biomed. 2022;93(4):e2022240. doi: 10.23750/abm.v93i4.12561.
10. Ma C, Mehta NK, Nguyen SA, Gudis DA, Miglani A, Schlosser RJ. Demographic variation in chronic rhinosinusitis by subtype and region: a systematic review. Am J Rhinol Allergy. 2022;36(3):367-377. https://doi.org/10.1177/19458924211056294
11. Yang HW, Park JH, Jo MS, Shin JM, Kim DW, Park IH. Eosinophil-derived osteopontin induces the expression of pro-inflammatory mediators and stimulates extracellular matrix production in nasal fibroblasts: the role of osteopontin in eosinophilic chronic rhinosinusitis. Front Immunol. 2022;13(3):777928. https://doi.org/10.3389/fimmu.2022.777928.
12. Talat R, Speth MM, Gengler I, Phillips KM, Caradonna DS, Gray ST, et al. Chronic rhinosinusitis patients with and without polyps experience different symptom perception and quality of life burdens. Am J Rhinol Allergy. 2020;34(6):742-750. https://doi.org/10.1177/1945892420927244
13. Yamasaki A, Hoehle LP, Phillips KM, Feng AL, Campbell AP, Caradonna DS, et al. Association between systemic antibiotic and corticosteroid use for chronic rhinosinusitis and quality of life. Laryngoscope. 2018;128(1):37-42. https://doi.org/10.1002 /lary.26778
14. Pedregal-Mallo D, Pacheco E, Rodrigo JP, Llorente JL, Alvarez-Marcos C. Impact of immunotherapy on quality of life in patients with house dust mite allergic rhinitis. Allergy. 2020;75(7):1783. https://doi.org/10.1111/all.14215
15. Chmielik LP, Mielnik-Niedzielska G, Kasprzyk A, Stankiewicz T, Niedzielski A. Health-related quality of life assessed in children with chronic rhinitis and sinusitis. Children. 2021;8(12):1133. https://doi.org/10.3390/children8121133
16. Ahmed OG, Rowan NR. Olfactory dysfunction and chronic rhinosinusitis. Immunol Allergy Clin. 2020;40(2):223-232. https://doi.org/10.1016/j.iac.2019.12.013

17. Chamani S, Mahmoudzadeh S, Rezapour H, Fereidouni M. Frequency of allergic sensitivity to local herbs pollen among medical students in East of Iran by use of skin prick test. Alergia Astma Immunologia-Przegląd Kliniczny. 2021;26 (1):27-35. www.alergia-astma-immunologia.pl
18. Jin L, Fan K, Tan S, Liu S, Ge Q, Wang Y, et al. The beneficial effects of hydrogen-rich saline irrigation on chronic rhinitis: a randomized, double-blind clinical trial. J Inflamm Res. 2022; 15(2022):3983-3995. https://doi.org/10.2147/JIR.S365611.
19. Zieglmayer P, Zieglmayer R, Lemell P. Allergen challenge tests in allergen immunotherapy: State of the art. Allergol Select. 2023;7(3):25-32. https://doi.org/10.5414/ALX02322E
20. Bernstein JA, Bernstein JS, Makol R, Ward S. Allergic Rhinitis: A Review. JAMA. 2024;331(10):866-877. https://doi.org/10.100 1/jama.2024.0530

Author Contributions:

Mumtaz Ahmad Umar: conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts.

Ayesha Jawad: Participated in its design and coordination. drafted, read and approved the final manuscript.

Mirza Nasheed Baig: Participated in its design and coordination. Statistical analysis, drafted, read and approved the final manuscript.

All authors are equally accountable for research work

Nighat Arif: Participated in its design and coordination. Statistical analysis, drafted, read and approved the final manuscript.

Saira Iftikhar: Participated in its design and coordination. Statistical analysis, drafted, read and approved the final manuscript.

Mohibullah Mushwani: Participated in its design and coordination. Statistical analysis, drafted, read and approved the final manuscript.

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