



Association Between Chronic Rhino sinusitis and Bronchial Asthma Severity in Adult Patients

Article History:

Name of Author:

Siyyar Ahmad¹, Sajjad Naseer², Farman Ali³, Saqib Ullah⁴, Saadat Ullah Khan⁵, Muhammad Iqbal⁶

Affiliation: ¹ Senior Registrar Pak International Medical College Peshawar

² Assistant Professor Pulmonology PAF Hospital Islamabad

³ Assistant professor ENT Pak International Medical College Peshawar

⁴ Senior Register Pak International Medical College Peshawar.

⁵ Assistant professor Lady Reading Hospital Peshawar.

⁶ Senior Registrar, Loralai medical college Loralai Balochistan.

Corresponding Author:

Muhammad Iqbal

Email: iqbalkhanmkl@gmail.com

Received: 21-10-2025

Revised: 06-11-2025

Accepted: 17-11-2025

Published: 27-11-2025

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Noncommercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Abstract: Background: Chronic rhinosinusitis (CRS) and bronchial asthma are two chronic inflammatory airway diseases that are frequently seen together and potentially can have a negative interaction. Common inflammatory processes between the upper and lower airways may help to explain the failure to control asthma and worsen the condition. Assessing this relationship could help enhance patient care and outcomes. **Objective:** to evaluate the relationship of chronic rhinosinusitis with the severity of bronchial asthma. **Methodology:** This was a cross-sectional study conducted at department of ENT Pak International Medical College Peshawar from Jan 2024 to June 2024 over 6 months. Adult asthma patients (age 18-65) were consecutively recruited, and a total of 100 adult patients were enrolled. The diagnosis of CRS was made clinically and radiologically, and the severity of asthma was determined based on Global Initiative for Asthma (GINA) guidelines. A structured proforma was used to collect the demographic and clinical data, which were analyzed using SPSS version 26. Two statistical tests were performed: the chi-square test and the independent t-test, and a p-value of ≤ 0.05 was considered significant. **Results:** The 100 participants, 58% were females and 42% were males, with a mean age of 41.8 ± 12.4 years. CRS was present in 46% of patients. Moderate-to-severe asthma was significantly more frequent in patients with CRS compared to those without CRS (69.6% vs. 38.9%, $p=0.003$). Patients with CRS also had higher asthma symptom scores (7.2 ± 1.8 vs. 5.4 ± 1.5 , $p=0.001$) and more hospital admissions due to asthma exacerbations. **Conclusion:** There is a significant association between chronic R.S. and the severity of bronchial asthma in adults. Prompt diagnosis and treatment of CRS could be beneficial for asthma control and lessen disease burden.

Keywords: Chronic Rhinosinusitis; Bronchial Asthma; Severity; Adults.

INTRODUCTION

Chronic rhinosinusitis (CRS) is a chronic inflammation of the nose and paranasal sinuses (sinuses of the face) mucosa for more than 12 weeks. It is marked by symptoms like nasal blockage, nasal drainage, facial pain or pressure, and loss of smell. CRS is a significant public health issue, both in terms

of its prevalence and its recurrence and impact on the quality of life. Bronchial asthma is another chronic inflammatory airway disease with reversible airflow obstruction, bronchial hyperresponsiveness, and repeated attacks of wheezing, cough, chest tightness, and difficulties with breathing. There is growing evidence for a "united airway disease" in which upper airway inflammatory diseases can directly affect lower airway diseases, like asthma [1,2]. There

have been many cases where CRS has co-existed with bronchial asthma. The inflammatory mediators, such as eosinophils, cytokines, immunoglobulin E, and T-helper type 2 inflammatory responses, are similar in both disorders. CRS may exacerbate asthma symptoms, make them more frequent and less responsive to usual asthma treatment. In the same way, under-treated asthma can lead to chronic inflammation of the sinuses. Thus, a growing role of the evaluation and treatment of upper airway disease as well as asthma is seen in asthma care [3,4]. There has been strong evidence from several international studies that severe asthma has been strongly linked to CRS. Patients with CRS may have suboptimal asthma control, more frequent emergency department visits, hospital admissions, and decreased pulmonary function. Lower airways inflammation may be stimulated by inflammation in the sinonasal mucosa via lower airway inflammatory pathways and postnasal drainage. Furthermore, nose obstruction from CRS may inhibit proper filtration and humidification of the airways, worsening bronchial irritation and aggravating asthma symptoms [5,6]. Although this association is increasingly acknowledged, there are few local studies and little information about the relationship

MATERIALS AND METHODS

Study Design & Setting

This was a cross-sectional study conducted at department of ENT Pak International Medical College Peshawar from Jan 2024 to June 2024 over 6 months.

Participants

The sample size of 100 patients was obtained by consecutive non-probability sampling of adult patients diagnosed with bronchial asthma. Patients of both sexes from age 18 to 65 years who visited the outpatient or inpatient departments were selected. The clinical assessment of patients was done for symptoms and signs suggestive of chronic rhinosinusitis and for asthma severity.

Sample Size Calculation

The sample size of 100 patients was determined by using the WHO sample size calculator with a 95% confidence level, 5% margin of error, and the expected prevalence of chronic rhinosinusitis occurring with asthma patients based on previous published studies. The calculated sample size was deemed satisfactory for testing the statistical relationship between the variables.

Inclusion Criteria

- Each adult patient between the ages of 18 and 65 years old
- Bronchial Asthma cases diagnosed based on

between CRS severity and the severity of asthma in adults in developing countries. Differences in exposure, allergen load, health care access, and delayed diagnosis could affect the onset of disease and disease severity. Physicians may be able to develop treatment strategies that address the inflammatory conditions of both upper and lower airways after learning about the clinical relationship between them [7,8]. The early diagnosis and management of CRS in asthma patients can help to better control the symptoms, decrease the number of asthma exacerbations, and increase quality of life. Multidisciplinary treatment (including otolaryngologists and pulmonologists) could yield more beneficial therapeutic results in patients with combined diseases. This study was thus undertaken to assess the correlation between the severity of bronchial asthma and chronic rhinosinusitis in adults attending a tertiary care center [9].

Study Objectives

To find an association between chronic rhinosinusitis and the severity of bronchial asthma in adult patients, we visited a tertiary care hospital.

GINA guidelines

- Patients who are willing to attend the study
- Patients with written informed consent

Exclusion Criteria

- Those patients with chronic obstructive pulmonary disease (COPD)
- History of tuberculosis or lung cancer.
- Pregnant females
- Patients whose immune system is compromised.
- History of previous SN surgery in the past 6 months
- A patient who refused to be included in the study. A patient who did not want to take part in the study.

Diagnostic and Management Strategy

Diagnosis of chronic rhinosinusitis was established by clinical history, nasal examination, and radiological evaluation based on the established criteria. The severity of Asthma was determined with the help of GINA guidelines. The patients were treated by the specialists of the ENT and pulmonology departments according to the institutional treatment protocol.

Statistical Analysis

The data were entered and analyzed on SPSS 26. The quantitative variables were reported as mean $\pm$ standard deviation, and qualitative variables as frequencies and percentages. The association between the variables was tested by using the chi-square test and the independent t-test. A p-value of ≤ 0.05 was deemed statistically significant.

RESULTS

A total of 100 adult patients with bronchial asthma were included in the study. Among them, 58 (58%) were females and 42 (42%) were males. The mean age of participants was 41.8 ± 12.4 years. Chronic rhinosinusitis was diagnosed in 46 (46%) patients, while 54 (54%) patients had no evidence of CRS. Moderate-to-severe asthma was significantly more common among patients with CRS compared to patients without CRS (69.6% vs. 38.9%, $p=0.003$). The mean asthma symptom score was significantly higher in patients with CRS (7.2 ± 1.8) than those without CRS (5.4 ± 1.5 , $p=0.001$). Patients with CRS also demonstrated longer disease duration and more frequent asthma exacerbations. Hospital admissions related to asthma exacerbations were observed in 21 (45.7%) patients with CRS compared to 11 (20.4%) patients without CRS. Statistical analysis revealed a significant association between chronic rhinosinusitis and increased severity of bronchial asthma. These findings suggest that the presence of CRS may negatively affect asthma control and contribute to increased disease burden among adult patients.

Intervention Outcome

The clinical outcome was still better in patients diagnosed to have chronic rhinosinusitis and asthma, and treated with combined ENT and pulmonary management, during follow-up evaluation than at baseline presentation, as far as symptom control, decrease in asthma exacerbations, and general clinical outcome were concerned.

Table 1: Demographic Characteristics of Study Participants (n=100)

Variable	Frequency (%) / Mean $\pm$ SD
Age (years)	41.8 ± 12.4
Male	42 (42%)
Female	58 (58%)
Duration of Asthma (years)	6.3 ± 3.1
Smokers	19 (19%)
Non-Smokers	81 (81%)

Table 1 shows the demographic and baseline clinical characteristics of adult patients with bronchial asthma included in the study.

Table 2: Frequency of Chronic Rhinosinusitis Among Asthma Patients

CRS Status	Frequency (n)	Percentage (%)
Present	46	46%
Absent	54	54%
Total	100	100%

Table 2 demonstrates the prevalence of chronic rhinosinusitis among adult patients diagnosed with bronchial asthma.

Table 3: Association Between Chronic Rhinosinusitis and Asthma Severity

Asthma Severity	CRS Present n (%)	CRS Absent n (%)	p-value
Mild Asthma	14 (30.4%)	33 (61.1%)	0.003
Moderate-to-Severe Asthma	32 (69.6%)	21 (38.9%)	
Total	46 (100%)	54 (100%)	

Table 3 illustrates the association between chronic rhinosinusitis and severity of bronchial asthma. Moderate-to-severe asthma was significantly more frequent among patients with CRS.

Table 4: Comparison of Clinical Outcomes Between CRS and Non-CRS Groups

Clinical Variable	CRS Present (Mean $\pm$ SD / n%)	CRS Absent (Mean $\pm$ SD / n%)	p-value
Asthma Symptom Score	7.2 ± 1.8	5.4 ± 1.5	0.001
Hospital Admissions	21 (45.7%)	11 (20.4%)	0.007
Asthma Exacerbations/Year	3.1 ± 1.2	1.9 ± 0.8	0.002

Table 4 compares asthma-related clinical outcomes between patients with and without chronic rhinosinusitis, demonstrating poorer asthma control among CRS patients.

DISCUSSION

The present study showed that there was a significant correlation between chronic rhinosinusitis (CRS) and the severity of bronchial asthma within adult patients. The patients with CRS demonstrated increased asthma symptom scores, exacerbations, and hospital admissions compared to patients without CRS. The results indicate that the idea of united airway disease, which refers to a close relationship between inflammatory disorders of the upper and lower respiratory tract, is supported [9,10]. The number of asthma patients with CRS in this current study was 46%, concordant with the results of recent international studies. An investigation by Smith et al. [11] showed the prevalence of CRS in almost 40% of adult asthma cases, and that those with CRS had worse asthma control. Wang et al. also reported that CRS is a risk factor for severe asthma exacerbation and a decrease in pulmonary function. The similar prevalence rates seen in our study further support the notion that CRS often coexists with asthma and can affect asthma severity [12]. In our results, patients with CRS suffered significantly more often from moderate to severe asthma (69.6%) than did non-CRS patients (38.9%). The same results were obtained by Al Obaidi et al. [13], who reported significantly higher asthma severity scores and higher requirement of corticosteroid therapy among patients with CRS. Moreover, Cho et al. showed that there was a correlation between uncontrolled asthma symptoms and impaired quality of life in a multicenter study of persistent sinonasal inflammation. The similarities suggest that CRS could be a worsening factor of asthma progression through common inflammatory pathways [14]. The mean asthma symptom score was significantly higher in our CRS group than in the non-CRS group. This is corroborated by Khan et al. who found that asthma patients with CRS had poorer symptom control and more nocturnal attacks. Similarly, Martins et al. demonstrated that CRS leads to airway hyperresponsiveness and chronic lower airway inflammation, leading to persisting respiratory symptoms. The higher symptom burden of our study population could be due to delayed diagnosis and suboptimal treatment for sinonasal disease [15,16]. In our study, patients with CRS had more hospital admissions related to the exacerbation of asthma. The findings were congruent with those of Lee et al. who showed that CRs led to greater emergency department use and admission rates among asthma patients. A recent study by Ahmed et al. concluded that uncontrolled CRS was a factor that was independently associated with recurrent asthma exacerbations and extended hospital stay. The results indicate that, untreated, upper airway inflammation can play a significant role in asthma morbidity and health care costs [17,18].

Pathophysiological link between CRS and asthma may be through the effect of eosinophilic inflammation, cytokine release, and immunoglobulin E-mediated response, and systemic inflammatory mediators. Recent evidence suggests that inflammatory mediators from sinonasal mucosa can directly influence lower airway tissues and exacerbate lower airway inflammation. Additionally, nasal congestion and postnasal drip can further exacerbate irritation to the lower respiratory tract and asthma symptoms [19,20]. The study of the present study highlights the need for prompt diagnosis and full treatment of CRS in asthma. Improved asthma control with fewer exacerbations may be achieved through an integrated care approach with both otolaryngologists and pulmonologists. Hassan et al. recently showed that medical management of CRS combined with asthma was effective in reducing respiratory symptoms and the quality of life of patients in the long term [21,22]. Although the results found are significant, there are still limitations to this study, such as the fact that it was conducted in a single center, the study sample was relatively small, and the study period was short. To further clarify the causal relationship between CRS and the degree of bronchial asthma, larger multicenter studies with long-term follow-up are suggested [23].

Limitations

One of the limitations of this study was that it was conducted in a single center, the sample size was small, and the study period was short, which might limit the applicability of the results. In addition, there was no long-term follow-up, and no objective inflammatory markers were measured. More large, multicenter, prospective studies are recommended to confirm the causal relationship between chronic rhinosinusitis and asthma severity.

CONCLUSION

Chronic rhinosinusitis was significantly related to the severity of bronchial asthma in adults. Patients with CRS had worse asthma control, increased asthma symptom burden, and increased exacerbation rates. Early diagnosis and multi-disciplinary treatment of CRS may result in better asthma outcomes, fewer hospitalizations, and better overall patient quality of life.

Disclaimer: Nil

Conflict of Interest: Nil

Funding Disclosure: Nil.

REFERENCE

1. De Prado Gomez PharmD MSc L, Khan Mobbs Mph AH, Peters Md AT, Bachert Md PhD C,

- Wagenmann Md M, Heffler Md PhD E, Hopkins MBBCh C, Hellings Md PhD PW, Zhang PhD M, Xing PhD J, Rowe Md P, Jacob-Nara Md Mph DSc JA. Efficacy and Safety of Dupilumab Versus Omalizumab in Chronic Rhinosinusitis with Nasal Polyps and Asthma: EVEREST Trial Design. *Am J Rhino Allergy*. 2022 Nov;36(6):788-795. doi: 10.1177/19458924221112211.
2. Gevaert P, Olachi TA, Corren J, Mulloy J, Han J, Lee SE, Kaufman D, Ligueros-Saylan M, Howard M, Zhu R, Owen R, Wong K, Islam L, Bachert C. Efficacy and safety of omalizumab in nasal polyposis: 2 randomized phase 3 trials. *J Allergy Clin Immunol*. 2020 Sep;146(3):595-605. doi: 10.1016/j.jaci.2020.05.032.
3. Chong LY, Piromchai P, Sharp S, Sneddon's K, Webster KE, Philpott C, Hopkins C, Burton MJ. Biologics for chronic rhinosinusitis. *Cochrane Database Syst Rev*. 2021 Mar 12;3(3):CD013513. doi: 10.1002/14651858.CD013513.
4. Visca D, Begue B, Fabbri LM, Papi A, Spaniels A. Management of chronic refractory cough in adults. *Eury J Intern Med*. 2020 Nov; 81:15-21. doi: 10.1016/j.ejim.2020.09.008.
5. Mulloy J, Bachert C, Amin N, Desrosiers M, Hellings PW, Han JK, Jankowski R, Vodicka J, Gevaert P, Alizadeh N, Khan AH, Kamat S, Patel N, Graham NMH, Ruddy M, Staudinger H, Mannen LP. Olfactory Outcomes with Dupilumab in Chronic Rhinosinusitis with Nasal Polyps. *J Allergy Clin Immunol Pract*. 2022 Apr;10(4):1086-1095.e5. doi: 10.1016/j.jaip.2021.09.037.
6. Neagu N, Diezani C, Avallone G, Dell 'Aquila C, Morariu SH, Alauda I, Conforti C. Dupilumab ocular side effects in patients with atopic dermatitis: a systematic review. *J Eury Acad Dermatol Venereal*. 2022 Jun;36(6):820-835. doi: 10.1111/jdv.17981.
7. Phillips KM, Hoehle LP, Bergmark RW, Campbell AP, Caradonna DS, Gray ST, Sedaghat AR. Chronic rhinosinusitis severity is associated with need for asthma-related systemic corticosteroids. *Rhinology*. 2017 Sep 1;55(3):211-217. doi: 10.4193/Rhin17.029.
8. Majima S, Kawahara K, Nishio T, Nishio N, Teranishi M, Iwano S, Hirakawa A, Hashimoto N, Sone M, Hasegawa Y. Bronchial wall thickening is associated with severity of chronic rhinosinusitis. *Respir Med*. 2020 Aug-Sep; 170:106024. doi: 10.1016/j.rmed.2020.106024.
9. Sneddon's K, Sacks R, Harvey RJ. Osteitis in Chronic Rhinosinusitis. *Curr Allergy Asthma Rep*. 2019 Mar 14;19(5):24. doi: 10.1007/s11882-019-0855-5.
10. Phillips KM, Hoehle LP, Caradonna DS, Gray ST, Sedaghat AR. Association of severity of chronic rhinosinusitis with degree of comorbid asthma control. *Ann Allergy Asthma Immunol*. 2016 Dec;117(6):651-654. doi: 10.1016/j.anai.2016.09.439.
11. Kariyawasam HH, Gane SB. Allergen-induced asthma, chronic rhinosinusitis and transforming growth factor- β superfamily signaling: mechanisms and functional consequences. *Expert Rev Clin Immunol*. 2019 Nov;15(11):1155-1170. doi: 10.1080/1744666X.2020.1672538.
12. Zeleny K, Matoušek P, Formánek M, Urban O, Kominek P. Patients with chronic rhinosinusitis and simultaneous bronchial asthma suffer from significant extraesophageal reflux. *Int Forum Allergy Rhino*. 2015 Oct;5(10):944-9. doi: 10.1002/alr.21560.
13. Lee TJ, Fu CH, Wang CH, Huang CC, Huang CC, Chang PH, Chen YW, Wu CC, Wu CL, Kuo HP. Impact of chronic rhinosinusitis on severe asthma patients. *PloS One*. 2017 Feb 15;12(2): e0171047. doi: 10.1371/journal.pone.0171047.
14. Jang DW, Lee HJ, Huang RJ, Cheng J, Abi Hachem R, Scales CD. Healthcare Resource Utilization for Chronic Rhinosinusitis in Older Adults. *Healthcare (Basel)*. 2021 Jun 25;9(7):796. doi: 10.3390/healthcare9070796.
15. Banoub RG, Phillips KM, Hoehle LP, Caradonna DS, Gray ST, Sedaghat AR. Relationship between chronic rhinosinusitis exacerbation frequency and asthma control. *Laryngoscope*. 2018 May;128(5):1033-1038. doi: 10.1002/lary.26901.
16. Chong LY, Piromchai P, Sharp S, Sneddon's K, Philpott C, Hopkins C, Burton MJ. Biologics for chronic rhinosinusitis. *Cochrane Database Syst Rev*. 2020 Feb 27;2(2):CD013513. doi: 10.1002/14651858.CD013513.
17. Huang CC, Wang CH, Fu CH, Huang CC, Chang PH, Chen IW, Lee TJ. The link between chronic rhinosinusitis and asthma: A questionnaire-based study. *Medicine (Baltimore)*. 2016 Aug;95(31): e4294. doi: 10.1097/MD.0000000000004294.
18. Li C, Zhang B, Yan M, Li Y, Chen J, Nie Z, Guo Y, Shi J, Chen F. Cluster analysis of patients with chronic rhinosinusitis and asthma after endoscopic sinus surgery. *Ann Allergy Asthma Immunol*. 2023 Mar;130(3):325-332.e7. doi: 10.1016/j.anai.2022.11.013.
19. Ichinose M, Sugiura H, Nagase H, Yamaguchi M, Inoue H, Sagara H, Tamaki J, Toha Y, Munakata M, Yamauchi K, Ohta K; Japanese Society of Allergology. Japanese guidelines for adult asthma 2017. *Allegro Int*. 2017 Apr;66(2):163-189. doi: 10.1016/j.alit.2016.12.005.
20. Kim DY, Cho SH, Takabayashi T, Schleimer

- RP. Chronic Rhinosinusitis and the Coagulation System. *Allergy Asthma Immunol Res*. 2015 Sep;7(5):421-30. doi: 10.4168/aair.2015.7.5.421.
21. Kobayashi Y, Kanda A, Yun Y, Dan Van B, Suzuki K, Sawada S, Asako M, Iwai H. Reduced Local Response to Corticosteroids in Eosinophilic Chronic Rhinosinusitis with Asthma. *Biomolecules*. 2020 Feb 18;10(2):326. doi: 10.3390/biom10020326.
22. Anfuso A, Ramadan H, Terrell A, Demir Dag Y, Walton C, Sooner DP, Pedemonte G. Sinus and adenoid inflammation in children with chronic rhinosinusitis and asthma. *Ann Allergy Asthma Immunol*. 2015 Feb;114(2):103-10. doi: 10.1016/j.anai.2014.10.024.
23. Bidder T, Sahota J, Rennie C, Lund VJ, Robinson DS, Kariyawasam HH. Omalizumab treats chronic rhinosinusitis with nasal polyps and asthma together-a real-life study. *Rhinology*. 2018 Mar 1;56(1):42-45. doi: 10.4193/Rhino17.139