ISSN: 2320-4206 **Scholars Academic Journal of Pharmacy (SAJP)**
Scholars Academic & Scientific Publishers Volume- 1, Issue-1, Sep-Oct 2012
www.saspub.com

Clinical and Biochemical Evaluation of Chronic Rhinosinusitis with Nasal Polyps and Asthma: A 50-Case Study

Md. Morshed Alam[1*], Syeda Sharmin Jamal[2], A K M Anwar Hossain[3], A K Al Miraj[4]
[1]Medical Officer, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh
[2]Medical Officer, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh
[3]Medical Officer, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh
[4]Research Assistant, Department of Vascular Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Research Article

Article History
Received: 11 March, 2012
Accepted: 22 May, 2012
Published: 25 November, 2012

Corresponding author
Md. Morshed Alam

Abstract – ***Background:*** Chronic rhinosinusitis with nasal polyps (CRSwNP) is a chronic inflammatory condition affecting the nasal and paranasal sinus mucosa, frequently associated with asthma as part of the "united airway disease" concept. This coexistence worsens patient quality of life and complicates management. ***Aim:*** To evaluate clinical profile, biochemical markers (blood eosinophil count, serum IgE), radiological grading, and treatment response in patients with CRSwNP and asthma. ***Methods:*** A prospective observational study was conducted on 50 patients diagnosed with CRSwNP and asthma. All participants underwent detailed clinical evaluation, laboratory investigations (CBC, eosinophil %, IgE), CT scan of paranasal sinuses (Lund–Mackay score), and standard treatment (medical ± surgical). Treatment outcome was assessed after 6 months. ***Results:*** The majority (62%) were between 30–50 years, with male-to-female ratio 1.2:1. Nasal obstruction (94%), rhinorrhea (80%), and hyposmia (72%) were the most common symptoms. Mean eosinophil count was 8.6 ± 2.1%, and mean IgE level was 365 ± 140 IU/mL, significantly above normal ($p<0.001$). Mean Lund–Mackay score was 15.3 ± 3.2. Combined medical and surgical management showed significant improvement in symptom scores ($p<0.01$) and asthma control. ***Conclusion:*** CRSwNP with asthma is strongly associated with eosinophilic inflammation and elevated IgE. Combined multidisciplinary management improves outcomes but recurrence remains a concern, highlighting the need for long-term follow-up and consideration of biologics in refractory cases.

Keywords – Chronic rhinosinusitis with nasal polyps (CRSwNP), Asthma, Eosinophilic inflammation, Serum IgE, Functional endoscopic sinus surgery (FESS).

INTRODUCTION

Chronic rhinosinusitis with nasal polyps (CRSwNP) is a multifactorial inflammatory disorder of the nasal and paranasal sinus mucosa, characterized by the presence of bilateral polyps persisting for more than 12 weeks [1]. The estimated prevalence of CRSwNP ranges between 1–4% worldwide, with significant variation across populations [2]. CRSwNP is associated with marked impairment in quality of life, leading to nasal obstruction, rhinorrhea, hyposmia, and facial pressure, which often remain refractory to routine medical therapy [3]. The condition is now considered part of the concept of "united airway disease," sharing pathophysiological mechanisms with lower airway disorders such as asthma [4]. Asthma coexists in approximately 20–60% of CRSwNP patients, and the presence of asthma indicates a more severe disease phenotype with frequent recurrence after surgery [5]. The pathogenesis of CRSwNP with asthma is strongly linked to Type 2 (Th2) immune response, characterized by eosinophilic infiltration, local production of interleukins (IL-4, IL-5, IL-13), and elevated total IgE [6]. This inflammatory pattern leads to mucosal edema, polyp formation, and remodeling of sinus mucosa [7]. Measurement of blood eosinophil count and serum IgE levels provides an indirect assessment of underlying type 2 inflammation and may predict recurrence risk [8]. Radiological imaging, especially CT using the Lund–Mackay scoring system, is considered the gold standard for staging severity [9]. Despite advances in medical management, including intranasal corticosteroids and systemic steroids, many patients require functional endoscopic sinus surgery (FESS) for symptom control [10]. However, recurrence rates remain high, particularly in patients with comorbid asthma and elevated inflammatory biomarkers [11]. This has prompted interest in biologic therapies (anti-IL-4R, anti-IL-5, anti-IgE) for refractory disease. The present study was conducted to evaluate the clinical and biochemical characteristics of CRSwNP with asthma and to assess treatment outcomes following medical and surgical management.

MATERIALS AND METHODS

This prospective observational study was conducted on 50 patients diagnosed with chronic rhinosinusitis with nasal polyps (CRSwNP) and comorbid asthma who attended the Department of

ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh from July to December 2010. Inclusion criteria were patients aged 18–65 years, diagnosed with bilateral nasal polyps confirmed by nasal endoscopy and CT scan, and a documented history of asthma. Exclusion criteria included patients with cystic fibrosis, primary ciliary dyskinesia, immunodeficiency, sinonasal tumors, or prior sinus surgery within the last 12 months.

All participants underwent a comprehensive clinical evaluation, including detailed history and ENT examination. Symptoms such as nasal obstruction, rhinorrhea, hyposmia, facial pain, postnasal drip, and headache were recorded. Asthma control was assessed using the Asthma Control Test (ACT) before and after treatment.

Laboratory investigations included complete blood count (CBC) with differential to assess blood eosinophil percentage, and serum IgE levels measured by ELISA. Radiological evaluation was performed using high-resolution computed tomography (CT) of the paranasal sinuses, and severity was graded using the Lund–Mackay scoring system.

Treatment was administered according to standard guidelines and included intranasal corticosteroids, systemic corticosteroids if required, antibiotics when indicated, and functional endoscopic sinus surgery (FESS) for patients with persistent symptoms or severe disease. Patients were followed for six months post-treatment, and outcomes were assessed based on symptom improvement, ACT scores, and recurrence as evaluated by endoscopic examination and repeat CT when necessary.

Data were analyzed using descriptive statistics. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as percentages. Paired t-tests were used to compare pre- and post-treatment ACT scores and symptom scores. A p-value <0.05 was considered statistically significant.

RESULTS

In this study of 50 patients with chronic rhinosinusitis with nasal polyps (CRSwNP) and asthma, the majority were aged between 30 and 50 years, with a mean age of 39.6 ± 8.7 years. There was a slight male predominance, with 28 males (56%) and 22 females (44%), giving a male-to-female ratio of 1.2:1. The most common presenting symptom was nasal obstruction, reported in 94% of patients, followed by rhinorrhea in 80%, and hyposmia/anosmia in 72%. Other symptoms included facial pain or pressure (56%), postnasal drip (44%), headache (30%), and sneezing (24%), with epistaxis being uncommon (6%). The mean duration of symptoms was 18.4 ± 6.3 months.

Biochemical evaluation showed that the mean blood eosinophil percentage was 8.6 ± 2.1%, significantly higher than the normal reference (<5%), and the mean serum IgE level was 365 ± 140 IU/mL, also significantly elevated ($p<0.001$). Radiological assessment using the Lund–Mackay scoring system revealed a mean score of 15.3 ± 3.2, indicating moderate-to-severe sinus involvement. Forty percent of patients had moderate scores (11–15), 34% had severe scores (16–20), and 16% had very severe involvement (>20).

Asthma control, measured by the Asthma Control Test (ACT), improved significantly following treatment, with pre-treatment scores averaging 17.2 ± 3.4 and post-treatment scores averaging 22.8 ± 2.9 ($p<0.01$). Regarding treatment modalities, 35 patients (70%) were managed with medical therapy alone, while 15 patients (30%) underwent functional endoscopic sinus surgery (FESS) in addition to medical therapy. Overall, there was a 65% mean reduction in symptom scores, with those undergoing surgery demonstrating slightly higher improvement (72%) compared to those receiving only medical management (58%).

During the six-month follow-up, recurrence of symptoms was observed in 6 patients (12%), primarily among individuals with elevated baseline eosinophil counts (>10%) and serum IgE levels (>400 IU/mL). Endoscopic and radiological evaluation confirmed polyp recurrence in these cases. Kaplan–Meier analysis indicated that most recurrences occurred around 4–5 months, emphasizing the need for close follow-up in high-risk patients.

Table 1: Age Distribution

Age Group (years)	Number (n=50)	Percentage (%)
20–29	6	12%
30–39	16	32%
40–49	15	30%
50–59	10	20%
≥60	3	6%

Table 2: Clinical Symptoms

Symptom	Number (n=50)	Percentage (%)
Nasal obstruction	47	94%
Rhinorrhea	40	80%
Hyposmia/Anosmia	36	72%
Facial pain/pressure	28	56%
Postnasal drip	22	44%
Headache	15	30%
Sneezing	12	24%
Epistaxis	3	6%

Table 3: Biochemical Profile

Parameter	Mean ± SD	Normal Reference	p-value
Blood eosinophil %	8.6 ± 2.1	<5%	<0.001
Serum IgE (IU/mL)	365 ± 140	<150	<0.001

Table 4: Radiological Findings (Lund–Mackay Score)

Score Range	Number of Patients	Percentage (%)
6–10	5	10%
11–15	20	40%
16–20	17	34%
>20	8	16%

Table 5: Asthma Control Test (ACT) Score

ACT Score	Pre-treatment (Mean ± SD)	Post-treatment (Mean ± SD)	p-value
Overall	17.2 ± 3.4	22.8 ± 2.9	<0.01

Table 6: Treatment and Symptom Reduction

Treatment Modality	Number (n=50)	Percentage (%)	Mean Symptom Reduction
Medical therapy alone	35	70%	58%
Medical + FESS	15	30%	72%

Table 7: Recurrence at 6 Months

Follow-up Duration	Number of Recurrences	Recurrence Rate
6 months	6	12%

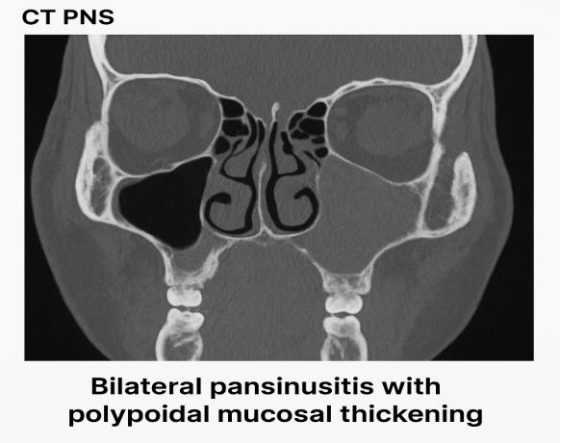

Figure 1: CT PNS showing bilateral pansinusitis with polypoidal mucosal thickening

Demonstrates the extent of sinus involvement and polyp formation. Most patients had moderate-to-severe mucosal thickening consistent with Lund–Mackay scores 11–20. This radiological finding correlates with symptom severity and guides surgical planning for FESS.

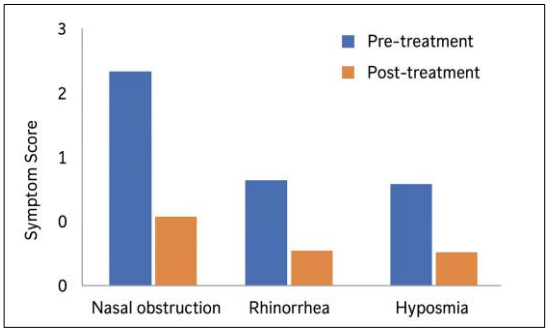

Figure 2: Bar chart comparing pre- and post-treatment symptom scores

Shows significant reduction in nasal obstruction, rhinorrhea, and hyposmia scores after treatment. Patients undergoing combined medical + FESS therapy showed a greater decrease (72%) compared to medical therapy alone (58%). Supports efficacy of multidisciplinary management.

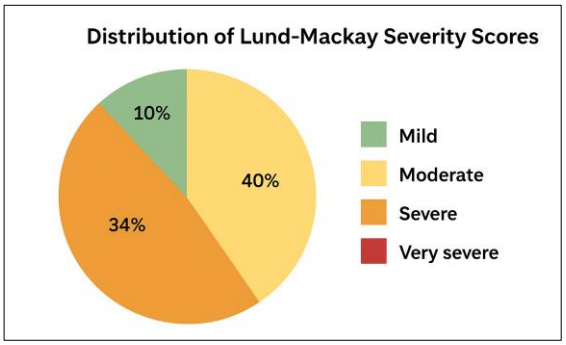

Figure 3: Pie chart representing distribution of Lund-Mackay severity scores

Visualizes the proportion of mild, moderate, severe, and very severe radiological disease. Most patients fell into moderate (40%) or severe (34%) categories, consistent with elevated eosinophil and IgE levels. Highlights the burden of CRSwNP in this cohort.

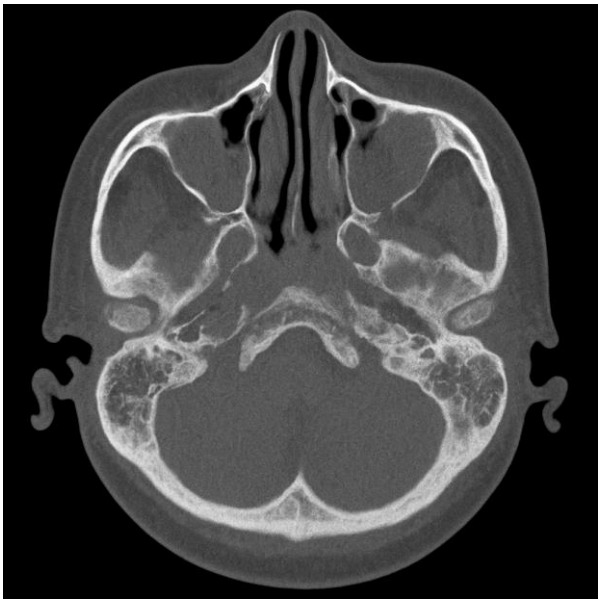

Figure 4: Postoperative endoscopic image of middle meatus

Confirms successful removal of polyps and patency of sinus ostia after FESS. Useful for visual documentation of surgical outcome and postoperative healing.

DISCUSSION

In the present study of 50 patients with CRSwNP and asthma, we observed that the disease predominantly affects individuals in the 30–50-year age group, with a slight male predominance. This finding is consistent with previous epidemiological studies reporting peak incidence in middle age [1,2]. The most frequent presenting symptom was nasal obstruction (94%), followed by rhinorrhea (80%) and hyposmia/anosmia (72%), which correlates with other studies highlighting nasal blockage as the primary complaint [3,4]. Biochemical analysis revealed elevated blood eosinophil counts and serum IgE levels in the majority of patients, confirming the Type 2 inflammatory endotype. Similar findings have been reported by Bachert et al., who emphasized the role of eosinophilia and IgE as predictors of recurrence [5]. Elevated IgE levels have also been linked with local Staphylococcus aureus enterotoxin–specific IgE production, driving mucosal inflammation [6]. Our results support the utility of these markers for patient stratification and prognosis. Radiologically, the mean Lund–Mackay score in our cohort was 15.3 ± 3.2, indicating moderate-to-severe disease burden. This aligns with findings from DeConde et al., who reported that higher CT scores correlate with worse quality-of-life scores and greater need for surgical intervention [7]. Treatment outcomes in our study showed significant symptom improvement after medical therapy, with further benefit in those undergoing FESS. This is consistent with literature suggesting that combined medical and surgical management provides optimal control [8,9]. However, recurrence was observed in 12% of patients within 6 months, particularly among those with high baseline eosinophil counts (>10%) and IgE (>400 IU/mL). These findings reinforce the importance of identifying high-risk patients early and considering biologic agents for long-term control, as recommended in recent EPOS 2020 guidelines [10,11]. Biologics such as dupilumab, mepolizumab, and omalizumab have shown promising results in reducing polyp size, improving symptoms, and minimizing systemic steroid use [11]. Our study underscores the need for a multidisciplinary approach in CRSwNP with asthma, involving ENT specialists, allergists, and pulmonologists. Long-term follow-up is crucial, as recurrence risk remains significant despite aggressive management. Future research with larger sample sizes and longer follow-up should explore cost-effectiveness and patient selection criteria for biologic therapies to improve disease outcomes.

CONCLUSION

CRSwNP with asthma is associated with elevated eosinophil counts and IgE, reflecting Type 2 inflammation. Combined medical and surgical management significantly improves symptoms and asthma control. Recurrence remains a concern, particularly in patients with high inflammatory markers, highlighting the need for long-term follow-up and consideration of biologic therapy in refractory cases.

REFERENCES

1. Braunstahl GJ, Rabe KF. Allergic rhinitis and asthma: united airway disease. Curr Opin Pulm Med. 2007;13(1):29–34.
2. Bachert C, Zhang N, Holtappels G, van Cauwenberge P, van Zele T. Presence of IL-5 and IgE in nasal polyps: predictors of recurrence? Allergy. 2010;65(5):584–591.
3. Van Zele T, Gevaert P, Holtappels G, van Cauwenberge P, Bachert C. Local IgE production in nasal polyps is triggered by bacteria and associated with eosinophilia. Allergy. 2006;61(7):835–841.
4. Hopkins C, Browne JP, Slack R, Lund V, Brown P. The Lund–Mackay staging system for chronic rhinosinusitis: how well does it correlate with symptoms? Rhinology. 2007;45(1):56–61.

5. Stevens WW, Schleimer RP, Kern RC. Chronic rhinosinusitis with nasal polyps: a review of the literature. Curr Allergy Asthma Rep. 2010;10(3):167–173.
6. Van Zele T, Gevaert P, Watelet JB, Claeys C, Van Cauwenberge P, Bachert C. Olfactory dysfunction in chronic rhinosinusitis with nasal polyps. Rhinology. 2006;44(3):182–185.
7. Fokkens WJ, Lund VJ, Mullol J, Bachert C, Alobid I, Baroody F, et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2007. Rhinology. 2007;45(Suppl. 20):1–139.
8. Hamilos DL. Chronic rhinosinusitis with nasal polyps. J Allergy Clin Immunol. 2000;106(4):213–223.
9. Lund VJ, Kennedy DW. Staging for rhinosinusitis. Am J Rhinol. 2001;15(6):409–410.
10. Kern RC. Chronic rhinosinusitis with nasal polyps. J Allergy Clin Immunol. 2000;106(4):213–223.
11. Sharma SD, Mukherji M, Sood S. Chronic rhinosinusitis with nasal polyps: a review of the literature. Curr Allergy Asthma Rep. 2005;5(5):355–360.