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Original Article

Impact of comorbid Chronic Rhinosinusitis with Nasal Polyp (CRS wNP) on Asthma Severity in a Specialized Clinical Setting

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Abstract

Background: Chronic rhinosinusitiswith nasal polyps (CRSwNP) and asthma are common comorbid conditions affecting upper and lower airways. Their coexistence is associated with increased morbidity rates and a synergistic risk of exacerbation, leadingto a substantial clinical burden. Aunified airway approach is often recommended, emphasize coordinatedmanagement rather treating each condition separately. This study aimed to evaluate the clinical, biochemical and radiological correlations, between CRSwNPseverity andthe level of asthma control, as well as treatment outcomes.

Methods: This retrospective observational study was conducted in the department of otolaryngology at Bangladesh Medical University (BMU) over a period of three years. A total 130 participants were included. All participants underwentdetailed clinicalevaluation andlaboratory investigation including Completeblood count (CBC), eosinophil countand serum IgE level. Radiological severity was assessed using computed tomography (CT) of the paranasal sinusesapplying Lund- Mackay Scoring System. Patients received either medical therapy alone or a combination of medical and surgical intervention. Outcomes wereevaluated after 6- month follow- up period.

Results: The study population (n=130) ranged in age from 25 years to 70 years with a median age of 47.5 years. The male to female ratio was 1.8:1. The mostcommon symptoms were nasal obstruction (84%). Rhinorrhea(78%) and hyposmia(68%). Biochemical markers were significantly elevated($p<0.001$) with a mean eosinophil count of 9.3+4.2 and a mean IgE level of 485+130IU/ml. The mean Lund-Mackay score was 15.7+ 2.2. The Asthma Control Test (ACT) scores showed astatisticallysignificant improvement after treatment ($p<0.001$) Combined medical and surgical management resulted in a greater improvement (72%) improvement compared to medical therapy alone(58%). Symptom recurrence was observed in 11(8.5%) patients during the 6- month follow-up.

Conclusion: Comprehensive and integrated management of CRSwNP patients and coexisting asthma is crucial for achieving optimal clinical outcomes. A combined therapeuticapproachsignificantly improves symptom control enhances quality of life and reduces overalldisease burden.

Key Words: CRSwNP, Asthma, Unified Airway, Lund-Mackay Score.

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Introduction

Scientific research across epidemiological, clinical and pathophysiological domains indicatesa robust connection between chronic rhinosinusitis with nasal polyps (CRSwNP) and asthma[1,2]. Data shows that inflammation within nasal mucosa is in extricablylinked to lower airway

health. Specifically, a significant correlation(p<.01) exists between the inflammatory profiles found in bronchial and nasal biopsies of CRSwNP patients[3]. This evidence reinforces the"united airways" theory, ehichposits that the respiratory tract functions as a single integrated system[4-7]. The relationship between sinonasal issues and lower airway dysfunction is particularly evidentin cases of severe asthma. Studies utilizing CT scans have demonstrated that degree of mucosal thickening in the sinuses correlates positively with markers of systemic airway inflammation, such as elevated eosinophillevels in peripheral blood or bronchial sputum and increased nitric oxide concentrations in exhaled breath[8]. Clinical observations suggest that when nasal polyposis is present asthma becomes significantly harder to regulate, leading to more extensive eosinophilic inflammation and persistent airway obstruction[2]. So, the aim of this study was to investigate the clinical, biochemical and radiological correlation between the severity of CRSwNP and the level of asthma control, in order to evaluating treatment outcomes.

Methods and Materials:

This retrospective observational study was conducted inthe department of otolaryngology at Bangladesh Medical University(BMU). The study was carried out over a three-year period, from January 2020 to December 2022.

A total of 130 patients diagnosed with chronic rhinosinusitis with nasal polyps (CRSwNP) and coexisting asthma were included in the study. Patients were selected based on clinical, endoscopic and computed tomography (CT) imaging of the paranasal sinuses. Asthma diagnosis and control status were assessed using standard clinical guidelines and asthma control test (ACT). Patients with previous sinonasalmalignancy, immunedeficiency disorders, cystic fibrosis or incomplete medical record were excluded.

Relevant demographic, clinical, biochemical and radiological data were retrieved from hospital records.

Clinical features such as nasal obstruction. rhinorrhea, hyposmia, facial pain, postnasal drip and headache were documented. Laboratory investigation included eosinophil count and serum immunoglobulin E(IgE) levels.

All patients underwent computed tomography (CT) scanning of the paranasal sinuses. Disease severity was evaluated using the Lund- Mackay Scoring System.

Patients received either medical management alone or a combination medical and surgical intervention depending on disease severity and response to initial therapy. Medical treatment included intranasal corticosteroid, antihistamine and systemic therapy when indicated. Surgical management consisted of functional endoscopic sinus surgery (FESS) in selected cases. Treatment outcomes were assessed after a 6- month follow-up period. Clinical improvement was evaluated based on symptom relief and changes in ACT scores. Recurrence was defined as the reappearance of symptoms and/ or polyps during the follow-up. Recurrence was evaluated by CT scan and endoscopic examination if needed.

Data analysis was conducted using suitable statistical software. Continuous variables were summarized as mean ± standard deviation (SD), whereas categorical variables were reported as frequencies and percentages. Appropriate statistical tests were applied, and a p-value of <0.05 was considered statistically significant.

Results:

This study enrolled 130patients diagnosedwith chronic rhinosinusitiswith nasal polyps (CRSwNP) and asthma.

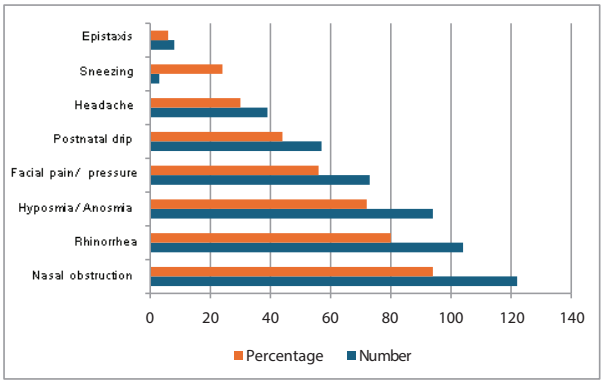
The ranged in age were 25 to 70 years with as lightly malepredominance accounting for 63.8% of the total participants.

Participants Demography (n=130)

Category	Metric	Value
Age	Range	25 -70 years
	Median	47.5
Gender	Male	83(63.8%)
	Female	47(3 6.2%)

M:F Ratio – 1.8:1.

The most prevalent presenting symptoms were nasal obstruction (84%) followed by rhinorhea(78%) and hyposmia(68%).

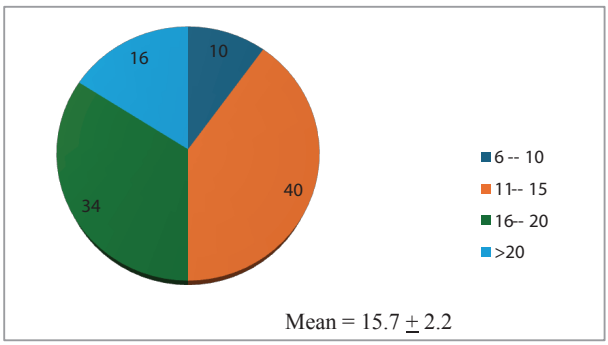


Biochemical analysisrevealed mean serum IgEleveland blood eosinophil count were significantly elevatedcompared to standard reference ranges(p<0.001).

Biochemical Profile:

Parameter	Mean± SD	Normal Reference	p- value
Serum IgE (IU/ml)	485±130IU /ml	<150	<0.001
Blood eosinophil (%)	9.3 ±4.2	<5	<0.001

Radiological evaluation via the Lund-Mackay Scoring System yielded a mean score of 15.7+ 2.2 indicating that the average patients presented with moderate to severe chronic rhinosinusitis. The largest sub group of patients (40%) fell within(11-15) score range.



Following intervention Asthma Control Test(ACT)scored demonstrated statistically significant improvement($p<0.001$).

Asthma Control Test (ACT) Score

ACT Score	Pre -treatment (mean+/ -SD)	Post -treatment (mean+/ - SD)	p-value
Overall	19.8+/ -1.2	25.3+/ -3.1	<0.001

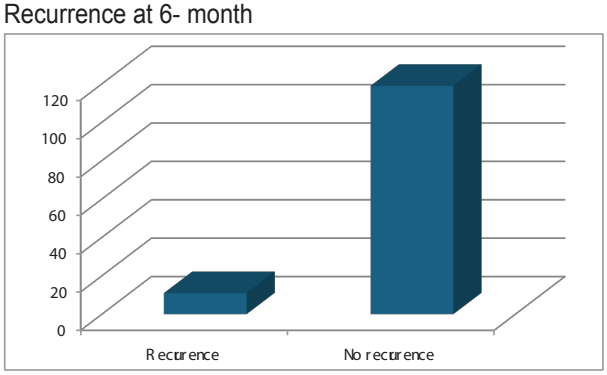
Regarding treatment modalities patients who received a combination of medical and functional endoscopic sinus surgery(FESS) experienced a high rate of symptom reduction (72%) compared to those treated with medical therapy alone(58%).

Treatment and Symptom Reduction

Treatment Modality	Number (n -130)	Percentage %	Mean Symptom Reduction
Medical therapy alone	91	70	58%
Medical+ FESS	39	30	72%

At the 6-month follow-up assessment symptomatic recurrence was observed in 11(8.5%) patients.

Recurrence at 6- month



Discussion:

Chronic rhinosinusitis (CRS) involves persistent inflammation of the nasal and paranasal sinus mucosa[9].

Two main phenotypes are widely recognized: CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP). This phenotype differs markedly in clinical presentation, inflammatory patterns and associated comorbidities[10]. CRS is typically driven by type-2 inflammation, often presents with greater severity and recurrence, and frequently coexists with conditions such as NSAID- exacerbated respiratory disease(N-ERD) and asthma[11].

In the present study, patients showed a slight male predominance (63.8%) with a median age at diagnosis of 47.5 years. These demographic features align closely with findings reported by Salmi ST and colleagues[12].

Nasal obstruction, rhinorrhea and hyposmia were the most common presenting symptoms in our study. This pattern was consistent with observation by Banerji A and colleagues[13], who described similar clinical features. In contrast, Fokkens WJ and colleagues[14] noted anterior and posterior rhinorrhea, nasal congestion, hypodmiaand/ or facial pressure or pain asfrequent manifestation.

Alkergic mechanism commonly trigger IgE- mediated activation of mast cells and basophil, resulting in cytokine release that promotes eosinophil recruitmentandactivation[15]. Our study demonstrated statistically significant elevations in blood eosinophil count and serum IgE levels($p<0.001$)reflecting these shared inflammatory pathways. However, TorabizadehM and colleagues[16] found no direct correlation between serum IgE levels and eosinophil count, highlighting variability across population.

The Lund – Mackay(L-M) score was employed to quantify radiologicdisease severity[17]. In our patients, the mean L-M score was 15.7+ 2.2 which corresponds well with results reported by WuPU and colleagues[18].

When CRSwNP coexists with asthma the condition is termed global airway disease(GAD). Asthma control was assessed using Asthma Control Test (ACT) where score 20-25 indicates good control, 16-19 partial control and ≤ 15 poor control, often necessitation treatment adjustment[19]. Following treatment in our study, the mean ACT score reached 25+ 3.1, signifying well- controlled asthma. Most cases of chronic rhinosinusitis with nasal polyps (CRSwNP) were initially managed medically using intranasal corticosteroid, saline irrigation and antibiotics when indicated. However, polyp removal, correction of anatomical abnormalities and enhancement of sinus drainage often require sinus surgery(ESS) as a key component of surgical intervention. The selection of an

appropriate treatment approach –medical, surgical or combined should be individualized based on symptom severity, disease extent, patient preference and surgical expertise[20]. In the present study combination therapy consisting of both medical and surgical intervention yielded superior outcomes(72%) compared to medical treatment alone (58%). These findings were consistent with the results reported by Kumar P and colleagues[21].

Recurrence in CRS is broadly defined by subjective symptoms, objective findings or both. Our study recorded a recurrence rate 8. 5% (11 out of 130 patients) over a 6-month follow- up period. This rate was lower than the 18.2% reported by Cavaliere C and colleagues[22] over a longer follow-up(6-69months).

The present study had several limitations, primarily its retrospective design and relatively short follow-up duration. Additionally, we did not evaluate Keu biomarkers such as IL-5, IL-4 or IL-13, which represent important targetsfor current monoclonal antibodies therapy in type-2 inflammatory disease.

Conclusion:

Chronic rhinosinusitis with nasal polyps (CRSwNP) represents an increasingly significant health concern worldwide. The coexistence of asthma in these patients requires special clinical attention and often necessitate-sintensive management. Surgical intervention plays a crucial role in reducing the overall disease burden and improving clinical outcomes in individuals affected by CRSwNP.

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