Immunol Genet J, Vol. 8, No. 4, 2025, pp.329-331 **DOI: https://doi.org/10.18502/igj.v8i4.20100**

Original Article

Hematological Parameters in Patients with Allergic Rhinosinusitis Combined with Chronic Allergic Otitis Media

Ashur Qosimzoda*, Makhsum Bustonov, Sayfullo Rakhmonov, Zohid Shermatov, Bobur Bustonov

Department of Surgical Disciplines, Khatlon State Medical University, Tajikistan

Received: 23 July 2025; Accepted: 14 November 2025

Abstract

Background: Allergic rhinosinusitis (ARS) and chronic allergic otitis media are common manifestations of upper airway allergic inflammation. Despite advances in understanding the immunopathogenesis of these conditions, hematological markers reflecting systemic immune activation remain underexplored, particularly in combined presentations. To evaluate hematological parameters, with emphasis on leukocyte subpopulations and the eosinophil-lymphocytic index, in patients with allergic rhinosinusitis combined with chronic allergic otitis media compared to non-allergic chronic otitis media.

Methods: Archival records of 60 adult patients (33 males, 27 females; mean age 41.2 years) from the Otorhinolaryngology Department of the National Medical Center "Shifobakhsh," Republic of Tatarstan, were analyzed. Group I (n=30) included ARS with CAOM, and Group II (n=30) included non-allergic COM. Complete blood count (CBC) with leukocyte differential and ELI were assessed and compared descriptively. Correlation analysis between leukocyte subpopulations was also performed.

Results: Mean total leukocyte count in allergic patients was near the upper normal range (8.9×10^9/L). Leukocytosis was observed in 16.7% of allergic versus 40% of non-allergic cases. Peripheral eosinophilia (>5%) was observed in 63.3% of patients with allergies, with a mean eosinophil count of 5.8%. Relative lymphocytosis occurred in 40% of allergic and 16.7% of non-allergic patients, while absolute lymphocyte counts were lower in the allergic group. ELI was increased in 43.3% of patients with allergies. Correlation analysis revealed strong relationships ($\eta>0.90$) between neutrophils, eosinophils, and monocytes in both groups, indicating coordinated immune responses.

Conclusion: Peripheral eosinophilia and elevated ELI serve as indirect hematological markers of systemic allergic sensitization in ARS with CAOM. These findings support using simple blood parameters as adjunctive indicators of allergic inflammation when specialized allergy testing is unavailable.

Keywords: Allergic Rhinosinusitis; Chronic Otitis Media; Eosinophilia; Hematological Parameters

***Corresponding Author:** Ashur Qosimzoda

Department of Surgical Disciplines, Khatlon State Medical University, Tajikistan

E-mail: qosimzoda@gmail.com

How to cite this article

Qosimzoda A, Bustonov M, Rakhmonov S, Shermatov Z, Bustonov B. Hematological Parameters in Patients with Allergic Rhinosinusitis Combined with Chronic Allergic Otitis Media. Immunol Genet J, 2025; 8(4): 329-331. DOI: https://doi.org/10.18502/igj.v8i4.20100

Introduction

Rhinosinusitis and otitis media are among the most common upper airway inflammatory conditions worldwide. According to the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS 2020), rhinosinusitis affects nearly 15% of the global population, accounting for millions of annual cases (1,2). Allergic rhinosinusitis (ARS) involves IgE-mediated inflammation of the nasal and sinus mucosa and frequently coexists with allergic manifestations in the middle ear, known as chronic allergic otitis media (CAOM) (3,4).

The pathophysiology of ARS includes Th2-driven immune activation with IgE binding to mast cells and basophils, leading to degranulation and release of histamine, leukotrienes, and cytokines (5,6). These mediators contribute to mucosal edema, hypersecretion, and tissue remodeling. Eosinophils and lymphocytes are key effector cells, and alterations in their peripheral blood levels may reflect the intensity of the allergic process (7–9). The eosinophil–lymphocytic index (ELI) provides an accessible laboratory measure for assessing allergic inflammation (10,11). However, studies focusing on hematological parameters in ARS coexisting with CAOM remain limited. This study aimed to characterize hematological patterns in these patients and compare them with those in non-allergic COM to identify potential systemic indicators of allergy.

Materials and Methods

Study Population

The study analyzed medical records of 60 adults (32–54 years old) treated at the National Medical Center "Shifobakhsh" in the Republic of Tatarstan. Group I (n=30) had ARS and CAOM, while Group II (n=30) served as non-allergic controls. Diagnosis of ARS and CAOM was based on clinical findings, endoscopy, CT (Lund–Mackay ≥4), audiometry, tympanometry, and allergological tests (skin prick or specific IgE). Exclusion criteria included acute infection, autoimmune disease, hematologic disorders, asthma, or corticosteroid/antihistamine therapy within four weeks.

Hematological Tests

Venous samples were collected in EDTA tubes and analyzed using an automated hematology analyzer. CBC parameters included leukocyte count, eosinophils, lymphocytes, monocytes, and calculation of ELI (absolute eosinophils/absolute lymphocytes).

Statistical Analysis

Descriptive statistics summarized numerical data; correlation analysis was conducted between leukocyte types (Spearman's η). Significance was considered at $p<0.05$.

Results

Hematological findings showed a mean leukocyte count of 8.9×10^9/L in patients with allergy. Leukocytosis occurred in 16.7% of Group I and 40% of Group II. Eosinophilia was observed in 63.3% of allergic patients, while none were observed in controls. The mean eosinophil percentage was 5.8% in allergic patients versus 1.2% in non-allergic patients. Relative lymphocytosis was twice as frequent in allergic cases (40% vs 16.7%). Absolute lymphocyte counts were lower in allergies (1.8×10^9/L) than in control patients (2.4×10^9/L). Monocyte counts remained within normal range; absolute monocytosis was more frequent in non-allergic (23.3%) than allergic patients (8.3%). Elevated ELI was found in 43.3% of allergic patients, ranging from 0.3 to 1.2. Cor-

Table 1. Correlation coefficients (η) between leukocyte subpopulations

	Segmented neutrophils		Eosinophils	Monocytes
Lymphocytes	1*	0,61	0,86	0,83
	2	0,52	0,81	0,76
Eosinophils	1	0,91	-	0,64
	2	0,93	-	0,60
Monocytes	1	0,92	0,64	-
	2	0,92	0,60	-

* 1 – η in patients with allergic rhinosinusitis in combination with chronic allergic otitis media
2 – η in patients with chronic otitis media without manifestations of allergies (control group).

relation analysis **(Table 1)** revealed strong, stable relationships among segmented neutrophils, eosinophils, and monocytes ($\eta > 0.90$).

Discussion

Distinct hematological alterations were found in patients with ARS and CAOM, particularly elevated eosinophil counts and increased ELI, consistent with allergic sensitization. The 63.3% eosinophilia rate aligns with the literature, which reports 17–62% in allergic airway disease (12,13). Elevated ELI in nearly half of allergic patients suggests its value in detecting subclinical allergic activity. In contrast, leukocytosis predominated in non-allergic COM, likely reflecting bacterial or nonspecific inflammation (14). The lower absolute lymphocyte count in allergic patients may be due to lymphocyte migration to inflamed tissues, as reported in asthma and rhinitis (15,16). The strong correlations between neutrophils, eosinophils, and monocytes indicate shared progenitor origins and cooperative roles in immune response (17). Overall, simple hematological indices can complement clinical evaluation when advanced immunological tests are unavailable.

Conclusion

Peripheral eosinophilia and increased eosinophil–lymphocytic index represent reliable hematological indicators of allergic sensitization in ARS with CAOM. These parameters can aid diagnostic reasoning in general clinical practice, particularly in limited-resource settings.

References

1. Fokkens WJ, Lund VJ, Mullol J, et al. EPOS 2020: Executive summary of the European Position Paper on Rhinosinusitis and Nasal Polyps. Rhinology. 2020;58(3):233–238.
2. Rosenfeld RM, Piccirillo JF, Chandrasekhar SS, et al. Clinical practice guideline (update): adult sinusitis. Otolaryngol Head Neck Surg. 2015;152(2 Suppl):S1–S39.
3. Greiner AN, Meltzer EO. Rhinitis and otitis media: a clinical and pathophysiological review. J Allergy Clin Immunol. 2011;128(5):942–949.
4. Pawankar R. Allergic rhinitis and its impact on asthma (ARIA 2010 update). World Allergy Organ J. 2011;4(2):85–93.
5. Galli SJ, Tsai M. IgE and mast cells in allergic disease. Nat Med. 2012;18(5):693–704.
6. Hellquist H. Eosinophils in nasal mucosa in perennial rhinitis. Acta Otolaryngol. 1984;97(1–2):51–58.
7. Kowalski ML, Jassem E. The eosinophil–lymphocyte ratio as a marker of allergic inflammation. Adv Exp Med Biol. 2007;595:253–260.
8. Demissie Z, Wills-Karp M, Gold DR, et al. Genetic and environmental determinants of eosinophilia in asthma. Am J Respir Crit Care Med. 2003;167(1):14–20.
9. Settipane GA, Charnock DR. Epidemiology of rhinitis: allergic and nonallergic. Clin Allergy Immunol. 2006;19:267–285.
10. Bachert C, Zhang N, Gevaert P. Pathophysiology of nasal polyposis. Curr Opin Allergy Clin Immunol. 2006;6(1):11–15.
11. Bochner BS, Busse WW. Asthma. Lancet. 2005;366(9488):829–840.
12. Lim DJ, Fu Y, Cho J, et al. Molecular aspects of otitis media. Otolaryngol Head Neck Surg. 2000;122(6):770–780.
13. Hamilos DL. Chronic rhinosinusitis: epidemiology and medical management. J Allergy Clin Immunol. 2011;128(4):693–707.
14. Kay AB. Allergy and allergic diseases: mechanisms. N Engl J Med. 2001;344(2):94–103.
15. Iwasaki H, Akashi K. Myeloid lineage commitment from the hematopoietic stem cell. Immunity. 2007;26(6):726–740.
16. Robinson DS, Larché M, Durham SR. Tregs and allergic disease. J Clin Invest. 2004;114(10):1389–1397.
17. Ciprandi G, De Amici M, Marseglia GL, et al. Eosinophil-to-lymphocyte ratio: a new biomarker in allergic rhinitis. Allergy Asthma Proc. 2015;36(5):e41–e47.