

# Rhinosinusitis among the Patients with Perennial or Seasonal Allergic Rhinitis

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Allergic rhinitis (AR) and rhinosinusitis are diseases affecting millions of people all over the world. AR is a chronic disease affecting 15-30% of the global population. Additionally, 33-42% of the population was demonstrated to have rhinosinusitis by scanning with computed tomography (CT).<sup>1</sup> An association between allergic rhinitis and rhinosinusitis has been discussed for many years. Although no hypothesis is universally accepted, most allergists and otolaryngologists recognize an association of allergy with sinus disease.<sup>2</sup> AR is not the cause of rhinosinusitis in these patients, but rather a contributing factor. The etiology of chronic rhinosinusitis is thought to be multifactorial and ranges from anatomic abnormalities to ciliary dysfunction and immune deficiency. Currently AR is thought to be the second most common cause in the development of chronic rhinosinusitis.<sup>3,4</sup> Patients with sinusitis have a higher incidence of positive allergy skin tests than the normal population.<sup>5</sup> Rhinosinusitis is more common in patients with AR than in normal subjects being mostly bilateral and

**SUMMARY** Although no hypothesis is universally accepted, allergic rhinitis (AR) may play an important role in the occurrence of rhinosinusitis. This study was carried out to investigate the frequency and severity of rhinosinusitis among patients with seasonal or perennial AR. This study included 73 patients with AR. Findings related to rhinosinusitis of these patients were demonstrated by computed tomography (CT), and were scored according to the Lund-Mackay CT scan staging system. Fifty-two of the 73 patients (71.2%) were shown to have findings of rhinosinusitis. Of these 52, twenty-four patients (77.4%) had perennial AR and 28 (66.7%) patients had seasonal AR. The mean total CT staging score of rhinosinusitis was  $4.2 \pm 3.2$  in patients with perennial AR and  $2.6 \pm 1.3$  in patients with seasonal AR. Although the frequency of rhinosinusitis among patients with perennial AR was higher than among seasonal ones, this was statistically insignificant ( $p = 0.32$ ). But CT staging scores of rhinosinusitis among the patients with perennial AR were significantly higher than among the seasonal AR group ( $p = 0.014$ ). Although there was no significant difference between the frequency of rhinosinusitis of seasonal and perennial AR, the severity of rhinosinusitis was more severe in cases with perennial AR, in this study. Early management of an allergic disease is essential if its long-term consequences are to be prevented or minimized.

multifocal in paranasal sinuses.<sup>6</sup>

The types of AR play an important role in the occurrence of rhinosinusitis. Symptoms of allergic rhinitis may occur only during specific seasons (seasonal AR), or this condition may be perennial (perennial AR).<sup>7</sup> In patients with perennial AR, the inflammatory stimulus is persistent, whereas, in patients with seasonal AR, the inflammatory stimulus occurs only during allergen challenged periods.<sup>8,9</sup> This study was carried out to investigate

the frequency and severity of rhinosinusitis among patients with seasonal or perennial AR.

## MATERIALS AND METHODS

This study included 73 patients with AR, seen at the Department of Otorhinolaryngology, Süleyman Demirel University School of Medicine, between January 2000 and

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August 2001. AR was diagnosed after a detailed medical history, physical examination, nasal endoscopy, complete blood count, nasal smears, total IgE, and epicutane prick test (Multitest<sup>®</sup>, Center Laboratories, Port Washington, NY, USA). The diagnosis of rhinosinusitis was defined by physical examination, anterior rhinoscopy, endoscopic examination, and paranasal sinus CT scans. Physical examination included inspection of any evidence of nasal blockade and thick, yellow-green nasal purulent discharge and the visible part of the mucous membrane that lines the nose or ostiomeatal complex for swelling and redness. Location of swollen or tender areas was examined by pressing on the patient's face over the sinuses. Presence of pain was accepted as a positive finding. The Lund-Mackay CT scan staging system was used to stage all CT scans. Each paranasal sinus (maxillary, frontal, sphenoid, anterior ethmoids, and posterior ethmoids) was graded as follows: 0 = no abnormality; 1 = partial opacification; and 2 = total opacification. The ostiomeatal complex was scored as follows: 0 = when there was no occlusion; and 2 when there was an occlusion. Thus, after all sinuses are staged, the total severity score possible with this system ranged from 0 to 24 for five couple of sinuses plus ostiomeatal complex (0 = normal, 1-24 = rhinosinusitis scores).<sup>10</sup>

Patients who had ear, nose or throat infection or were taking systemic antibiotics, antihistamines, oral or topical corticosteroids, or oral or nasal decongestants within two months before the study were excluded from this study. Also patients with septal deviation, chonca bullosa, and polyps were excluded

from this study. The statistical evaluations were performed using the Mann-Whitney U test and Student's t test.

## RESULTS

Among the 73 patients with AR, 31 had perennial AR and 42 had seasonal AR. There were 5 men and 26 women with the mean age of  $34.5 \pm 10.3$  years in the perennial AR group. There were 17 men and 25 women with seasonal AR and a mean age of  $30.9 \pm 9.8$  years. Mean duration of allergic complaints of patients with perennial and seasonal AR was  $2.7 \pm 1.15$  and  $6.2 \pm 5.4$  years, respectively. There was no significant difference between the ages of patients with perennial and seasonal AR ( $p = 0.14$ ). The number of female patients was higher in both groups. The onset of the diseases significantly started longer ago in the seasonal allergic rhinitic patients ( $p = 0.000$ ).

Fifty-two patients (71.2%) demonstrated positive findings of rhinosinusitis in their CT scans. After all sinuses of the patients were staged in CT scans, the total severity score with the Lund-Mackey CT scan staging system was 1 in three patients, 2 in twenty-five patients, 3 in four patients, 4 in twelve patients, 6 in six patients, 10 in one patient and 16 in one patient. Twenty-two patients (42.3%) with CT findings of rhinosinusitis had purulence on endoscopic examination and complaints of headache. Twenty-four (77.4%) patients with perennial allergic rhinitis, and 28 (66.7%) patients with seasonal allergic rhinitis were diagnosed with findings of rhinosinusitis. The mean total staging score of rhinosinusitis was  $4.2 \pm 3.2$  in patients with per-

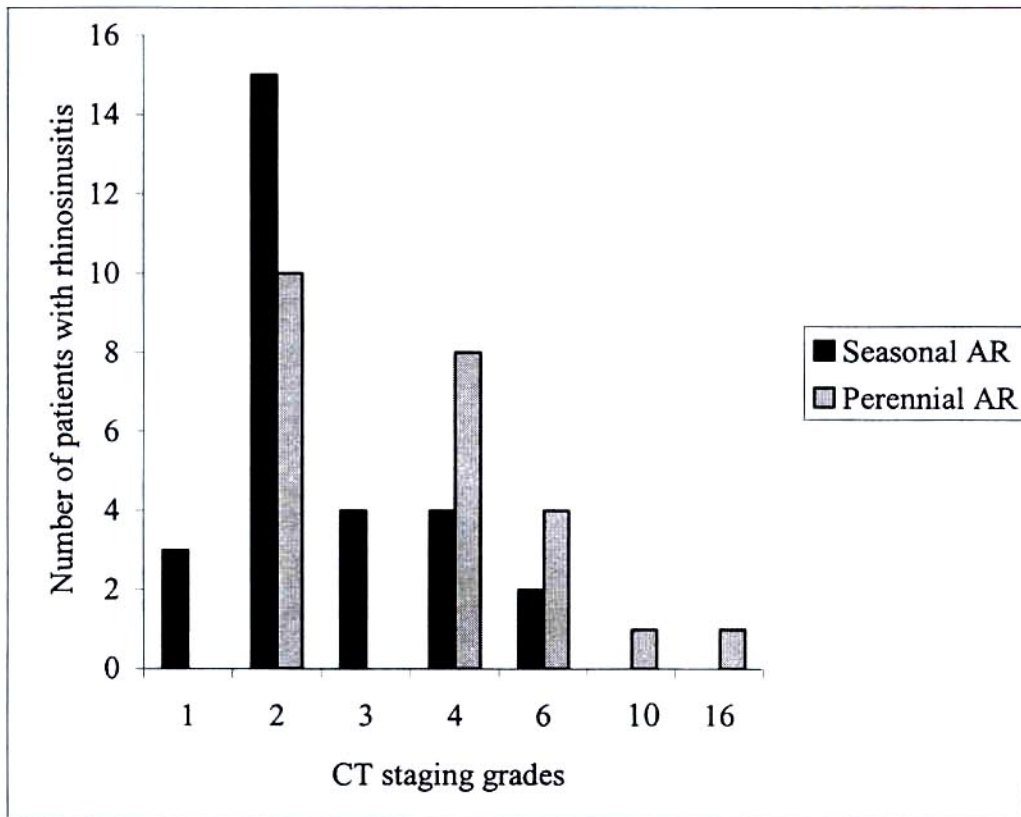
ennial AR and  $2.2 \pm 1.3$  in patients with seasonal AR. The severity distributions of rhinosinusitis in patients with perennial and seasonal AR are demonstrated in Fig. 1. Although the frequency of rhinosinusitis among patients with perennial AR was higher among seasonal ones, it was statistically insignificant ( $p = 0.32$ ). In contrast CT scan staging scores of rhinosinusitis among the patients with perennial AR were significantly higher than among seasonal allergic rhinitis group ( $p = 0.014$ ).

## DISCUSSION

Allergy may be one of the underlying factors in acute and chronic rhinosinusitis, since it alters the normal physiology of the paranasal sinuses. Allergic disease causes mucosal edema, which is believed to be the primary etiology of rhinosinusitis, and also may lead to secondary infections. An inflamed nasal mucosa and damaged functioning of the ciliary apparatus in allergic patients can block ostial drainage from the sinus and may cause stasis of secretions, with the consequent development of infection.<sup>1,6,11,12</sup> Allergic reactions cause releasing of topical mediators from paranasal sinus mucosa as well as transmission of these type products from the nasal cavity into sinuses will further contribute to the development of rhinosinusitis. Mediators and immunologic mechanisms mediated by other factors contribute to the pathogenesis of rhinosinusitis together with previously stated mechanical disorders and proliferation of classical pathogens.<sup>13,14</sup> The mediators in AR predispose individuals to viral and bacterial infection of the upper airways.<sup>1,14,15</sup> Berrettini *et al.*<sup>6</sup> evaluated CT findings and



Fig. 1 Severity distribution of rhinosinusitis of patients with allergic rhinitis.



found sinusitis in 67.5% of allergic patients, twice as much as in normal individuals. The association between allergy and sinusitis reported in various studies varies from 25 to 78%.<sup>6,16,17</sup> Therefore, the ratio (71.2%) that was found in our study by investigation of CT scans was in concordance with the literature.

The mucosa of sinuses continue with the nasal mucosa. Both sinus and nasal mucosa of patients with allergic rhinitis indicate macroscopic changes, even if no infection ensues.<sup>12,18</sup> There is an increase in the number of eosinophils and release of cytokines such as interleukin-3 and granulocyte macrophage colony stimulating factor, in

the secretion and mucosa of the paranasal sinuses of these patients. The release of mediators, into the sinuses causes tissue damage, which may result in a chronic inflammation, even if no pathogenic microorganisms exist.<sup>7,14</sup> In our study, about half of the patients (57.7%) with AR and rhinosinusitis did not demonstrate any other clinical sign of rhinosinusitis than the findings on the CT scans. These findings are probably due to immunologic reactions within the mucosa of the paranasal sinus.

Allergic reactions and related findings appear only during an allergen challenged period in patients with seasonal AR. Impairment of mucous secretion during allergen

challenge among patients with seasonal AR returns to normal when the allergen has been removed.<sup>1,12</sup> The inflammatory stimulus is persistent in patients with perennial AR.<sup>6</sup> Some studies have examined the incidence of sinusitis in allergic patients and concluded that chronic rhinosinusitis could represent a complication of perennial AR.<sup>6,9,19</sup> Other studies have indicated that allergy is an important factor in the development of rhinosinusitis without discriminating perennial and seasonal ones, and that allergic patients are more likely to demonstrate advanced disease on CT scans when compared to nonallergic patients.<sup>2,5</sup> Emanuel and Shah<sup>20</sup> reported that 84% of patients who have been operated due to resistant

chronic rhinosinusitis were confirmed having AR, which was more commonly perennial than seasonal. In our study, 77.4% of patients with perennial AR and 66.7% of patients with seasonal AR were confirmed having rhinosinusitis on CT scans.

Although there was no significant difference between the frequency of rhinosinusitis of seasonal and perennial AR in this study, the severity of rhinosinusitis was higher in cases with perennial AR. This might be due to the persistent inflammatory process in cases with perennial AR, and resulting permanent mucosal changes in the paranasal sinuses.

In conclusion, rhinosinusitis frequently occurs in patients with perennial and seasonal AR. Early management of an allergic disease is essential if its long-term consequences are to be prevented or minimized. For this reason, when treating the patients with AR, especially the perennial ones, the presence of rhinosinusitis must be determined, and should be treated.

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