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Agreement Rate of Skin Prick Test with Tissue Eosinophil Count in Patients with Nasal Polyps

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ABSTRACT

The pathogenetic mechanism of nasal polyps remains unknown, although allergy has been cited as an important factor in the etiology of nasal polyposis. Currently there is no definite histological criterion for differentiation of allergic from inflammatory nasal polyp. However, in a few studies, tissue eosinophil count has been used for this. This study aimed to find out the agreement rate of skin prick test and tissue eosinophil count in patients with nasal polyposis.

Twenty five patients (18 males, 7 females) with nasal polyp were enrolled in this study. For each patient tissue sample from polyp material was taken for histopathological investigation. Moreover, skin prick test was performed for each patient using eleven common aeroallergens.

Skin prick test was positive in 48% of the patients. Tissue eosinophil count of more than 50% was found in 75% of skin prick positive and in 69.2% of skin prick negative patients. Also tissue eosinophil count of more than 50% was found in 69.2% of patients with typical allergic symptoms as well as 75% of patients without allergic symptoms. No agreement was found between skin prick tests and tissue eosinophil counts in patients with nasal polyp. Also no difference was found between the tissue eosinophil counts in allergic and non allergic patients.

Considering these results, it can be concluded that having a high tissue eosinophil count in patients with nasal polyp does not indicate that the polyp is allergic.

Key words: Allergy; Eosinophil; Nasal Polyps; Skin Prick Test

INTRODUCTION

Nasal polyp is a chronic inflammatory disorder of the upper respiratory tract, which is often concomitant

with sinusitis, asthma and rhinitis. The etiological agent of nasal polyp is still unknown and many factors are counted for this, including infections and allergy. The role of allergy in pathogenesis of nasal polyp is controversial.¹⁻³

A clinically respiratory allergy, particularly to perennial airborne allergens might play a relevant role in the pathogenesis of nasal polyposis, probably

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through the induction of a long-lasting inflammation of the nasal mucosa.⁴ Some evidence suggest that nasal polyposis is associated more strongly with nonatopic disease than with atopic disease⁵ and others propose associated allergy to be a cause of recurrence of nasal polyposis.⁶

For screening and diagnosis of allergic patients, skin prick test which is a simple and sensitive approach can be used and a positive reaction is mainly related to the presence of allergic specific IgE. It has been reported that nasal polyps has an association with positive allergy skin test.⁷ At the present there is no definite histological criterion for differentiation of allergic from inflammatory polyp although tissue eosinophil count has been used for this purpose.

This study was conducted to find out the agreement rate of skin prick test and tissue eosinophil count using histopathological investigation and also skin-prick test in patients with nasal polyposis.

MATERIAL AND METHODS

Subjects of this study were 25 patients with nasal polyp who underwent nasal polypectomy in Khalili hospital in Shiraz, Iran. Diagnosis of nasal polyp was based on history (sneezing, nose and eye pruritus, rhinorrhea, anosmia, hyposmia, and postnasal drip), careful physical examination of nose and throat, and CT scanning of nose and paranasal sinuses. For each patient tissue sample from polyp materials were taken and stained with hematoxylin and eosin for eosinophil count. Moreover, skin prick test (Allergopharma, Germany) was performed for each patient using eleven common aeroallergens including pollens (trees, grasses and weeds), mites, and molds. Positive (histamine) and negative (glycerol) control was used for each patient and wheal larger than 3 mm and larger than histamine reaction (positive control) was considered as positive.

Patients with urticaria or dermatographism were excluded from the study. Patients were tested only if they were not taken histamine during 10 preceding days and were in good condition for breathing and common health.

Collected data were analyzed using statistical kappa and agreement rate test. As kappa measures the agreement between the evaluations of two tests when both are evaluating the same object, it was used to measure the agreement between tissue eosinophil count measurement and skin prick test or tissue eosinophil

count measurement and history of allergic symptoms. A kappa value of 1 indicates perfect agreement and zero indicates that agreement is not better than chance.

RESULTS

The study group was comprised of 25 patients (18 male and 7 female, mean ages: 45.8 years). Patients experienced sneezing, cough, pruritus, postnasal drip, and rhinorrhea. Among these, nasal obstruction and postnasal drip were the most common complaints. History of asthma was noticed in 2 (8%) and asthma was observed in 4 (16%) of the patients. Sinusitis was seen in 68% of the patients. Typical allergic symptoms such as rhinitis, sneezing, and pruritus were seen in 13 (52%) of the patients. Skin prick test was positive in 12 (48%) of the patients (Table 1) and 18 (72%) of the patients had eosinophil count of more than 50%. Typical allergic symptoms were seen in 52% of the cases (Table 2).

Eosinophil count more than 50% was found in 75% of skin positive patients and in 69.2% of skin negative patients ($\kappa=0.057$, $P=0.748$). Also eosinophil count more than 50% was found in 69.2% of patients with typical allergic symptoms as well as 75% of patients without allergic symptoms ($\kappa=0.057$, $P=0.748$) (Table 3). None of the aforementioned agreements proved to be statistically significant.

Table 1. Hypersensitivity of skin positive polyposis patients to different allergens.

Allergen	Number	Percent
Pollen (Trees)	8	66.6
Pollen (grasses)	8	66.6
Pollen (weeds)	8	66.6
Mites (Petronyssonius)	4	33.3
Mites (Farinae)	3	25
Molds	1	8.3

Table 2. Allergy related characteristics of patients with nasal polyposis.

Features	No of patients	Percent
Positive skin prick test	12	48
Tissue eosinophil count (More than 50%)	18	72
Typical allergic symptoms	13	52

Table 3. Agreement of tissue eosinophil counts with skin prick tests in polyposis patients.

Eosinophil count	Skin Prick test		Typical allergic symptoms	
	Positive	Negative	Present	Not present
Eosinophil count more than 50%	9 (75%)	9 (69.2)	9 (69.2)	9 (75%)
Eosinophil count less than 50%	3 (25%)	4 (30.8%)	4 (30.8%)	3 (25%)
Total	12 (48%)	13 (52%)	13 (52%)	12 (48%)

DISCUSSION

There are various theories regarding the pathogenesis of nasal polyp and those which mention the allergic origin of the polyp are more accepted.^{7,8} There are reports which cited allergy as an important factor in the etiology of nasal polyposis.^{1,2} It has been shown in a study conducted by Pumhirun et al.⁸ on 40 patients with nasal polyps and 30 normal subjects that allergic persons are 6 times more prone to have polyposis than normal persons.

Kirtsreesakul¹ in a study carried out on 73 patients, showed that 68.5 percent of patients with nasal polyps had a positive allergy skin test and 69.9 percent had eosinophil-dominated inflammation. He concluded that nasal polyps have association with positive allergy skin test and eosinophil-dominated inflammation.

In another study, Dogru et al.⁹ compared the prevalence of atopy in 34 patients with nasal polyps and 20 healthy volunteers without nasal polyps and noted that the difference between the two groups is statistically significant where the number of positive skin tests in patients with nasal polyps was higher than those in control subjects.

Result of our study showed that one third of the patients with nasal polyps had positive skin test along with typical symptoms of allergy. This indicates that in one third of the subjects nasal polyp is concomitant with allergic symptoms, mainly rhinitis. Considering the tissue eosinophil count as a tool for differentiation of allergic from inflammatory polyposis, no agreement was found between allergy and tissue eosinophil count or no differences was found between the tissue eosinophil count in allergic and non allergic patients with nasal polyps in our study. In the current study, allergens were selected for skin prick test based on our knowledge about climate and regional herbal geography and results of previous surveys on sensitization patterns in our area.^{10,11}

Result of this study showed that there is no agreement between skin prick tests and tissue eosinophil count in patients with nasal polyp. Although the relatively small number of patients (25 cases) could be a probable explanation, our findings are consistent with those reported by Park et al.¹² conducted on 21 cases and Pawliczak et al.¹³ with 36 cases; they demonstrated that eosinophils and mast cells are abundant in nasal polyps from both atopic and nonatopic patients. Also using immunohistochemical methods to study 17 patients, Ediger et al.⁽¹⁴⁾ found higher number of eosinophils in skin prick test negative nasal polyps compared with skin test positive cases, confirming our work.

Considering these results, it can be concluded that having a high tissue eosinophil count in patients with nasal polyp does not indicate that the polyp is allergic.

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