



Pattern of sensitivity to respiratory allergens in patients with sinonasal polyposis

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ABSTRACT

Background & Aim: Sinonasal polyposis is the existence of a nontumoral mass inside the nose and paranasal sinuses which can lead to nasal obstruction and other annoying problems for the patient. Since the pathogenesis of this disease and the involved factors in severity of symptoms has remained unknown, the present study has proceeded to evaluate the Pattern of sensitivity to respiratory allergens in patients with sinonasal polyposis.

Methods & Materials: This observational study was a descriptive cross sectional study evaluating 77 patients with sinonasal polyposis from May 2014 to April 2015. The demographic data, history of signs related to allergy in the patient and his/her family was collected and recorded. The concentrations of serum specific IgE were measured.

Results: Seventy-seven patients with sinonasal polyposis including 25 women (32.5%) with average age of 42.48 ± 13.43 years and 52 men (67.5%) with average age of 43.40 ± 13.57 years were evaluated. The present study showed that the result of allergen test was positive in 32 men (61.54%) and 20 women (80%). Also, the results showed that the allergen test was negative in 25 patients (32.47%), in 6 cases (7.79%) only one allergen was positive, the results of allergen test in 46 patients (59.74%), for at least two allergens were positive. The highest numbers of positive allergens in a patient was 28. The most allergen observed in patients included plane tree 23 (29.9%), Kochia 22 (28.6%), *Alternaria alternaria* 20 (26%), Pigweed 20 (26%).

Conclusion: Our results indicate that there are correlations between aeroallergen and clinical signs in individuals with sinonasal polyposis, and the possibility of allergic background can be considered in encountering with such patients, although these cases need specific studies with larger sample sizes.

Keywords: aeroallergens, sinonasal polyposis, specific IgE

INTRODUCTION

Sinonasal polyposis is a chronic disorder which influences on life quality of suffering individuals, this disorder is a non-neoplastic inflammation of nose which finally leads to development of abnormal masses in nasal cavity and paranasal sinuses. Treatment of this disorder includes medical treatment, surgery, or combination of these two methods (1, 2). Nasal obstruction is the most important sign of sinonasal polyposis which its severity is related to location and size of polyposis, retropharyngeal discharges, headache, anosmia, and coughing are other signs of this disorder (3). Studies have shown that the clinical complications are lower in patients with polyposis in smaller sizes (4, 5).

This disease is more common between men comparing to women (ration 2 to 1), the average age of nasal polyposis incidence is third and fourth decades of life, although the exact prevalence of this disorder is unknown, but, according to epidemiological studies in various areas of world, it is between 2 to 15%, approximately half of patients with nasal polyposis have a positive family history (6-8).

The pathogenesis of sinonasal polyposis is not accurately determined, but the studies have suggested that different types of infections, immunologic factors, metabolic diseases, congenital diseases such as cystic fibrosis and also autonomic dysfunction are some leading factors of polyposis. From long times ago, the correlation between asthma and

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Table 1: Common allergens in Iran

Mites	Derm.farinae , Derm.pteronssinus
Molds	A.fumigatus, Penicillium expansum, Aspergillus rreus, Penicillium notatum, Aspergillus nidulans, Cladosporium herbarum, Aspergillus flavus, Alternaria alternaria
Animals Epithel And Feather	Cat epithel, Rodent epithelia, Dog epithel, Rodent epithelia, Rodent epithelia, Rodent epithelia, Doves feather , Goose feather, Hen feather, Duck feather
Cockroach	Cockroach mix(P.americana+B.germanica)
Trees	Acacia, Olive_Ash mix, Eucaliptus, Olive_Ash mix , Plane tree (sycamore), Pine mix, Maple, Cypress
Weeds	Pigweed, Russian thistle, Chenopodium album, Kochia, Plantain, Orach, Ambrosia, Artemisia, Xanthium, Poplar, Willow, Birch
Grasses	Cynodon, Orchard grass, Rye grass, Timothy grass, Kentucky blue, Johnson grass

polyposis has been known (9-11). The aim of the present study was to evaluate pattern of sensitivity to respiratory allergens in patients with sinonasal polyposis.

METHODS & MATERIALS

This observational study was a descriptive cross sectional study evaluating 77 patients with sinonasal polyposis from May 2014 to April 2015 referring to Ahvaz Imam Hospital. The demographic data, sinonasal symptoms according to SNOT 22 Questionnaire and his/her family history was collected and recorded. The tests based on severity from asymptomatic to very severe (0 to 5+) in four seasons of spring, summer, autumn and winter were evaluated,

Determination of serum IgE level

For measurement of IgE specific to studied allergens, 5 milliliters venous blood was collected from the patient and after separation of serum, immediately the serums were frozen at -30 centigrade degree up to day of trial. Commercial kit of AlleisaScreen made by Germany was used according to the kit's guidelines in order to measurement of the amounts of IgE specific to aeroallergens. In this method, the amounts of specific IgE antibody was reported in IU/ml. In Iran, the mentioned standard trial (AllergyScreen® test using common allergens in the country) is Iranized with cooperation of allergiologists and immunologists in the country and Mediwiss company (Germany) (Table 1).

Inclusion and Exclusion Criteria

The inclusion criteria in the present study were confirmation of polyposis through evaluation of clinical signs and radiologic tests. Patients with cystic fibrosis, kartagener syndrome and fungal allergic sinusitis are excluded from the study.

Statistical Analysis

After coding, the collected data were analyzed using SPSS software version 18. Qui-square statistical test was used for evaluation of correlation between qualitative variables with each other, and for quantitative variables, t-independent test was used. The confidence ratio is 95% in all measurements and $P < 0.05$ is considered significant.

RESULTS

Demographic Characteristics of Patients

In the present study, 77 patients with sinonasal polyposis including 25 women (32.5%) with average age of 42.48 ± 13.43 years and 52 men (67.5%) with average age of 43.40 ± 13.57 years were evaluated. The ratio of men to women in this study was 2.08 to 1. There was no significant difference between male and female patients for age. The patients were categorized into two age range of < 40 & ≥ 40 years, on the other hand, 20 patients (25.97%) were positive for asthma and 35 patients (45.46%) had a positive family history and none of them were positive for consumption of NSAIDs sensitivity (Figure 1).

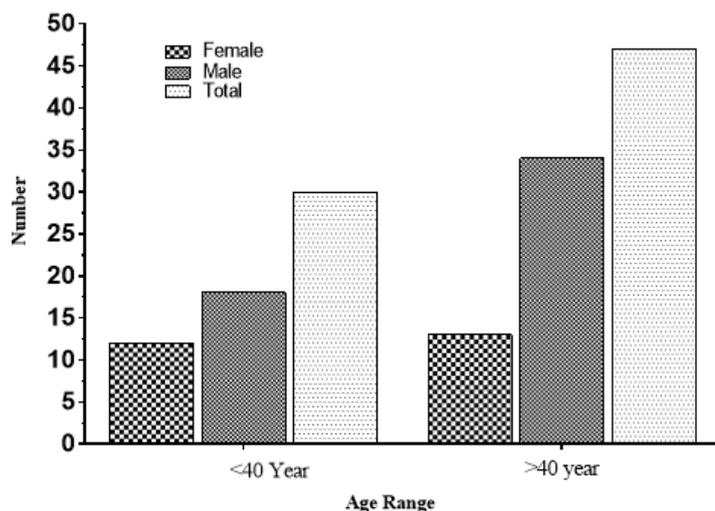


Figure 1: The percentage of evaluated patients based on age categorization

Table 2: The status of studies allergens in patients

Allergen	Status		Allergen	Status	
	Positive	Negative		Positive	Negative
Derm.farinae	7 (9.1%)	70 (90.9%)	Eucaliptus	16 (20.8%)	61 (79.2%)
Derm.pteronssinus	12 (15.6%)	65 (84.4%)	Olive_Ash mix	12 (15.6%)	65 (84.4%)
<i>A.fumigatus</i>	5 (6.5%)	62 (83.5%)	Plane tree (sycamore)	23 (29.9%)	54 (70.1%)
Penicillium expansum	8 (10.4%)	61 (89.6%)	Pine mix	11 (14.3%)	66 (85.7%)
Aspergillus rreus	7 (9.1%)	70 (90.9%)	Maple	3 (3.9%)	74 (96.1%)
Penicillium notatum	6 (7.8%)	71 (92.2%)	Cypress	2 (2.6%)	75 (97.4%)
Aspergillus nidulans	5 (6.5%)	72 (93.5%)	Poplar	16 (20.8%)	61 (79.2%)
Cladosporium herbarum	10 (13%)	67 (87%)	Willow	16 (20.8%)	61 (79.2%)
Aspergillus flavus	5 (6.5%)	72 (93.5%)	Birch	18 (23.4%)	59 (76.6%)
Alternaria alternaria	20 (26%)	57 (74%)	Pigweed	20 (26%)	50 (74%)
Cat epithel	2 (2.6%)	75 (97.4%)	Russian thistle	18 (23.4%)	59 (76.6%)
Rodent epithelia	7 (9.1%)	70 (90.9%)	Chenopodium album	17 (22.1%)	60 (77.9%)
Dog epithel	6 (7.8%)	71 (92.2%)	Kochia	22 (28.6%)	55 (71.4%)
Rodent epithelia	7 (9.1%)	70 (90.9%)	Plantain	13 (15.9%)	64 (83.1%)
Rodent epithelia	7 (9.1%)	70 (90.9%)	Orach	18 (23.4%)	59 (76.6%)
Rodent epithelia	6 (7.8%)	71 (92.2%)	Ambrosia	0 (0%)	77 (100%)
Doves	0 (0%)	77 (100%)	Artemisia	0 (0%)	77 (100%)
Goose	0 (0%)	77 (100%)	Xanthium	0 (0%)	77 (100%)
Hen	0 (0%)	77 (100%)	Cynodon	20 (26%)	50 (74%)
Duck	0 (0%)	77 (100%)	Orchard grass	12 (15.6%)	65 (84.4%)
Cockroach mix	18 (23.4%)	59 (76.6%)	Rye grass	13 (15.9%)	64 (83.1%)
Cockroach mix	18 (23.4%)	59 (76.6%)	Timothy grass	3 (3.9%)	74 (96.1%)
Acacia-mesquite mix	17 (22.1%)	60 (77.9%)	Kentucky blue	12 (15.6%)	65 (84.4%)
Acacia-mesquite mix	16 (20.8%)	61 (79.2%)	Johnson grass	3 (3.9%)	74 (96.1%)
Olive_Ash mix	13 (15.9%)	64 (83.1%)	-	-	-

The Status of Allergens in Evaluated Patients

In the present study, the patients with sinonasal polyposis were evaluated for the presence or absence of respiratory allergens. The results showed that the most frequent observed allergen in patients were: plane tree 23 (29.9%), Kochia 22(28.6%), Alternaria alternaria 20 (26%), pigweed 20 (26%). On the other hand, the results of Duck, Hen, Artemisisa, Ambrosia, Goose and Xanthium allergens were positive in none of the patients (**Table 2**).

IgE Specific Concentration

The mean specific IgE related to respiratory allergens of patients showed that the most amount of this specific antibody were Kochia, Pigweed, Sycamore mix, alternaria alternaria, respectively (**Table 3**).

Table 3: The specific concentration of IgE of evaluated antigens

Allergen	IgE (IU/ml)	Allergen	IgE (IU/ml)
<i>Aspergillus fumigatus</i>	0.0 ± 0.0	<i>Johnson grass</i>	0.0339 ± 0.23
<i>Aspergillus mix</i>	0.25 ± 1.26	<i>Kochia</i>	6.684 ± 16.78
<i>Aspergillus nidulans</i>	0.0 ± 0.0	<i>Kentucky blue</i>	0.372 ± 1.32
<i>Aspergillus rreus</i>	0.0 ± 0.0	<i>Maple</i>	0.125 ± 1.007
<i>Alternaria alternaria</i>	2.16 ± 12.39	<i>Olive_Ash mix</i>	0.923 ± 3.380
<i>Aspergillus flavus</i>	0.0 ± 0.0	<i>Orach</i>	2.754 ± 9.558
<i>Acacia-mesquite mix</i>	2.14 ± 7.68	<i>Orchard grass</i>	1.23 ± 4.27
<i>Ambrosia</i>	0.0 ± 0.0	<i>Penicillium notatum</i>	0.0 ± 0.0
<i>Artemisia</i>	0.0 ± 0.0	<i>Plane tree(sycamore)</i>	0.88 ± 3.19
<i>Bermuda grass</i>	0.87 ± 2.94	<i>Penicilliumexpansum</i>	0.0 ± 0.0
<i>Birch</i>	2.02 ± 8.44	<i>Pigweed</i>	2.98 ± 12.76
<i>Cat epithel</i>	0.08 ± 0.54	<i>Poplar</i>	0.0 ± 0.0
<i>Cladosporium herbarum</i>	0.33 ± 1.51	<i>Penicillium mix</i>	0.30 ± 1.335
<i>Cockroach mix</i>	0.59 ± 2.34	<i>Pine mix</i>	0.66 ± 2.532
<i>Cypress</i>	0.05 ± 0.36	<i>Plantain</i>	0.49 ± 1.813
<i>Cynodon</i>	0.0 ± 0.0	<i>Russian thistle</i>	1.25 ± 4.889
<i>Chenopodium album</i>	2.52 ± 11.26	<i>Rye grass</i>	1.70 ± 5.096
<i>Doves</i>	0.0 ± 0.0	<i>Rodent epithelia</i>	0.26 ± 1.308
<i>Duck</i>	0.0 ± 0.0	<i>sycamore mix</i>	3.48 ± 13.85
<i>Dog epithel</i>	0.04 ± 0.17	<i>Timothy grass</i>	0.31 ± 2.22
<i>Derm.pteronssinus</i>	0.33 ± 1.28	<i>Willow</i>	1.76 ± 6.28
<i>Derm.farinae</i>	0.07 ± 0.23	<i>Xanthium</i>	0.0 ± 0.0
<i>Eucaliptus</i>	1.38 ± 5.01	<i>Hen</i>	0.0 ± 0.0
<i>Goose</i>	0.0 ± 0.0		

Table 4: The results of allergen test in patients according to age and gender

Parameters	Positive	Negative
< 40year	19 (63.34%)	11 (36.66%)
≥ 40 year	33 (70.21%)	14 (29.79%)
Female	20 (80%)	5 (20%)
Male	32 (61.54%)	20 (38.46%)
Total	52 (67.53%)	25 (32.47%)

The Results of Allergen Test According to Age and Gender

The present study showed that the results of allergen test was positive in 32 men (61.54%) and 20 women (80%), also the positive results in age categorization of 40 years old were higher than age categorization younger than 40 years old (Table 4).

The Abundance of Allergens

The results showed that the allergen tests were negative in 25 patients (32.47%), in 6 cases (7.79%) only one allergen was positive, the results of allergen test in 46 patients (59.74%) was positive for at least two allergens. The most number of positive allergens in a patient was 28 instances (Figure 2).

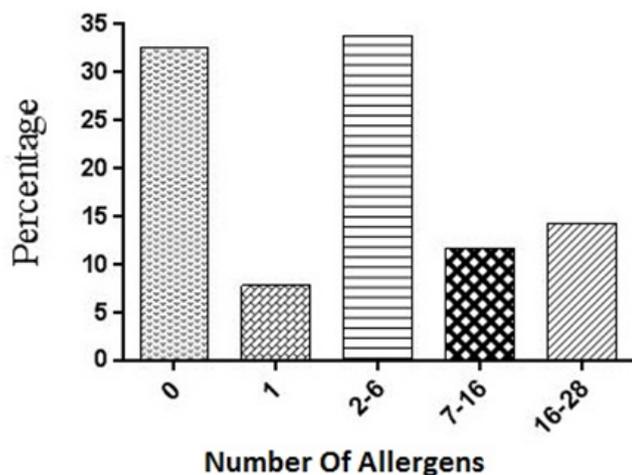


Figure 2: The abundance of evaluated allergens for age and gender

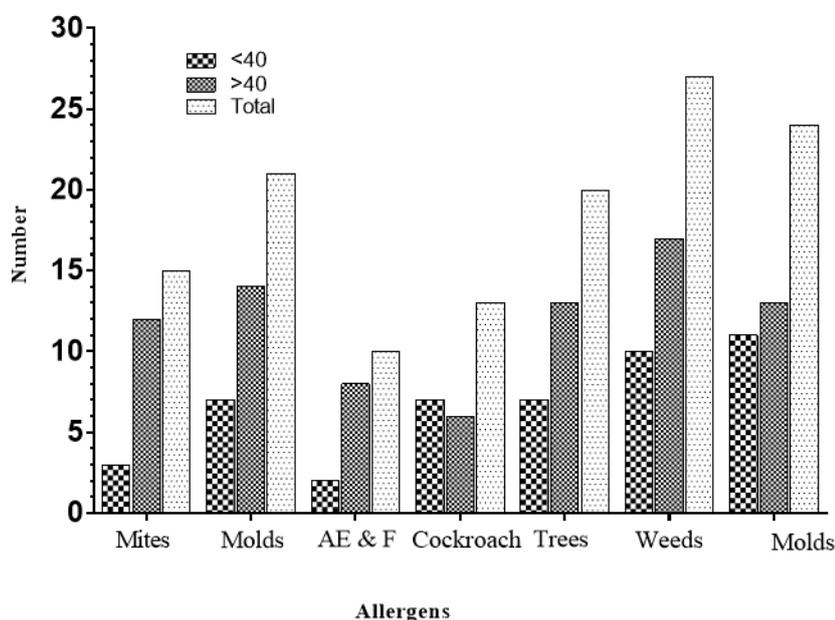


Figure 3: Different types of evaluated allergens for age of patients

The Results Related to Evaluated Allergens

In the present study, 49 different allergens were evaluated in various categories including mites, molds, epithelium and feather of animals, cockroach, trees, weeds and grasses. The most frequent evaluated allergens were weeds, trees, grasses and ..., respectively (**Figure 3**).

The Correlation of Allergens and Clinical Signs

The results showed that there is no significance correlation between clinical signs with age ($P=0.390$, $r=0.640$) and gender ($P=0.662$, $r=0.293$) of patients. The mean of SNOT in patients was 45.33 ± 25.11 , on the other hand the results showed that there was an overall significant correlation in facing with molds ($P=0.008$, $r=0.711$), cockroach ($P=0.009$, $r=0.816$), tree ($P=0.028$, $r=0.673$), weeds ($P=0.028$, $r=0.693$), grasses ($P=0.001$, $r=0.752$), but there was no significant correlation between clinical signs and mites ($P=0.217$, $r=0.666$). The correlation between allergens and clinical signs are separated shown in **Table 5**.

Table 5: The correlation between allergens and clinical signs (separated)

Allergen	Sings	Allergen	Sings	Allergen	Sings
Derm.farinae	R=0.214 P=0.062	Goose feather	-	Pigweed	R=0.454 P=0.000
Derm.pteronssinus	R=0.018 P=0.880	Hen feather	-	Russian thistle	R=0.475 P=0.000
A.fumigatus	R=0.040 P=0.733	Duck feather	-	Chenopodium album	R=0.496 P=0.000
Penicillium expansum	R=0.217 P=0.058	Cockroach mix	R=0.441 P=0.000	Kochia	R=0.406 P=0.000
Aspergillus rreus	R=0.010 P=0.930	Cockroach	R=0.441 P=0.000	Plantain	R=0.396 P=0.000
Penicillium notatum	R=0.307 P=0.007	A23	R=0.567 P=0.000	Orach	R=0.381 P=0.001
Aspergillus nidulans	R=0.040 P=0.733	A24	R=0.565 P=0.000	Ambrosia	-
Cladosporium herbarum	R=0.027 P=0.815	A25	R=0.497 P=0.000	Artemisia	-
Aspergillus flavus	R=0.028 P=0.806	Eucaliptus	R=0.498 P=0.000	Xanthium	-
Alternaria alternaria	R=0.086 P=0.459	Olive_Ash mix	R=0.497 P=0.000	Cynodon	R=0.491 P=0.000
Cat epithel	R=0.088 P=0.445	Plane tree (sycamore)	R=0.437 P=0.000	Orchard grass	R=0.436 P=0.000
Rodent epithelia	R=0.058 P=0.618	Pine mix	R=0.501 P=0.000	Rye grass	R=0.338 P=0.003
Dog epithel	R=0.113 P=0.328	Maple	R=0.163 P=0.156	Timothy grass	R=0.043 P=0.710
Rodent epithelia	R=0.058 P=0.618	Cypress	R=0.276 P=0.015	Kentucky blue	R=0.276 P=0.015
Rodent epithelia	R=0.058 P=0.618	Poplar	R=0.486 P=0.000	Johnson grass	R=0.019 P=0.870
Rodent epithelia	R=0.004 P=0.969	Willow	R=0.486 P=0.000		
Doves feather	-	Birch	R=0.427 P=0.000		

DISCUSSION

In the present study, 77 patients with sinonasal polyposis including 25 women (32.5%) with average age of 42.48 ± 13.43 years and 52 men (67.5%) with average of 43.40 ± 13.57 years were evaluated. More than 70% of studied patients in this survey were between 40 to 60 years old, epidemiological studies have shown that although the possibility of catching of sinonasal polyposis is present at any age, but with increasing of age, the likelihood of its incidence is increasing and the most prevalent age range for its incidence is 40 to 60 years old, that these reports are consistent with our results (8, 12). On the other hand, based on previous reports, the incidence of this study is nearly twofold in men comparing to women (12, 13), that this was consistent with our study which showed the ratio of men to women as 2.08 to 1. On the other hand, 20 patients (25.97%) were positive for asthma and 35 patients (45.46%) had a positive family history of asthma, and none of them were positive for drug consumption. Settupane et al. showed in their study that one third of patients with polyposis, have a history of asthma, that these results were consistent with our results (8).

The results of the present study showed that the most prevalent clinical signs observed in patients -different severity- were: frequent vacant of nose, retropharyngeal discharges, nasal discharge, thick nasal discharge respectively.

Newton et al. (2008) indicated in their review study that the most common clinical sign observed in polyposis patients is nasal obstruction, they also indicated that the severity of obstruction is related to location and size of polyposis (6). Newton et al. (2008) stated that after nasal obstruction, the most frequent signs observed in polyposis patients were nasal discharge and retropharyngeal discharges (6). In study of Ogunleye et al. (2005), 63 patients with polyposis were evaluated and it was shown that the most common clinical signs were nasal obstruction, nasal vacant and sneezing (7). On the other hand, Jahromi et al. (2012) showed that the most prevalent incidence of signs in patients with polyposis

were in spring and summer seasons (14), the results of the above study was consistent with our results for incidence of clinical signs and season of incidence of these signs.

The present study showed that the results of allergen test were positive in 32 men (61.54%) and 20 women (80%), also, the most rate of positive results were at age range of 46-55. Various studies have reported contradictory results for positive allergen test in patients based on age and gender which some of them were consistent with results of our study and some others were contrast with our results. In study of Shakurnia et al. (2013), the most frequent positive cases were observed at age ranges of 15-35 years old and in male gender (15), although in the present study the most prevalent positive cases were at age range of 46-55 years old and in female gender, the results of the mentioned study were not consistent with results of our study. Kashef and coworkers (2003) showed with evaluation of aeroallergens that the most prevalent positive cases were between individuals older than 15 years old (16), that these results were consistent with our results, there are various reasons reported in results for this difference such as sample size of evaluation, epidemiologic conditions, the rate of exposure of patients, type and size of polyposis.

The results of the present study showed that the results of allergen test were negative in 25 patients (32.47%), in 6 cases (7.79%) only one type of allergen was positive, the results of allergen test were positive for at least 2 allergens in 46 patients (59.74%). The highest number of positive allergens in one patient was 28 cases. On the other hand, the most frequent allergen under evaluation were weeds, trees and grasses, Shakurnia and coworkers (2013) showed that the most prevalent positive cases were related to weeds, trees, mites, fungi and cockroach (15). Also, in study of Assarehzadegan and coworkers (2013) indicated that the most prevalent allergens were weeds, trees, plants pollen, mites and fungi (17). The results of the two above studies were consistent with our results for category of common allergens, the reason for this can be similar climate conditions of two above studies with the present study, because all three studies had been conducted in Ahvaz. However, in a study in shiraz conducted by Kashef et al. (2003) stated in their study that the most prevalent reported allergens were pollen, mites and fungi, respectively (16), that were not consistent with our results, the reason for this can be attributed to different climate status of Ahvaz with Shiraz.

The most identified allergens were Plane tree 23 (29.9%) Kochia 22 (28.6%), Alternaria alternaria 20 (26%) and Pigweed 20 (26%), in contrast none of the Goose, Ambrosia, Artemisia, Hen, Duck and Xanthium allergens were detected in the patients. The most positive cases among the weed were Kochia. Pigweed and Russian thistle whereas Assarehzadegan et al have reported Russian thistle as the most common allergen among weed category (15, 17). The sample size also the allergen detection methods which have been used in the studies can be reason for the discrepancies; Prick test in previous studies and specific concentration of IgE in the current study.

Alternaria alternaria was the most detected yeast allergen. This specie was also identified as the most prevalent yeast allergen in the previous studies. Intriguingly, Sabirov et al. have shown the significant correlation between the level of IgE serum concentration of Alternaria alternaria and the prevalence of nasal polyp (18).

Derm.pteronssinus and Derm.farinae were positive for 15.6% and 9.1% of patients, respectively which are consistent with the results of Kashef et al. who have reported 15.5% and 12.8% respectively (16) also Fereidouni et al. have reported the same prevalence as the current study (19) but Assarehzadegan have shown higher positive tests for Derm.farinae than Derm. pteronssinus (17). However, the widespread of this allergen were higher in Malasia (D. pteronyssinus 93.6% and D. farinae 81.4%) (20), Thailand (D. pteronyssinus 76%, D. farinae 79%) (21) and Singapore (D. pteronyssinus (93.4%), D. farinae (92.3%) (20) than our province. This different is likely related to the growth environmental requirements that are mentioned as 20 C and 60% humidity for these mites.

The epidermal allergens were positive for 2-7% of patients whereas Pumhirun have shown 28-35 positive cases in Thailand for those specific allergens (21). The discrepancy can be related to the different methods of animal caring also the various jobs of participants in the studies.

Eucaliptus, Acacia and Olive -Ash were the most prevalent three-associated allergen whereas Assarehzadegan et al. have shown Mesquite, White Ash, Acacia and Eucaliptus as the most common allergen also Pumhirun et al. have indicated that Coconut, mango and acacia produce highest amount of the allergen among all of trees (17, 21), however the variation between our study and previous ones can be related to climate features that are necessary for growth of the tree.

The 24.8 % of cases were positive about Cockroach that is consistent with Asaradegan et al. who also have reported 30% of positive cases for the allergen but in contrast to Pumhirun et al. that have shown higher than 50% for positive cases (12, 19). This variation likely due to the different climate conditions in Pumhirun et al. study because it was conducted in Thiland where weather conditions are mostly proper for propagating of these beetles than our province.

The current study has shown Cynodon, Rye grass and Kentucky are the most common allergen in the Grasses group. This prevalence ordering is same as the results of Liam et al. in Malaysia and Assarezadegan although the level of prevalence is in contrast with the last (17, 22).

Our study has indicated no correlation between clinical sign and allergen test among 59 patients (76.62%) however 18 patients (23.38%) have been found with some level of correlation between clinical signs and allergen level. In the positive group, Grasses cases were most positive cases and then Weeds, Trees, and Mites respectively. Gosepath et al. have determined DNA of some fungus as *Alternaria Alternaria* in the polyp of patients (23), als Sabirov et al. have indicated the meaningful correlation among pathology of nasal polyps (18) that consistent with our results. Correlation between allergen agents and nasal polyp is considered as a controversial issue. As a temple, Castillo et al. have shown that skin test was significantly higher in patients with nasal polyp than healthy individuals also they have introduced *Dermatophagoides pteronyssinus*, *Dermatophagoides farina* and *Olea Europaea* as the most important polyp-associated allergen (24) also Asero et al. in two different studies have indicated the correlation between polyp and fungal allergen (25). In contrast, Erbek et al. have claimed that there is not any correlation between allergen agents and polyp size also clinical sings and the disease recurrence (26), in addition Bonfils et al. have supported the idea that allergen are not causative agents for nasal polyp (27).

CONCLUSION

Our results show that some degree of correlation between aeroallergens and clinical signs in patients with sinusoidal polyposis. This type of correlation can be useful in clinical aspect for patient with allergic background although further investigations are needed for confirmation of such correlation.

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