Investigation of the Impact of Aeroallergens Sensitization on Allergic Rhinitis Severity**

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Abstract

Background: To date, there is no enough evidence of which allergen is associated with more allergic rhinitis symptoms than the others. Identifying allergens that are associated with significant symptoms and those that cause more symptoms than others can help us in deciding which allergens to include in the immunotherapy regimen and, therefore, may reduce the need for multiple allergens immunotherapy and subsequently improve the safety, adherence to, and efficacy of immunotherapy.

Objectives: The aim of this study was to investigate the impact of aeroallergens sensitization on allergic rhinitis severity and to identify allergens which are associated with the most significant symptoms in allergic rhinitis patients.

Methods: A cross-sectional study was conducted at Ear, Nose, and Throat (ENT) clinics at the Jordan University Hospital. During the week prior to the clinic visit, patients completed a diary of their allergic symptoms. Skin prick test with 18 standardized allergen extracts were performed in all patients. We used linear regression analysis to identify allergens which independently contribute to patients symptoms.

Results: Eight allergens had a statistically significant and independent effect on allergic symptoms as compared to other allergens. Olive pollen sensitization has the most significant contribution to allergic symptoms.

Conclusions: This is the first study that reports differences in the effect of allergen sensitization on allergic symptoms severity. Olive pollen should be given the highest attention, exposure should be avoided, and it should be considered the principle allergen when designing the immunotherapy regimen for those who are sensitized.

Keywords: Allergic Rhinitis, Skin Prick Test, Symptoms Severity.

(J Med J 2011; Vol. 45 (1):18- 28)

Received	***Accepted***
December 30, 2009	*April 27, 2010*

Introduction

Allergic rhinitis is one of the most common chronic conditions, affecting 10% to 30% of adults and up to 40% of children. [1, 2] It has been demonstrated that there is a progressive increase in the prevalence of allergic rhinitis in the recent decades. [3, 4] Although sometimes mistakenly viewed as a trivial disease, symptoms of allergic rhinitis may significantly impact a patient's

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** ***Disclosure of potential conflict of interest: S. AbuRuz has conducted several courses on clinical trials for Novartis Company and participated in several clinical trials with Pfizer Company.***

quality of life by causing fatigue, headache, cognitive impairment, affecting psychological well-being and causing other systemic symptoms. [5, 6]

Aeroallergens sensitization is the most important factor which causes symptoms in allergic rhinitis. Therefore, allergen avoidance should be considered as a first-line intervention in the management of allergic rhinitis.[7] Immunotherapy, on the other hand, can significantly reduce the severity of the allergic disease, as well as improve the patients' quality of life. [7]

It is well known that the majority of patients with allergic rhinitis have multiple sensitizations. To date, there is no enough evidence of which allergen is associated with more symptoms than the others. Identifying these allergens can help us in deciding which allergens should be given the priority for inclusion in the immunotherapy regimen and, therefore, may reduce the need for multiple allergens immunotherapy and subsequently improve the safety, adherence to, and efficacy of immunotherapy. [8-10] These allergens should also be of prime concern when educating patients regarding allergens avoidance strategies.

The aim of this study was to investigate the impact of aeroallergens sensitization on allergic rhinitis severity and identify allergens which are associated with the most significant symptoms in patients with allergic rhinitis. The results of this study will help allergologists to develop better strategies for the prevention and management of allergic rhinitis.

Methods and Subjects

Study Population and Design

A cross-sectional study was conducted at the Ear, Nose, and Throat (ENT) outpatient Clinics, the Jordan University Hospital, Amman, Jordan. Jordan University Hospital is the largest hospital in Jordan serving annually more than 0.5 million patients. The study involved all patients 18 years and older who were diagnosed with allergic rhinitis and were attending the clinics during the period between January-June 2006 and January-June 2007. The common regional plant species are expected to pollinate during these months. [11]

Patients were excluded from the study if they fulfilled any of the following criteria:

1. If they had any contraindication to skin prick test. [12, 13] These include: pregnancy, breast feeding, asthma or severe atopic dermatitis.
2. If they had any infectious disease, fever or inflammation.
3. If they had any clinical condition that may affect allergic rhinitis symptoms.
4. If they refused to stop antihistamine for at least one week before the skin prick test.

This study was approved by the Institutional Review Board (IRV) at the Jordan University Hospital and all patients provided informed consent to participate in the study. The diagnosis of allergic rhinitis was confirmed using score for allergic rhinitis (SFAR score) [14] and clinical examination.

During the baseline visit, demographic data and clinical history were collected. Classification of allergic rhinitis into intermittent or persistent was based on the Allergic Rhinitis and its Impact on Asthma guidelines (ARIA). [15] Patients were asked to stop their antihistamine and to come back to the clinic one week later for skin prick testing.

Control Group

A control group was included in this study to aid in the exploration of the effects of allergens on allergic rhinitis symptoms. A convenient sample of 550 individuals who don't have a history of allergic rhinitis were recruited and asked to complete an allergic symptoms diary (see below).

Allergic Rhinitis Symptoms Severity

During the week prior to the next clinic visit, patients completed a diary of their allergic symptoms. [16] Each evening they scored the severity (0= none to an occasional limited

episodes, 2= mild steady symptoms but easily tolerable, 4= moderately bothersome, symptoms hard to tolerate, may interfere with activities of daily living and sleep, 6= unbearably severe, symptoms are so bad and patient cannot function all the time) of sneezing, runny nose, stuffy nose, itchy nose, post nasal drip and eye symptoms. An average score was calculated for each patient. The symptoms diary was used to aid in the diagnosis of allergic rhinitis and quantification of patient allergic rhinitis symptoms severity. A full validation study on 150 patients for this symptoms diary indicated that the instrument is valid and reliable with a minimal important difference of 0.4 points. [17] The minimal important difference is the minimum difference in patients' symptoms that is considered clinically significant.

Skin Prick Test

Skin Prick Test (SPT) with 18 standardized allergen extracts (Stallergenes, France) were performed in all patients in accordance to published guidelines. [18] Some of the standardized allergen extracts were mixtures; therefore, the total number of allergens tested was approximately 50. In general, mites, moulds, and animals are considered as perennial allergens whereas grasses, trees, cereals and weeds are considered as seasonal allergens. Allergens used in this study were chosen according to common regional plant species [11] and other possible allergens identified from consulting local ENT specialists. The SPT was performed by the same trained and experienced person [Ms. F.Z.]; also the results were taken by him to ensure uniformity.

Histamine hydrochloride (10 mg/mL) and glycerol saline were used as positive and negative controls, respectively. The skin prick test was performed on a healthy skin on the volar surface of the forearm, the test sites were placed at 20 -30 mm apart approximately 5 cm below the elbow, and 5 cm above the wrist. A drop from each extract was applied on the skin (10 extract on each arm) and then the skin was pricked through each drop using Stallerpoint (Stallergenes, France). The order of SPT was firstly by histamine, followed by negative control then the allergens extracts. The size of the wheal after 20 minutes was determined by measuring the mean of the longest diameter and the diameter perpendicular to it. [18]

Interpretation of SPT Results

- According to Stallergenes monograph the test is valid if it satisfies a double condition:
  a. The wheal diameter of the positive control must be larger than or equal to 4 mm.
  b. The wheal diameter of the negative control must be less than or equal to 3 mm.
- According to Stallergenes monograph the reaction is regarded as positive if it satisfies all the following conditions
  a. The wheal diameter is larger than the negative control.
  b. The wheal diameter is larger than or equal to 5mm, or included between 3 and 5 mm and larger than or equal to 70% of that one obtained with the positive control.
  c. The wheal diameter should be larger than 3mm, if not then the test is negative.

Statistical Analysis

Qualitative data are presented as frequencies (%) and quantitative data as mean (SD). Data were analyzed by SPSS software package version 15 (Chicago, USA).

Group differences were studied using independent sample Student t-test. P value less than 0.05 in the two-tailed test was considered significant.

Most allergic rhinitis patients have multiple allergen sensitizations and therefore we can't determine if the allergic symptoms are due to a specific allergen sensitization or to another. On the other hand, the effect of an allergen in a positively sensitized group may not be statistically evident (using t-test) when compared to another group due to the sensitization to another allergen in the comparison group. Therefore, to solve the above issue, we used multiple linear regression analysis (with Backward) to identify allergens which

independently contribute to patients allergic symptoms. Patient average symptom score was entered as the dependent variable and sensitization to allergens (positive or negative) was entered as the independent variable. Entry and removal were set at 0.05 and 0.1, respectively. Checking for outliers, normality, linearity, singularity and multicollinearity were carried out using the methods described by Tabachnick and Fidell (2001). [19]

Results

Demographic and Cinical Characteristics

During the study period, 554 patients with allergic rhinitis fulfilled the inclusion criteria. 16 patients refused to participate in the study. Therefore, skin prick test was conducted on 538 patients. Twenty eight patients were excluded from final data analysis due to invalid skin prick test [histamine wheal less than 4 mm (one patient) or control wheal more than 3 mm (27 patients)].

Demographic and clinical characteristics of 510 (92%) who were included in the data analysis are shown in Table (1). Demographic and clinical characteristics of the control group are also shown in Table (1).

The Association between Allergen Sensitization and the Severity of Allergic Rhinitis Symptoms

Forty nine patients (9.6%) did not react to any of the tested allergens. Therefore, the overall rate of sensitization to any allergen was 90.4%. Only 46 (9%) patients were reactive to one allergens and the rest (81.4%) were reactive to two or more allergens. Full details about the skin prick test reactivity to aeroallergens in Jordanian allergic rhinitis patients is reported elsewhere. [20]

When compared to the control group, all patients showed a significant increase in all aspects of allergic symptoms by at least three points (mean 3.37 ±1.02 vs 0.13±0.1, P<0.0005 for the average allergic symptoms score).

The comparisons in Table (2) provide us with information regarding the effect of a specific allergen on allergic symptoms (patients with positive sensitization vs patients with negative sensitization). The average allergic symptoms scores for patients with positive skin test to olive, grasses, cereals or thistle weed pollens were significantly higher than those for patients who didn't show positive skin test to these allergens (still most of them have other allergen sensitization).

Since most patients have multiple allergen sensitizations, we can't determine if the increase in allergic symptoms was due to a specific allergen sensitization or to another. Therefore, we used multiple linear regression analysis (Backward) to identify allergens which independently contribute to patients symptoms (see statistical analysis section). As shown in Table (3), only 8 allergens were retained in the regression analysis. These allergens have a statistically significant ($p<0.05$) and independent effect on allergic symptoms as compared to other allergens and contribute to 60% of the total allergic symptoms score (Table 3). Olive pollen sensitization has the most significant contribution to allergic symptoms as proven by its highest partial correlation (r-partial). Olive pollens independently increased allergic symptoms by 7% (r-partial$^{2)}$.

The effect of olive pollen sensitization on all aspects of allergic symptoms is shown in Table (4). Olive pollen sensitization is associated with a significant increase in all aspects of allergic symptoms as compared to allergic patients who are not sensitized to this pollen a part from stuffy nose and post nasal drip. The increase is more than >0.5 points suggesting a clinically significant effect.

Grasses, cereals and thistle weed pollens sensitization are associated with a significant increase in eye symptoms only (in addition to the average score) as compared to patients who are not sensitized to these pollens (data not shown). The increase in eye symptoms score is more than 0.6 points. Patients with dust mites sensitization have significantly more sneezing as compared to

other patients (data not shown). Other allergens sensitization did not show any significant increase in allergic symptoms as compared with allergic rhinitis patients with negative sensitization to the allergen of interest (data not shown).

In Table (5) we have investigated the association between the number of allergens positive sensitization and allergic symptoms.

Table (1): Demographic and clinical characteristics of study patients and control group.*

Number	***Study Subjects 510***	***Control Group 550***
Age mean (SD)	*34.4 (13.1)*	*34.1 (12.9)*
Gender N (%) male	*198 (38.8)*	*215 (39.1)*
Marital status N (%) married	*267 (52.4)*	*291(52.9)*
Education Level N (%)		
High School	*189 (37.1)*	*202 (36.7)*
2 years College	*97 (19.0)*	*106 (19.3)*
University degree	*224 (43.9)*	*242 (44.0)*
Duration of Allergic rhinitis mean (SD) (years)	*6 (5)*	*NA*
Classification of allergic rhinitis		*NA*
Intermittent	*156 (30.6%)*	
Persistent	*354 (69.4%)*	
Positive family history of allergic rhinitis N (%)	*137 (26.9)*	*27 (4.9)*
Concomitant asthma N (%)	*86 (16.9)*	*None*
Concomitant eczema N (%)	*94 (18.4)*	*None*
Concomitant sinusitis N (%)	*22 (4.3)*	*None*
Smoking history N (%)		
Active smoker	*68 (13.3)*	*73 (13.3)*
Passive smoker	*206 (40.4)*	*223 (40.5)*
Never smoked	*214 (42.0)*	*229 (41.6)*
Quit smoking	*22 (4.3)*	*25 (4.5)*
Allergy symptoms score based on symptoms diary		
Mean (SD)*	*3.15 (1.72)*	*0.07 (0.25)*
Sneezing	*3.42 (1.68)*	*0.2 (0.4)*
Runny nose	*4.01 (1.81)*	*0.07 (0.25)*
Stuffy nose	*3.27 (1.79)*	*0 (0)*
Itchy nose	*3.27 (1.84)*	*0.2 (0.40)*
Post nasal drip	*3.03 (1.86)*	*0.26 (0.44)*
Eye symptoms	*3.37 (1.02)*	*0.13(0.10)*
Average allergic symptoms score		

**** No significant difference was observed between the intervention and control groups with regard to demographic data.***

***** Study subjects have significantly more allergic symptoms than control subjects in all symptoms aspects (p<0.0005).***

Table (2): Association between allergen sensitization and allergic symptoms.**

Aeroallergens	***N (%) of positive skin prick test in all patients***	***Mean (SD) allergic symptoms score in patients with positive skin prick test***	***Mean (SD) allergic symptoms score in patients with negative skin prick test***	***P value***
Mites				
Dermatophagoides pteronyssinus	*168 (32.9)*	*3.41 (0.98)*	*3.35 (1.04)*	*0.52*
Dermatophagoides farinae	*110 (21.6)*	*3.51 (1.06)*	*3.33 (1.00)*	*0.10*

Mould and Yeast mixtures				
Aspergillus mixture (Aspergillus fumigates, Aspergillus nidulans, Aspergillus niger)	*120 (23.5)*	*3.41 (1.11)*	*3.36 (1.00)*	*0.64*
Penicillium mixture (Penicillium digitatum, Penicillium expansum, Penicillium notatum)	*135 (26.5)*	*3.29 (1.03)*	*3.40 (1.02)*	*0.28*
Cladosporium mix (Cladosporium Cladosporioides, Cladosporium herbarum)	*95 (18.6)*	*3.38 (1.01)*	*3.37 (1.02)*	*0.93*
Alternaria alternata	*86 (16.9)*	*3.17 (1.02)*	*3.42 (1.02)*	*0.04**
Animals				
Cat	*212 (41.6)*	*3.41 (0.98)*	*3.34 (1.06)*	*0.45*
Feather mix (Duck, Goose, Hen)	*109 (21.4)*	*3.45 (1.02)*	*3.35 (1.02)*	*0.37*
Grasses mixture *12 Grasses mixture (Bent grass, Bermuda grass, Bromus, Cocksfoot, Meadow fescue, Meadow grass, Oat grass, Rey grass, Sweet vernal grass, Timothy, Wild oat, Yorkshire fog)*	*262 (51.4)*	*3.52 (0.97)*	*3.19 (1.05)*	*0.0002**
Cereals mixture *4 Cereals mixture (Oat, Wheat, Barley, Maize)*	*207 (40.6)*	*3.51 (0.98)*	*3.26 (1.04)*	*0.007**
Weed pollens				
Compositae (Golden rod, Dandelion, Ox-eye daisy, Cockelebur)	*94 (18.4)*	*3.47 (1.14)*	*3.35 (0.99)*	*0.30*
Chenopodiaceae (Fat hen, Rough pigweed)	*84 (16.5)*	*3.34 (1.00)*	*3.38 (1.02)*	*0.74*
Thistle weed (salsola kali)	*239 (46.9)*	*3.47 (0.98)*	*3.26 (1.05)*	*0.02**
Wall pellitory (Parietaria judaica)	*128 (25.1)*	*3.48 (1.02)*	*3.33 (1.02)*	*0.18*
Tree pollens				
Cypress (Cupressus sempervirens)	*119 (23.3)*	*3.43 (0.98)*	*3.35 (1.03)*	*0.38*
Fagaceae tree (chest nut, Oak, Beech)	*75 (14.7)*	*3.41 (0.93)*	*3.36 (1.04)*	*0.67*
Olive (Olea Europea)	*231 (45.3)*	*3.55 (1.00)*	*3.20 (1.00)*	*0.0001**
Betulaceae (Birch, Alder, Hornbeam, Hazel)	*154 (30.2)*	*3.40 (0.98)*	*3.36 (1.04)*	*0.69*

**** P <0.05***

***** The comparison is between those with positive skin test and those with negative skin test without including the control group. When compared to the control group, all allergens increased all aspects of allergic symptoms by at least three points (mean 3.37 ±1.02 vs 0.13±0.1, p<0.0005).***

Table (3): Linear regression analysis of the association between allergen sensitization and allergic symptoms (control group number = 550, allergic rhinitis patients number = 510, dependent variable: average allergic symptoms score).*

Variables	***B estimate***	***P value***	***Zero order correlation (r)***	***Partial correlation (r-partial)***
Dermatophagoides farinae	*.538*	*.000*	*.367*	*.130*
Dermatophagoides farinae	*.417*	*.001*	*.442*	*.115*
Cladosporium mix	*.606*	*.000*	*.314*	*.140*
Cats	*.529*	*.000*	*.530*	*.151*
Grasses	*.977*	*.000*	*.630*	*.253*

Cereals	*.349*	*.009*	*.551*	*.091*
Thistle weed	*.707*	*.000*	*.607*	*.195*
Olive	*.949*	*.000*	*.598*	*.267*

R=0.78; R^2 = 60.1%; adjusted R^2 = 59.8%, p=0.000

**** The control group was included in the analysis***

Table (4): Association between olive pollen sensitization and allergic symptoms severity.*

Allergic symptoms	*Mean (SD) score in patients with positive skin prick test to olive pollen N=231 (45.3%)*	*Mean (SD) score in patients with negative skin prick test to olive pollen N=279 (54.7%)*	*P-value for difference between groups*
Sneezing	*3.52 (1.66)*	*2.81 (1.71)*	*<0.0001**
Runny nose	*3.69 (1.66)*	*3.17 (1.67)*	*0.0005**
Stuffy nose	*3.79 (1.76)*	*4.22 (1.84)*	*0.008**
Itchy nose	*3.55 (1.68)*	*3.00 (1.86)*	*0.0006**
Post nasal drip	*3.21 (1.78)*	*3.33 (1.89)*	*0.46*
Eye symptoms	*3.46 (1.89)*	*2.63 (1.74)*	*<0.0001**
Average symptoms score	*3.55 (1.00)*	*3.20 (1.00)*	*<0.0001**

**** P <0.05***

Table (5): Association between number of allergen positive sensitization and allergic symptoms severity.

Allergic symptoms	*Number of allergen positive sensitization*		*P-value for difference between groups*
	One (N=46) Mean (SD)	*Two or more (N=415) Mean (SD)*	
Sneezing	*2.27 (1.38)*	*3.26 (1.71)*	*0.0002**
Runny nose	*2.62 (1.56)*	*3.49 (1.65)*	*0.0007**
Stuffy nose	*3.91 (1.89)*	*4.00 (1.82)*	*0.75*
Itchy nose	*3.10 (1.93)*	*3.30 (1.76)*	*0.47*
Eye symptoms	*2.25 (1.27)*	*3.16 (1.88)*	*0.0015**
Post nasal drip	*3.06 (1.88)*	*3.27 (1.82)*	*0.46*
Average symptoms score	*2.89 (0.94)*	*3.42 (1.00)*	*0.0007**

**** P <0.05***

Discussion

This study reports new findings regarding the association between specific allergen sensitization and allergic symptoms severity in patients with allergic rhinitis. In previous studies, symptoms severity of allergic rhinitis did not correlate with wheal size for any of the aeroallergens tested or even with the number of positive responses on SPT. [21- 23] We sought to identify the association between the presence of allergen sensitization (rather than wheel size) and allergic symptoms severity.

This study was conducted during the time period where allergens under investigation are available in the environment; that is during the pollination seasons. This is an important consideration; otherwise patients with positive sensitization will not show any symptoms due to the lack of exposure to the allergen. Perennial allergens are available all year long and probably will be less affected by the time period during which the study is conducted.

The Association between Allergen Sensitization and the Severity of Allergic Rhinitis Symptoms

Forty nine (9.6%) patients did not show any positive sensitization; however, since allergic rhinitis was confirmed on the screening phase, these patients are probably sensitized to other

allergens not included in this study. Most study patients (81.4%) were reactive to two or more allergens. Similar findings were also obtained from studies in other countries such as Iran and Kuwait where poly-sensitizations were found in 76% and 65% of patients, respectively. [24, 25]

Since most patients are poly sensitized, the comparisons in Table (2) do not provide enough understanding regarding the effect of the specific allergen. We can't be sure if the allergic symptoms are caused by a specific allergen or due to other allergen sensitization. Despite this, it is clear from the data presented that patients with olive, grasses, cereals or thistle weed pollens sensitization have significantly more allergic symptoms than those with negative sensitization to these allergens.

A better picture can be shown from the linear regression analysis as it will provide us with information about the magnitude and the independent effect of each specific allergen.

Only 8 allergens were associated with significant allergic symptoms. These contribute to 60% of the total allergic symptoms score. These results indicate that other allergens may be associated with less allergic symptoms and, therefore, should be of less interest when designing the immunotherapy regimen.

The finding that olive pollen is the most significant contributor to allergic symptoms severity is of prime interest. Olive was the only allergen that significantly increased most aspects of allergic symptoms. In one study, patients with monosensitization to olive tree pollens were suffering from allergic symptoms even outside the pollination season. [26] Clearly, olive tree is of a significant concern to patients with allergic rhinitis.

The data in Table (5) show that those with more than one allergen sensitization have significantly and clinically more severe allergic symptoms. This suggests that allergens, to some extent, may have an additive effect on allergic symptoms.

This is the first study that reports differences between allergens in their effect on allergic symptoms severity. This study is unique in its design and objectives as compared to previous studies conducted on similar subject. The lack of similar findings in other studies could be due to not using a validated measure of allergic symptoms severity or due to correlating symptoms severity with SPT wheal size [21- 23] rather than comparing between patients with positive sensitization and patients with negative sensitization. Peeters et al. [27] have investigated the association between SPT wheal size response in patients with peanut allergy and the severity of nasal symptoms and found a positive association. However, the design and objective of the study by Peeters et al are different than that of the current study.

Based on the finding of this study, we recommend to avoid or reduce the use of multiple allergen immunotherapy. Multiple allergen immunotherapy, although reported to be safe by some investigators, [28] is widely debated and still not recommended by many clinicians. [8,9] Therefore, in the immunotherapy regimen, we can focus on the most important allergen, those that contribute more to allergic symptoms severity. Patients should also be advised to give more attention to avoiding the most important allergens.

Study Limitations

This study was conducted during the pollination seasons (winter and spring), therefore, the results obtained are valid for this time frame. If this study was conducted during Summer-Autumn, different results would have been obtained regarding the association between allergen sensitization and allergic symptoms severity. The study was also conducted in Amman area, and possibly the result may not be applicable outside Amman or outside Jordan.

Conclusion and Recommendations

This is the first study that reports differences in the effect of allergen sensitization on allergic symptoms severity. Olive and grass pollens were

associated with the most significant allergic symptoms. Olive pollen, in particular, should be given the highest attention, exposure should be avoided, if possible, and it should be considered a principle allergen in designing the immunotherapy regimen for those who are sensitized. The findings of this study help us better understand which allergens have more effect on allergic symptoms and, perhaps, will help in improving the management of allergic rhinitis patients in the future.

We recommend that researchers around the world conduct a similar investigation. The results will be very important for practitioners where they can focus more on the significant allergens in the designing of the immunotherapy regimen and also will be of importance for patients by giving more attention to avoiding the most important allergens. This is very important taking into consideration that researches around the world have identified that most patients suffer from poly-sensitization.

Acknowledgement

The authors wish to acknowledge the Deanship of Academic Research at the University of Jordan for funding this research which was part of the protocol entitled "Improving the Management of Allergic Rhinitis in Jordan".

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دراسة حول تأثير نوعية الـ allergen على شدة حساسية الأنف

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الملخص

خلفية: حتى الآن، ليس هناك ما يكفي من الأدلة التي تثبت أن أحد الـ allergen يسبب أعراض حساسية الأنف أكثر من الآخرين. تحديد الـ allergen التي تسبب ألأعراض أكثر من غيرها يمكن أن يقلل من الحاجة إلى العلاج المناعي المتعدد للحساسية وبالتالي التحسين من سلامة ونجاح العلاج المناعي.

الأهداف: إن الهدف من هذه الدراسة هو دراسة تأثير نوعية الـ allergen على شدة حساسية الأنف وتحديد allergens التي تسبب أعراض حساسية الأنف أكثر من الآخرين.

طريقة البحث: دراسة مقطعية أجريت في عيادات الأنف والأذن والحنجرة في مستشفى الجامعة الأردنية. خلال الأسبوع السابق لزيارة العيادة أكمل المرضى مذكرات عن أعراض الحساسية. اختبار وخز الجلد مع 18 مقتطفات حساسية أجريت في جميع المرضى. استخدم تحليل الانحدار الخطي لتحديد allergens المؤثرة بشكل مستقل على شدة حساسية الأنف.

النتائج: ثمانية allergens كان لها تأثير مهم ومستقل على شدة حساسية الأنف من الناحية الإحصائية. حبوب لقاح الزيتون كان لها أكبر تأثير لأعراض الحساسية.

الاستنتاجات: هذه هي الدراسة الاولى التي تظهر الاختلاف في تأثير نوعية allergen على شدة أعراض حساسية الأنف. ينبغي إيلاء حبوب لقاح الزيتون الأهتمام ألأكبر، وبالتالي يجب أخذ الحيطة الشديدة وعدم التعرض لها وأنه ينبغي ان تكون عنصراً أساسياً عند تصميم العلاج المناعي.

الكلمات الدالة: حساسية الأنف، اختبار وخز الجلد، شدة الأعراض.