مجلة كلية التربية الاساسية
كلية التربية الاساسية – الجامعة المستنصرية
Journal of the College of Basic Education Vol.30 (NO. 128) 2024, pp. 79-88

The prevalence of inhalation allergen in sample of Iraqi allergic asthma patients in Alrusafa-Baghdad

Thaer Khalaf Khashin[1], Enaam Khelawe Mana, Mohammad Saleh Jabr[1]
[1]Ministry of Health Allergy Specialized Center, Alrusafa, Baghdad. Iraq.
thaer.kh83@gmail.com
enaam.83kh@gmail.com

Abstract

Various types of allergen are found around us this triggers, such as dander animals, pollen, and other. These allergens cause an immune response that influences the lungs and leads to difficulties in breathing. Study the difference between patients with allergic asthma in 10-25 year and 26-41 year age groups rather than patients in (< 42 years) age group. Work included ELISA technique to measure serum level of specific IgE, and aeroallergen type. The present study included 150 patients with allergic asthma, males 66 (44 %) and females 84 (56%), their ages ranged between 10-65 years, who attended the Allergy Specialized Centre in Baghdad, during the period from September 2019 to February 2020. It also, a recorded result of a specific immunoglobulin E (s-IgE) test regarding the type of aeroallergen showed that D. farinae, Alder pollen, and White Oak pollen have obtained the first rank. At the same time, Aspergillus fumigatus, and Cladosporium herbarium take the last rank. The majority of females who were enrolled in this study were more exposed to allergens compared to males his study showed an increased difference between patients with allergic asthma in the 10-25 year and 26-41 year age group rather than patients in (< 42 year) age group. This aeroallergen could be considered a significant element in the pathogenesis of allergic asthma.

Keyword: Allergic Asthma, Specific IgE, Allergen, Gender, Age group

Introduction

Type I hypersensitivity is associated with allergic asthmatic illness. In this kind, an allergen interacts with basophils or mast cells' surface-bound premade IgE. Multiple mediators are released as a result of this interaction, which also induces the FceRI receptor to cross-link. Clinical states such as allergic asthma, allergic rhinitis, or systemic anaphylaxis might arise based on the relative localization of release [1]

Regardless of the exact mechanism, substances that have the potential to cause an allergic reaction are commonly referred to as allergens. Sensitization can result from allergens stimulating the manufacture of IgE

antibodies [2]. According to Gould *et al* .allergen sensitization is the capacity of the allergen to elicit a Th2 cell response, during which IL-4 and IL-13 stimulate the production of IgE by encouraging B cells to recombinant their immunoglobulin class switch [3], there are two primary categories of allergens. The first kind includes any non-infectious environmental material that has the ability to produce IgE, which then triggers allergic reactions when the material is later re-exposed. Allergens found in many places include grass, tree pollens, house dust, mite faecal particles, animal dander, latex, some insect venoms, fish, tree nuts, particularly peanuts, shellfish, eggs, and milk. The second category includes non-infectious environmental substances that, although assumed to occur independently of IgE antibodies, can trigger an adaptive immune response associated with local inflammation (e.g., allergic dermatitis from contact with poison ivy or nickel) [4].

Based on estimates of prevalence, almost half of patients identified with allergic reactions in primary care may not be allergic. Consequently, allergy testing methods such as skin prick testing, specific IgE (s-IgE) measurement, and others (including atopy testing, allergic reactions to substances or allergens, sensitization testing, sensitivity and specificity testing, and total IgE) are very helpful in proving the existence and severity of an allergy [5]. To find allergen-specific IgE, which is helpful in identifying the allergens to which a person with allergic asthma was sensitized and in developing a preventative strategy against allergen exposure, routinely employ in vitro techniques like radioallergosorbent tests or enzyme-linked immunosorbant assays and in vivo techniques like the skin prick test (SPT) on humans [6]. This research intended to determine difference between patients with allergic asthma in 10-25 year and 26-41 year age groups rather than patients in (< 42 years) age group.

Material and Method

1. Sample collection

In the current study, 150 patients with allergic asthma who visited the Allergy Specialized Center in Baghdad, Resafa between September 2019 and February 2020 were included. Of these patients, 66 (44%) were male and 84 (56%), with ages ranging from 10 to 65. The questionnaire results for the group of patients with allergic asthma in this study were (mean ± S.D.) 34.9 ± 15.8 years. Age-wise, all samples were divided into three groups: <42 years, 26-41 years, and 10-25 years.

2. The Principle of specific IgE

The Immunoblotting method uses a labeled antibody to recognize a specific protein against a target protein in the protein mixture, allowing the desired protein to be identified. As a result, the test is designed to measure the concentration of each particular IgE linked to an allergen. (21).

3. Statistical Analysis:

The values are reported as Frequency and Present. The levels of marker were compared between the study groups of patients according to allergen type, gender and age group, using SPSS computer package.

Result:

1 Demographic Characteristic

There were 150 patients with allergic asthma who were nominated for this study. There were 66 (44%) men and 84 (56%) women in these samples. Patients with allergic asthma ranged in age from 10 to 65, with a mean age of 34.9 ± 15.8 years and a standard deviation of the same. The BMI is 29.4± 6.4 kg/m², with a standard deviation of 6.4 kg. 46 patients had negative (-sIgE) results, and 104 patients had positive (+sIgE) results.

Table 1: Demographic Characteristic of Allergic Asthma Patients.

Characteristics	Allergic asthma
Total No.	150
Females, N (%)	84 (56 %)
Males, N (%)	66 (44 %)
Age (mean ± S.D.)	34.9 ± 15.8 (years)
BMI (mean ± S.D.)	29.4 ± 6.4
No. of + s-IgE	104
No. of - s-IgE	46

No.: Number, N: Frequency, %: Present, + s-IgE: Positive Specific Immunoglobulin E: - s-IgE: Negative Specific Immunoglobulin-E

2. Specific Immunoglobulin E (s-IgE)

1 Aeroallergen Types:

In the current investigation, 104 (+sIgE) patients with allergic asthma ranked the percentage of common disease-causing aeroallergens as follows: Table 2 displays the following percentages: 8.5% *Dermatophagoides pteronyssinus (d1), 10% D. farinae (d2), 10% Alder pollen (t2), 6.5% Birch*

pollen (t3), 6.5% Hazel pollen (t4), 10% White Oak pollen (t7), 6.2% Timothy Grass pollen (g6), 7.1% Rye pollen (g12), 0.6% Aspergillus fumigatus (m1), 0.6% Cladosporium herbarum (m2), 1.1% Penicillium notatum (m3), 1.1% Alternaria alternata (m6), 5.6% Mugwort pollen (w6), 5.9% Plantain pollen (w9), 5.9% Dog epithelia (e2/e5), 6.5% Cat epithelia (e1), 4.8% Horse epithelia (e3), 0.9% Guinea Pig epithelia (e6), 1.3% Hamster epithelia (e82), and 0.9% Rabbit epithelia (e84).

Table 2: Aeroallergens Types among Patients with Allergic Asthma.

Allergens (n=104)	Code	Sours of allergens	N	%
Mites	d1	D. pteronyssinus	39	8.5
	d2	D. farinae	46	10
Trees	t2	Alder pollen	46	10
	t3	Birch pollen	30	6.5
	t4	Hazel pollen	30	6.5
	t7	White Oak pollen	46	10
Grasses	g6	Timothy Grass pollen	29	6.2
	g12	Rye pollen	33	7.1
Molds	m1	Aspergillus fumigatus	3	0.6
	m2	Cladosporium herbarum	3	0.6
	m3	Penicillium notatum	5	1.1
	m6	Alternaria alternata	5	1.1
Weeds	w6	Mugwort pollen	26	5.6
	w9	Plantain pollen	27	5.9
Animals	e2/ e5	Dog epithelia	27	5.9
	e1	Cat epithelia	30	6.5
	e3	Horse epithelia	22	4.8
	e6	Guinea Pig epithelia	4	0.9
	e82	Hamster epithelia	6	1.3
	e84	Rabbit epithelia	4	0.9

N: Frequency, %: Present

2. Allergen and Gender:

Distribution of etiological allergens concerning both genders was demonstrated in table (3), where females showed a high predominance of aeroallergens. As can be seen in table (3), the frequency of females with d1 was 27 vs. 12 in males, and 27 vs. 19 regarding d2, 27 vs. 20 regarding t2, 21

vs. 9 regarding t3, 21 vs. 9 regarding t4, 25 vs. 21 regarding t7, 16 vs. 13 regarding g6, 17 vs. 16 regarding g12. The frequency of females with m1 was 1 vs. 2, and 1 vs. 2 regarding m2, 3 vs. 2 regarding m3, 2 vs. 3 regarding m6, 19 vs. 7 regarding w6, 15 vs. 12 regarding w9, 16 vs. 11 regarding e2/e5, 12 vs. 10 regarding e3, 1 vs. 3 regarding e6, 3 vs. 3 regarding e84.

Table3: Allergen Distribution by Different Genders.

Allergens	Code	Sours of allergens	Gender (n=104) N (%)	
			Females	Males
Mites	d1	D. pteronyssinus	27(69.2%)	12(30.8%)
	d2	D. farinae	27(58.7%)	19(41.3%)
Trees	t2	Alder pollen	27(57.4%)	20(42.6%)
	t3	Birch pollen	21(70%)	9(30%)
	t4	Hazel pollen	21(70%)	9(30%)
	t7	White Oak pollen	25(54.3%)	21(45.7%)
Grasses	g6	Timothy Grass pollen	16(51.5%)	13(44.8)
	g12	Rye pollen	17(51.5%)	16(48.5%)
Molds	m1	Aspergillus fumigatus	1(25%)	2(75%)
	m2	Cladosporium herbarum	1(33.3%)	2(66.7%)
	m3	Penicillium notatum	3(60%)	2(40%)
	m6	Alternaria alternata	2(40%)	3(60%)
Weeds	w6	Mugwort pollen	19(73.1%)	7(26.9%)
	w9	Plantain pollen	15(55.6%)	12(44.4%)
Animals	e2/ e5	Dog epithelia	16(59.3%)	11(40.7%)
	e1	Cat epithelia	17(56.7%)	13(43.3%)
	e3	Horse epithelia	12(54.5%)	10(45.5%)
	e6	Guinea Pig epithelia	1(25%)	3(75%)
	e82	Hamster epithelia	3(50%)	3(50%)
	e84	Rabbit epithelia	3(75%)	1(25%)

N: Frequency, %: Present.

3. Allergen and Age group:

Table 4 showed the distribution of etiological allergens for both genders and showed that patients with allergic asthma in three age groups (10–25 years, 26–41 years, and <42 years) had diverse aeroallergens. as indicated by table (4)

Table 4: Allergen Distribution by Different Age group

Allergens	Code	Sours of allergens	Age group N (%); (n=104)		
			10-25 y	26-41 y	<42y
Mites	d1	D. pteronyssinus	16(34.2)	12(30.6)	11(28.2)
	d2	D. farinae	17(37.0)	14(30.4)	15(32.7)
Trees	t2	Alder pollen	17(36.2)	18 (38.3)	12(25.5)
	t3	Birch pollen	12(40.0)	14(46.7)	4(13.3)
	t4	Hazel pollen	10(33.3)	14(46.7)	6 (20.0)
	t7	White Oak pollen	16(34.8)	18(39.1)	12(26.1)
Grasses	g6	Timothy Grass pollen	8(27.6)	11(37.9)	10(34.5)
	g12	Rye pollen	8(24.2)	13(39.4)	12(36.4)
Molds	m1	Aspergillus fumigatus	0(0)	2(100)	0(0)
	m2	Cladosporium herbarum	1(33.3)	2(66.7)	0(0)
	m3	Penicillium notatum	2(40.0)	2(40.0)	1(20.0)
	m6	Alternaria alternata	2(40)	3(60)	0(0)
Weeds	w6	Mugwort pollen	9(34.6)	11(42.3)	6(23.1)
	w9	Plantain pollen	8(29.6)	12(44.4)	7(25.9)
Animals	e2/ e5	Dog epithelia	11(40.7)	10(37.0)	6(22.2)
	e1	Cat epithelia	9(30.0)	13(43.3)	8(26.7)
	e3	Horse epithelia	10(45.5)	7(31.8)	5(22.7)
	e6	Guinea Pig epithelia	0(0)	2(50.0)	2(50)
	e82	Hamster epithelia	3(50.0)	2 (33.3)	1 (16.7)
	e84	Rabbit epithelia	2(50.0)	1 (25.0)	1(25.0)

N: Frequency, %: Present.

Discussion

Aeroallergens should be the most blamed etiological factors when discussing asthma, despite the fact that the disease has been recognized as a typical complex one with many disease causative factors. This was demonstrated in the current study, where the majority of patients were sensitized to one or more (up to a maximum of twenty) types of aeroallergens. The results were helpful in identifying the most common aeroallergens that were prevalent among the patients. But as table (2)

illustrates, there was a high incidence of allergy to mites of type D. farinae, tree *pollen* of type *Alder, and White Oak pollen*, followed by D. pteronyssinus, Rye, Birch, Hazel, Cat, Timothy Grass, Dog, and Horse epithelia, and lastly, aeroallergens such as Hamster epithelia, Penicillium notatum, Alternaria alternata, Guinea Pig epithelia, Rabbit epithelia, Aspergillus fumigatus, and Cladosporium herbarum (2). The findings of Alwan and Wahab , who indicated that mites were the first allergen and pollen to show a noticeable positive correlation in the Iraqi environment [7][8], were all in general accord with the current data [9][10]. However, around 40% of patients with AR in Jordan, an area close to Iraq, were sensitized to thistle weed, olive tree pollens, and a combination of grasses [11]. At least 95% of sensitized individuals with allergic asthma in Ankara, Turkey, have identified the allergens Phleum pratense, Artemisia vulgaris, and Dermatophagoides pteronyssinus [12]. In Iran, it has been there are reports about prevalent that moulds, weeds, animal dander, grass pollen, house dust mites, and trees were the most prevalent allergens in patients with allergic rhinitis (AR) and allergic asthma [13]. It has been demonstrated that Alternaria spores are a common outdoor allergen in Saudi Arabia. The researchers hypothesized that airborne Alternaria could act as an allergy sensitizer for those who are prone to allergic asthma [14]. Most allergic asthma patients in Kuwait, according to Al-Dowaisan *et al* re sensitized to Salsola Imbricate pollens, which is thought to be the primary source of allergies and respiratory conditions [15]. According to several areas, analyzed Goronfolah's atopy data. In Tikrit City, Bermuda grass, mold, Dermatophagoides pteronyssinus and Dermatophagoides farinae were the most common allergens. In the city of Baquba, house dust mites, mixed grasses, and Bermuda grass were the most prevalent sensitizers. Lastly, according to Goronfolah *et al.*, grass pollen and house dust mites (HDMs) were the two allergens most frequently found in the Governorate of Mosul [16]. It is evident that the allergen profiles in local and regional investigations differ [16][17]. According to D'Amato *et al*. this was explained by the fact that the allergenic content of the atmosphere fluctuates according on the climate, topography, and vegetation [18]. The following explanation could account for these findings: most of the female participants in the study were unemployed and spent most of their time at home. As indicated by table (3), this is the reason why they were exposed to certain kinds of aeroallergens more than males. Additionally, as indicated in Table (4), this study revealed a

greater difference between patients with allergic asthma in the 10–25 and 26–41 year age groups than between patients in the (<42 year) age group. Age and gender may alter the sensitization pattern, and variations in climate and geography may impact the profiles' levels of sensitization [19][20]

Conclusion:

The result of this study showed specific immunoglobulin E (s-IgE) test regarding the type of aeroallergen showed that D. farinae, Alder pollen, and White Oak pollen have obtained the first rank. At the same time, Aspergillus fumigatus and Cladosporium herbarum take the last rank. Also, the majority of females have increased exposure to inhalation allergens compared with males. And, this study showed an increased difference between patients with allergic asthma in 10-25 year and 26-41 year age groups rather than patients in (< 42 years) age group.

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Journal of the College of Basic Education Vol.30 (NO. 128) 2024, pp. 79-88

مدى انتشار مسببات الحساسية الاستنشاقية في عينة من مرضى الربو التحسسي في الرصافة - بغداد

مستخلص البحث:

توجد حولنا أنواع مختلفة من مسببات الحساسية، مثل وبر الحيوانات وحبوب اللقاح وغيرها. تسبب هذه المواد المسببة للحساسية استجابة مناعية تؤثر على الرئتين وتؤدي إلى صعوبات في التنفس. وقد تم دراسة الفرق بين مرضى الربو التحسسي في الفئتين العمريتين (10-25 سنة)و26(-41 سنة) بدلاً من المرضى في الفئة العمرية (<42 سنة). وشمل العمل تقنية ELISA لقياس مستوى مصل IgE ونوع مسببات الحساسية الهوائية. شملت الدراسة الحالية 150 مريضاً مصاباً بالربو التحسسي، ذكور 66 (44%) وإناث 84 (56%)، تراوحت أعمارهم بين (10-65 سنة)، راجعوا مركز الحساسية التخصصي في بغداد، خلال الفترة من أيلول 2019 إلى شباط 2020. وقد أظهرت النتيجة المسجلة لاختبار الجلوبيولين المناعي النوعي E (s-IgE) فيما يتعلق بنوع مسببات الحساسية الهوائية حصول(D.farinae و Alder pollenو White Oak)على المرتبة الأولى. وفي الوقت نفسه، يأخذ كل من(Aspergillus fumigatus و Cladosporium Herbarium) المرتبة الأخيرة. كما كانت غالبية الإناث الذين تم تسجيلهم في هذه الدراسة أكثر تعرضاً لمسببات الحساسية مقارنة بالذكور، وأظهرت الدراسة زيادة الفرق بين المرضى الذين يعانون من الربو التحسسي في الفئة العمرية 10-25 سنة و26-41 سنة بدلاً من المرضى في (<42 سنة)) الفئة العمرية. يمكن اعتبار مسببات الحساسية الهوائية عنصرًا مهمًا في التسبب في الربو التحسسي.