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Distribution of atopic conditions among attendants to specialized allergy center/ Kirkuk/ Iraq

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ABSTRACT

Atopy is a syndrome characterized by genetic tendency to develop allergic diseases, such as asthma, allergic rhinitis and atopic dermatitis. The risk factors of atopic diseases can be placed in two categories, namely host and environmental factors. The host factors of allergy include genetics, race, gender, age… etc. The environmental factors include exposure to environmental pollution and allergens. To define the distribution of atopic conditions (asthma, allergic rhinitis and atopic dermatitis) according to age, residence and available skin prick test. This cross-sectional study included (100) patients, representing research sample. It was conducted in specialized allergy center in Kirkuk city during the period from first January .2016 to the end of December 2016

All patients included in this study were referred from primary health centers, complaining from signs and symptoms of atopic diseases. Depending on medical history and clinical examinations, the sample was classified into (3) groups (asthma, allergic rhinitis and atopic dermatitis). Skin prick test was used to identify patients allergy to house dust mite and pollen. Regarding the distribution of samples according to residence, most patients (about 91%) were from urban areas compared with (9%) of them were from rural areas. Also, it was found that the frequency of atopic diseases decreases by age advancement. The frequency distribution of asthma, allergic rhinitis and atopic dermatitis was 49%, 26% and 25%, respectively. The skin test data revealed the frequency of 2 aeroallergen mite and pollen in all patients under study. .Hence, 65% were sensitive to house dust mite, 26% to pollen and 9% to both mite and pollen

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In conclusion this study confirmed that most patients complaining from atopic disease were from urban area. Also, the frequency of atopic diseases decreased by age advancement. The most common atopic disease was asthma followed by allergic rhinitis and atopic dermatitis. Most patients were sensitive to house dust mite.

Keywords Atopy, Aeroallergens, Skin Prick Test, Hypersensitivity.

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نسبة انتشار الحساسية الاتوبية لدى مراجعي المركز التخصصي للحساسية كركوك\ العراق

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الملخص

التأتب هي متلازمة تتميز بالميل الجيني للإصابة بأمراض الحساسية مثل الربو والتهاب الأنف التحسسي والتهاب الجلد التأتبي. يمكن وضع عوامل الخطورة للأمراض التأتبية في فئتين هما العوامل المضيفة والعوامل البيئية. تشمل العوامل المضيفة للحساسية الوراثة والعرق والجنس والعمر وما إلى ذلك. وتشمل العوامل البيئية التعرض للتلوث البيئي والمواد المثيرة للحساسية. ,الهدف من هذه الدراسة تحديد توزيع الحالات التأتبية (الربو ، التهاب الأنف التحسسي ، التهاب الجلد التأتبي) حسب العمر، الإقامة ، واختبار وخز الجلد المتوفر. وان مجموع الافراد المشمولين في هذه الدراسة المستعرضة 100 مريض أجريت الدراسة في المركز التخصصي للحساسية في مدينة كركوك خلال الفترة من أول يناير 2016 إلى نهاية ديسمبر 2016. جميع المرضى المشمولين في هذه الدراسة أحيلوا من مراكز الرعاية الصحية الأولية وكانوا يعانون من علامات وأعراض الأمراض الاتوبيه. اعتمادا على التاريخ الطبي والفحوص السريرية ، تم تقسيم المرضى إلى 3 مجموعات رئيسية: الربو، التهاب الأنف التحسسي، التهاب الجلد التأتبي. تم استخدام اختبار وخز الجلد لتحديد المرضى الذين يعانون من الحساسية لغبار غبار الطلع وحبوب اللقاح. فيما يتعلق بتوزيع المرضى حسب السكن، معظم المرضى (حوالي 91٪) كانوا من المناطق الحضرية مقارنة بـ (9٪) من المناطق الريفية. انخفاض نسبة الأمراض التأتبية مع التقدم في السن. كانت نسب الاصابة بمرض الربو والتهاب الأنف التحسسي والتهاب الجلد التأتبي 49 ٪ ، 26 ٪ 25 ٪ على التوالي. كشفت بيانات اختبار وخز الجلد للحساسيه في جميع المرضى المشمولين بالدراسة ان 65٪ اظهروا حساسية لعث

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غبار المنزل ، 26٪ لحبوب اللقاح ، و 9٪ لكل من عث غبار المنزل وحبوب اللقاح. أكدت هذه الدراسة ان معظم المرضي الذين يشكون من الامراض الاتوبيه كانوا من المناطق الحضرية ، انخفاض نسبة الامراض الاتوبيه مع ازدياد العمر ، والمرض التاتبي الأكثر شيوعا كان الربو يليه حساسية الأنف والتهاب الجلد التاتبي. اظهر معظم المرضي حساسيه لعث غبار المنزل. **الكلمات الدالة** التأتب ، المستأرجات الهوائية، اختبار وخز الجلد ، فرط الحساسية.

1.Introduction

The term “atopy” originates from the Greek word (atopos: without a place). In 1923, Coca and Cooke has introduced this term to denote the lack of position in the medical classification. Then, it has been used for classifying eczema, asthma and allergic rhinitis [1]. So, atopy refers to the predisposition to create an excessive IgE immune reaction to otherwise safe environmental materials [2]. People who suffer from atopy normally have one or more of these diseases: atopic dermatitis, allergic rhinitis or allergic asthma. Also, they have a predisposition to suffer allergic conjunctivitis, food allergies and eosinophilic esophagitis [3].

The hypersensitivity response to an allergen causes atopic reactions.

Atopic diseases demonstrate a strong genetic element. There is a study confirming that the risk of developing atopic dermatitis (3%) or atopy in general (7%) "increases by a factor of two with each first-degree family member already suffering from atopy" [4]. A strong hereditary tendency exists toward atopic diseases, particularly on the motherly part, due to the strong family evidence. Researchers have attempted to define the sensitive genes to atopy [5]. There is increasing occurrence of allergic diseases in both industrialized and non-industrialized countries. The reason for this is undefined, but a widely believed assumption is “hygiene hypothesis”. This suggests that the immune system is biased against the development of atopic disease because of infections in childhood, and that allergy is the consequence for the decrease, incidence of infection caused by improvement in sanitation and health care services.

There are other factors contributing to the development of atopic diseases, a family history is the strongest among them. Additionally, disease susceptibility is attributed to many genes comprising those controlling the production of cytokine and levels of IgE. There are environmental factors governing the expression of hereditary predisposition like smoke of

cigarette, pollutants and the bacterial incidence and viral infection [2]. International studies like "ISAAC (The International Study of Asthma and Allergies in Childhood)" show that the prevalence of atopic disease varies from one country to another and that their distribution in those countries can vary also.

Studies on migrants can highlight the complex interaction between hereditary and environmental factors that play a role in forming the atopic phenotype [6]. Allergic diseases are on the rise with common allergies affecting 10-30% of the world population at any given point of time in their lives [7]. Asthma and allergic rhinitis are among the common air-borne allergic reactions affecting nearly 300-500 million people around the world. According to researches, 300 million people suffer from asthma and 400 million people suffer from rhinitis across the globe [8].

However, data on atopy in Iraq are rare. Alsamarai et al. examined data of survey for 16,736 heterogeneous issues in (5) combined studies. The total incidence of asthma diagnosed by physician was 10.2% based on the total levels of IgE and a relatively low threshold of 100 IU/ml [9]. Alsaimary stated that in Basrah, 88.8% of people were expected to have allergy [10]. An international, cross-sectional, web-based survey was conducted in the US, Canada, United Kingdom, Germany, France, Spain, Italy and Japan.

A questionnaire was sent to adult members of online respondent panels for identifying adult atopic dermatitis among participants according to region. The percentages of prevalence were as follows: "4.9%/3.9% in the US, 3.5%/2.6% in Canada, 4.4%/3.5% in the EU and 2.1%/1.5% in Japan". Generally, the incidence of disease in males was lower than in females, and reduced by age advancement. The incidence of adult atopic dermatitis ranged from 2.1% to 4.9% across countries [11].

2.Research Objective

To determine the distribution of atopic conditions (asthma, allergic rhinitis and atopic dermatitis) according to age, residence and available skin prick test.

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3.Patients and methods

This is a cross-sectional study carried out in specialized Allergy and Immunology center in Kirkuk city during the period from first of January 2016 to the end of December 2016. A total of 100 patients were included in this study from both genders. They were selected as a convenience sample. Their ages were stratified according to Ministry of Health (MOH) official classification (group A: 1-14 years; group B: 15-29 years; group C: 30-49 years; group D: 50-69 years, and group E: ≥70 years), obtained from the Ministry of Health Records of the center as age ranging from (1 year-≥70 year), residence (urban and rural).

All patients included in this study were referred from primary health centers to allergy specialized center, complaining from signs and symptoms of atopic conditions (allergic rhinitis, atopic dermatitis and asthma). Diagnosis of patients with atopic dermatitis was based on medical history (personal history of other allergic diseases and family history of atopic diseases) and criteria of atopic dermatitis according to Hanifin and Rajika [12]. Diagnosis of patients with asthma was based on medical history and clinical examination, including positive family history of asthma and atopic diseases, personal history of asthma and atopic diseases.

Clinical diagnosis of asthma is often promoted by symptoms, such as recurrent episodes of breathlessness, chest tightness, wheeze, cough, usually worsens at night and early morning. Chest examination was done using stethoscope (sound of wheezing during normal breathing or prolong phase of forced exhalation) with the limitation of lack of pulmonary function test. Diagnosis of allergic rhinitis largely depended on accurate history and clinical examination, personal history of atopic diseases, history of episodic rhinorrhea, sneezing, obstruction of nasal passage with lacrimation.

In addition to summarizing the history on aggravating risk factors like house dust mite, pollen, grass, animal dander and irritants like strong perfumes and tobacco smoke. It is useful to identify the trigger and try to avoid it. After diagnosis of patients, skin prick test was used to identify allergies to pollen from Stallergenes pharmaceutical company (France, established in 1962) and house dust mite allergen produced in Iraq.

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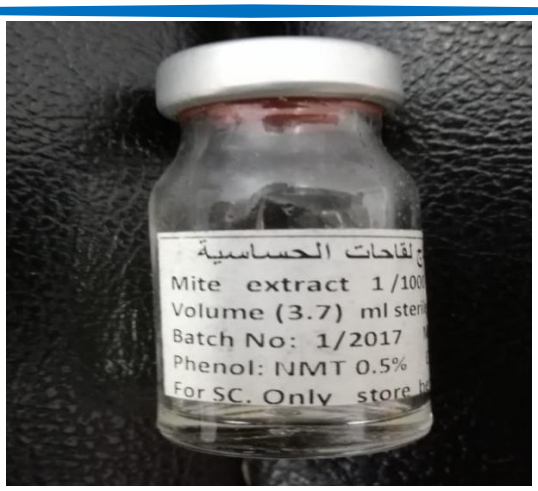

Figure (1): House dust mite vial

Skin prick testing (SPT) is a reliable technique for diagnosing IgE-mediated allergic disease in patients suffering from asthma, rhino-conjunctivitis, atopic dermatitis, urticaria and suspected food and drug allergy. It is minimally invasive test, inexpensive and its results are immediately available. In 1959, Helmtraud Ebruster has first published a study about SPT [13]. SPT has helped to diagnose the underlying cause of allergic diseases, and is required to recommend appropriate prophylaxis for immunotherapy [14].

Usually, skin prick tests are performed on forearm, and the range between tow prick tests should be 2 cm to avoid cross-contamination [15]. The location of each allergen can be marked with a pen. The application of tests should be to the palmar side of the forearm, about 2 – 3 cm from the wrist and the antecubital fossa. A drop of each test solution must be positioned on the skin in the same order for each patient tested and directly pricked [16]. After 20 minutes, the contours of the wheal are encircled with a pen and transferred to a record sheet by translucent tape [17]. The measurement of the largest wheal diameter of each specific test was done. Hence, the positive result indicates that the wheal is ≥ 3 mm [18].

4.Results and Calculations

The current study investigated allergic condition among 100 patients suffering from asthma, allergic rhinitis and atopic dermatitis. Regarding the distribution of sample according to residence, 45% of patients with asthma were from urban area in comparison to 25% of patients with allergic rhinitis and 22% of them suffering from atopic dermatitis.

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While about 4% of asthmatic patients were from rural area in comparison to 2% of allergic rhinitis patients and 3% of patients with atopic dermatitis (as shown in table 1).

Table (1): correlation between residence and allergic conditions among 100 patients

Residence / Allergic Conditions	Urban	Percent	Rural	Percent	Total	Percent
Asthma	45	45%	4	4%	49	49%
Allergic rhinitis	24	24%	2	2%	26	26%
Atopic dermatitis	22	22%	3	3%	25	25%
Total	91	91%	9	9%	100	100%

Table (2) shows the correlation of allergic conditions and age groups. In the current study, the sample was classified into (5) groups according to age, as follows: group A (1-14 year), group B (15-29 years), group C (30-49 years), group D (50-69 years) and group E (≥70 years). The percentage of allergic condition distribution among patients in group A was 12%; while in other groups B, C, D and E was (31%, 44%, 10%, 3%), respectively.

Table (2): correlation between age and allergic conditions

Age	Allergic conditions	Percent
Group A 1-14	12	12%
Group B 15-29	31	31%
Group C 30-49	44	44%
Group D 50-69	10	10%
Group E ≥70	3	3%
Total	100	100%

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Figure (2) shows the frequency distribution of allergic conditions among 100 patients included in this study. Percentage of asthmatic patients was 49% compared to 26% allergic rhinitis and 25% atopic dermatitis.

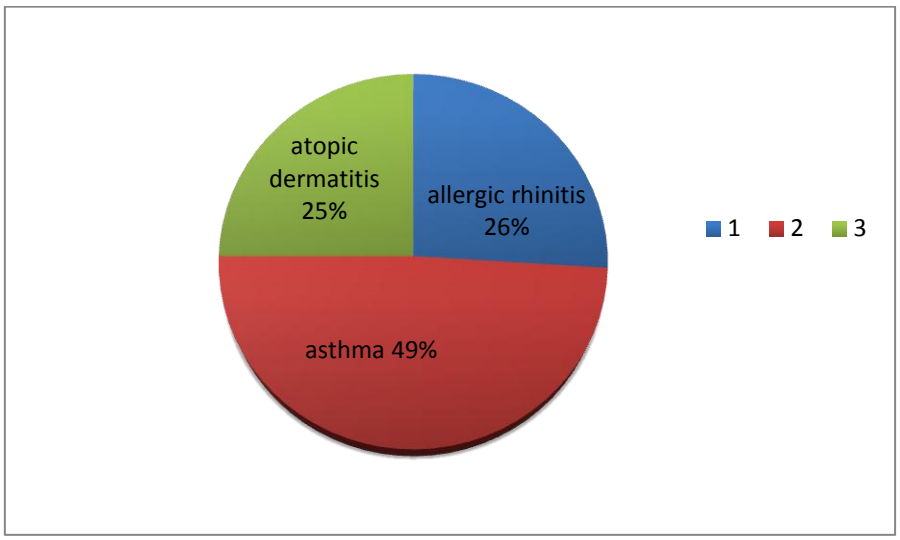

Figure (2): frequency distribution of allergic conditions

In this study, the frequency of 2 aeroallergen was tested among 100 patients. The result showed that in asthmatic patients, there were mite 33%, pollen 12% and both of them 3%. While in allergic rhinitis patients, there were mite 16%, pollen 10% and both of them 1%. Then, in patients with atopic dermatitis, there were mite 16%, pollen 4% and both of them 5%) (See table 3).

Table (3): frequency of 2 aeroallergen among 100 patients tested for allergic prick test

Allergic Conditions	Mite	Percent	Pollen	Percent	Both	Percent	Total	Percent
Asthma	33	33%	12	12%	3	3%	48	48%
Allergic Rhinitis	16	16%	10	10%	1	1%	27	27%
Atopic Dermatitis	16	16%	4	4%	5	5%	25	25%
Total	65	65%	26	26%	9	9%	100	100%

5.Conclusion

Regarding the outcomes of this study, it can be concluded that most allergic patients were living in urban areas compared with rural areas. Frequency of atopic diseases decreased by age advancement. Most patients visiting specialized allergy center were suffering from asthma followed by allergic rhinitis and atopic dermatitis. Finally, most patients included in this study were allergic to house dust mite.

6.Discussion

In this study, correlation of allergic conditions with residence showed that about 91% of patients in all three groups (asthma, allergic rhinitis and atopic dermatitis) were living in urban area compared with 9% living in rural area. In developing countries, studies frequently report that allergic diseases occur in rural areas with low rates in comparison to urban places. This is because of the preventive effects of environmental exposures like rural lifestyle [19]. In Africa and Asia, studies proved the increase of atopic diseases in both urban and rural places, which reduces the urban-rural prevalence gap [20]. Studies have assumed that the increasing prevalence of allergic diseases could be related to processes of urbanization, particularly with the change from rural to more modern urban lifestyles [19].

Moreover, the increase in occurrence of respiratory allergic diseases is associated with high levels of vehicles emissions. Similarly, the risk of allergic sensitization is increasing because of using modern oils, which might be a causative factor for the increased incidence of allergic disorder [21]. The Hygiene hypothesis suggests that reduced microbial exposure in early life leads to increasing incidence of allergic sensitizations and diseases [22]. The results of this study agree with those found in the study of Kilpeläinen M. et al. that in childhood, farm environment inhibits the development of allergies [23]. Also, they are in agreement with the findings of Nicolaou N. et al. that allergies are prevailing in rural Mongolia with low rates and that their prevalence increases with increasing urbanization [24]. They also agree with the results of the study of Lee SY et al. (2012) that the incidence of allergic diseases and atopy was greater in urban Korean children [25].

However, the current results disagree with Guner B. et al. (2011) that the prevalence of allergic diseases in rural and urban areas is similar [26]. Currently, there is an increased exposure to chemicals from various sources, particularly in industrial countries. Some chemicals are emitted as exhaust fumes of vehicles, industrial dust and insecticides. Another

hypothesis proposes that the increasing of atopic disease in urban areas may partly be attributed to a reduced exposure to allergens including pollens (resulted from the change in urban lifestyle, for example, spending much time at home and far from regions rich in natural sources of allergens), resulting in a lower tolerance to pollens: "a reverse case of immunotherapy" [27].

Age advancement is related to adjustments of the immune system, identified as immunosenescence. This might contribute to reduce the incidence of allergic diseases in the aged people. In the current study, atopic diseases are found to be decreased by age advancement. Many studies reveal that the prevalence of atopy is decreased by age advancement either in samples of general people or people with no allergy-related symptoms.

The National Health And Nutrition Examination Survey (NHANES) II is the largest study on skin prick/ puncture. It includes 16204 participants from the non-institutionalized population in the US, who have undergone a skin prick test to (8) allergens. Hence, 30% of persons whose ages range between 12–24 years have at least one positive skin test. The occurrence of positive reaction has declined to 8% in individuals aged 65–74 [28]. The current results agree with those found by Duaine R. Jackola et al. that there was a decline in total serum IgE by age advancement, and the incidence rates of relative atopy were slightly lower among those older than 60 years [29].

Based on literature review, only (2) studies indicated the absence of decrease in the incidence of atopy by age advancement. Yet, there are limitations in both studies. The incidence of allergic asthma in old people was identified in a work conducted in Baltimore, USA on 80 asthmatics older than 65 years. It was found that 75% of participants were having at least one sensitization to common airborne allergens as measured by skin pick test [30]. The second study done by Crawford W. W. et al. was a cross-sectional survey applied to adult asthmatics and patients with allergic rhinitis to evaluate the effects of age on atopy. They found the increase of atopic disease by age advancement [31].

In this study, the frequency distribution of asthma, allergic rhinitis and atopic dermatitis was 49%, 26% and 25%, respectively. Jobran M. Alqahtani found that the total incidence of asthma diagnosed by physician, allergic rhinitis and atopic dermatitis was 27.5%, 6.3% and 12.5%, respectively in Saudi Arabia [32]. In a cross-sectional study done by Dennis RJ in Colombia 2009–2010, the existing incidence of symptoms of asthma was 12% (95% CI, 10.5-13.7) with 43% (95% CI, 36.3-49.2) requiring a visit to emergency department

or hospitalization during the previous 12 months. Asthma diagnosed by physician was 7% (95% CI, 6.1-8.0). The existing incidence of symptoms of allergic rhinitis was 32% (95% CI, 29.5-33.9) and symptoms of atopic eczema was 14% (95% CI, 12.5-15.3) [33].

Aeroallergens are substances present in the air that, once inhaled, stimulate an allergic response in sensitized individuals. These substances include tree, grass, weed pollen, molds and other allergenic proteins associated with animal dander, dust mites and cockroaches [34]. House dust mites and pollens play a major role in allergic disorders. In this study, data of skin prick test revealed the frequency of 2 aeroallergens house dust mite and pollen among 100 patients included in this study. Hence, 65% of patients had positive hypersensitivity reaction to house dust mite in comparison to 26% to pollen and 9% to both mite and pollen. In asthmatic patients group, the rates were as follows: mite 33%, pollen 12% and both mite and pollen 3%. While in allergic rhinitis patients, they were as follows: mite 16%, pollen 10% and both of them 1%; and in patients with atopic dermatitis, they were represented as: mite 16%, pollen 4% and both of them 5%.

The current result agree with that of Navpreet K. G et al. who examined the prevalence of house dust mite and pollen among allergic diseases in India. They found that 38.23% of asthmatic patients were sensitive to mite, 29.41% to pollen and 32.35% to both mite and pollen. In patients with allergic rhinitis, about 37.5% of them were allergic to mite; while 34.36% of patients were allergic to pollen and 31.25% were allergic to both of them. In patients with atopic dermatitis, about 41.66% of them were allergic to house dust mite, 29.17% were allergic to mite and 29.17% were allergic to both mite and pollen [35].

However, data about atopic disease in Iraq are very rare. Alwan and Al-Dulaimy (2009) tested 391 patients suffering from allergic rhinitis and/or allergic asthma visiting an allergy clinic in Baquba. The most common sensitizations were house dust mite (25.3% of patients tested), Bermuda grass (23%) and mixed grasses (19.6%) [36]. Bassam TS et al. examined 62 patients suffering from allergic rhinitis visiting the allergic clinic at Tikrit

Teaching Hospital with 18 allergen extracts. Three patients (5%) were non-sensitized, 8 (13%) were monosensitized and 51 (82%) were sensitized to two or more allergens. The most notable sensitizations were Bermuda grass (66% of patients), grass mix (28%), molds (at least 34%), *Dermatophagoides pteronyssinus* (18%) and *Dermatophagoides farinae* (9%) [37]. In Mosul, a study about the effect of different factors on allergic patients was done by

Zakaria BB and Basima AA. They found that the overall sensitization rate in intradermal tests was 44% for house dust mite and 38% for grass pollen [38].

7.References

1] Hunter JA, SavinJA, Dahi MV. Clinical Dermatology . 3rd ed. London: Blackwell publisher; 2002:81-85.

[2] Boon N A, Colledge N R, Walker B R, Hunter J A. Davidson's principles and practice of medicine. 20th edition.London: Elservier; 2006: 83-84.

[3] González-Cervera J, Arias Á, Redondo-González O, Cano-Mollinedo MM, Terreehorst I, Lucendo AJ ."Association between atopic manifestations and eosinophilic esophagitis. *Ann Allergy Asthma Immunol* (Systematic Review and Meta-analysis); 2017: 118 (5): 582-590.

[4] Küster, W, Petersen M, Christophers E, Goos M, Sterry W. "A family study of atopic dermatitis". Dermatol Res 1990;282 : 98–102.

[5] *Lai CKW, Beasley R, Crane J, Foliaki S, Shah J, Weiland S, et al. Global variation in the prevalence and severity of asthma symptoms: phase three of the international study of asthma and allergies in childhood (ISAAC). Thorax. 2009;64(6):476–83.*

[6] *Rottem M, Szyper-Kravitz M, Shoenfeld Y. Atopy and asthma in migrants. Int Arch Allergy Immunol. 2005;136(2):198–204.*

[7] Ring J. Davos Declaration: Allergy as a global problem. *European Journal of Allergy and Clinical Immunology*,2012: 67(2):141–143.

[8] Pawankar R. Allergic diseases and asthma: a global public health concern and a call to action. World Allergy Organization Journal 2014 7(1):12.

[9] Alsamarai AM, Alwan AM, Ahmad AH, Salih MA, Salih JA, Aldabagh MA, Alturaihi S, Abdulaziz ZH, Salih AA, Salih SK, Murbat MM. The relationship between asthma and allergic rhinitis in the Iraqi population. Allergol Int. 2009;58(4):549-55.

[10] Alsaimary IE. Modes of allergy and total IgE concentrations among various ages of Basrah populations. International Research Journal of Microbiology. 2001;2(8):303-9

[11] Barbarot S. Auziere S., Gadkari A., Girolomoni G., Puig L et al. Epidemiology of atopic dermatitis in adults: Results from an international survey. *Allergy: European Journal of Allergy and Clinical Immunology* 2018; *73*(6):1284-1293.

[12] Hanifin JM. Rajka RG. Diagnostic features of atopic dermatitis. Acta Derm Venerol (stockh) 1980; 92(144):44-7.

[13] Ebruster H: The prick test, a recent cutaneous test for the diagnosis of allergic disorders. Wien Klin Wochenschr 1959; 71:551–554.

[14] Bousquet J, Heinzerling L, Bachert C, et al. Practical guide to skin prick tests in allergy to aeroallergens. Allergy. 2012;67(1):18–24.

[15] Piette V, Bourret E, Bousquet J, Demoly P. Prick tests to aeroallergens: is it possiblesimply to wipe the device between tests?*Allergy* 2002;57:940-942.

[16] Carr WW, Martin B, Howard RS, Cox L, Borish L. Comparison of test devices for skin prick testing. J Allergy Clin Immunol 2005;116(2):341–346.

[17] De Jong NW, Van Maaren MS, Vlieg-Boersta BJ, Dubois AE,et al. Sensitization to lupine flour: is it clinically relevant? Clin Exp Allergy 2010;40(10):1571–7.

[18] Konstantinou GN, Bousquet PJ, Zuberbier T, Papadopoulos NG: The longest wheal diameter is the optimal measurement for the evaluation of skin prick tests. Int Arch Allergy Immunol 2010, 151 (4): 343-345.

[19] von Hertzen L., Haahtela T. Disconnection of man and the soil: reason for the asthma and atopy epidemic? J Allergy Clin Immunol 2006;117:334–344.

[20] Addo-Yobo E, Woodcock A, Allotey A, Baffoe-Bonnie B, Strachan D, Custovic A. Exercise-induced bronchospasm and atopy in Ghana: two surveys ten years apart. PLoS Med. 2007;4:0355–0360.

[21] Nicolai T, Carr D, Weiland SK, DuhmeH, Von Ehrenstein O et al. Urban traffic and pollutant exposure related to respiratory outcomes and atopy in a large sample of children. Eur Respir J 2003;21:956–963.

[22] Platts-Mills TA, Erwin E, Heymann P, Woodfolk J. Is the hygiene hypothesis still a viable explanation for the increased prevalence of asthma? *Allergy* 2005;60: 25–31.

[23] Kilpeläinen M, Terho EO, Helenius H, Koskenvuo M. Farm environment in childhood prevents the development of allergies . Clin Exp Allergy 2000 Feb; 30(2):201-8.

[24] Nicolaou N, Siddique N, Custovic A. Allergic disease in urban and rural populations: increasing prevalence with increasing urbanization. Allergy. 2005;60(11):1357-60.

[25] Lee SY, Kwon JW, Seo JH, Song YH et al. Prevalence of atopy and allergic diseases in Korean children: associations with a farming environment and rural lifestyle. Int Arch Allergy Immunol. 2012;158(2):168-74.

[26] Guner S N, Gokturk B, Kili M, Ozkiraz S. The prevalences of allergic diseases in rural and urban areas are similar. Allergologia et Immunopathologia 2011; 39: 140-144.

[27] Linneberg A. Hypothesis: urbanization and the allergy epidemic – a reverse case of immunotherapy? Allergy 2005;60:538–539.

[28] Gergen P, Turkeltaub P, KovarM. The prevalence of allergic skin test reactivity to eight common aeroallergens in the U.S. population: results from the second national health and nutrition examination survey. Journal of Allergy and Clinical Immunology.1987; 80 (5) : 669-679.

[29] Duaine R. Jackola, Lisa K. Pierson-Mullany et al. Robustness Into Advanced Age of Atopy-Specific Mechanisms in Atopy-Prone Families. Journal of Gerontology: BIOLOGICAL SCIENCES. 2003; 58(2): 99–107.

[30] Huss K. , Naumann P.L., Mason P.J. *et al.* Asthma severity, atopic status, allergen exposure and quality of life in elderly persons Annals of Allergy, Asthma, & Immunology. 2001; 86 (5): 524-530.

[31] Crawford W. W., Gowda V.C., W.B. Klaustermeyer W.B. Age effects on objective measures of atopy in adult asthma and rhinitis. Allergy and Asthma Proceedings.2004; 25 (3): 175-179.

[32] Jobran M. Alqahtani Asthma and other allergic diseases among Saudi schoolchildren in Najran: the need for a comprehensive intervention program. . Ann Saudi Med 2016; 36(6): 379-385.

[33] Dennis RJ, Caraballo L, García E, et al. Prevalence of asthma and other allergic conditions in Colombia 2009–2010: a cross-sectional study. BMC Pulm Med.2012 Jul 13;12:17.**[34]** Atkinson R.W., Strachan D.P. Role of outdoor aeroallergens in asthma exacerbations: Epidemiological evidence. *Thorax*.2004; 59: 277-278.

[35] Navpreet K. G. , Amandev S. et al. house dust mites and pollens as risk factors in allergic manifestations. Indian J.Sci.Res.2016; 7(1) : 131-142.

[36] Alwan AH, Al-Dulaimy RA. Study of Skin Sensitivity to Various Allergens by Prick Skin Test in Patients with Bronchial Asthma Diyala Journal of Medicine 2011;1(2):78-82.

[37] Bassam TS, Allaa IA, Raad IS, Taha SM, Abdelstar HA. A study of skin prick test reactivity to common aeroallergens among patients with allergic rhinitis in Salahelden Governorate. Tikrit Journal of Pure Science 2011;16(4):40-4.

[38] Zakaria BB, Basima AA. Effect of different factors on Atopic Allergy In Mosul Community. International Journal of Advanced Research 2013;1(10):927-36.