Immunological Study in A Sample of Patients with Atopic Dermatitis in Baghdad

Emad Mohammed Rasdeed Shahbaa M. Al-Khazraji

Abstract:

Background: Atopic dermatitis is a chronic disease with many miserable complications. Atopic dermatitis is a common disease among the population, with estimated prevalence of 7% to 17.2% which may occur at any age.

Aim: This study was conducted to study some clinico-epidemiological pattern of the disease in Iraqi patients and with the two immunological investigations (eosinophil counts and total serum IgE).

Materials and Methods: A sample of 30 Iraqi patients with atopic dermatitis were chosen during a period of four months from 15th of November 2017 to 15th of March 2018 in the consultant clinic of the Dermatology and Venereology of Al-Yarmouk Teaching Hospital in Baghdad. The disease was diagnosed clinically by dermatologist. A control group of 30 unrelated healthy nonatopic individuals (matched for age and gender) was selected for the comparison. Additionally, two laboratory parameters were investigated for their association with AD. These were: eosinophil counts and total serum IgE.

Results: The rate of atopic dermatitis was significantly decreasing with age, and season of birth appeared to have no effect on the occurrence of Atopic dermatitis.

About half of the patients (50%) were with long duration of atopic dermatitis (more than 10 years). There was a significant association between family history of atopy in parents and personal history of atopy with atopic dermatitis. In general, respiratory atopy and family history were found in 76.7% and 70 % of patients respectively.

The significant provocation factors for AD in the current study were soap sensitivity (90. %); wool clothes (86.7%); daily bathing (60%); and climate and seasonal variation (83.3%). The majority of AD patients showed a significant increase in the eosinophil counts (83.3%) and serum IgE (90%) in comparison to control group.

Conclusion: There were an obvious and significant association of increased risk of AD and some environment factors which act as provocation factors. Also, results showed a highly significant increase in both eosinophils counts and total serum levels of IgE in patients with AD.

Key words: Atopic dermatitis, Eosinophil counts, Total serum IgE

Introduction:

Atopic Dermatitis (AD) is a chronic relapsing inflammatory condition of the skin, often associated with a personal or family history of asthma and allergic rhinitis. AD is a common disease among the population, with estimated prevalence of 7% to 17.2% which may occur at any age but it usually appears during infancy and early childhood[(1)] .

Atopic Dermatitis is of a world-wide interest because of its unknown etiology, unclear pathogenesis and difficult treatment. Although, the cause of AD is not well-understood but it may be the result of interaction between hereditary, immunological and environmental factors. In AD a decreased in number and function of suppressor T-lymphocyte may result in an increase in circulating IgE serum level and peripheral eosinophils[(2,3)] .

Total IgE level are increased in the majority of AD patients [(4)]. Laboratory data may be helpful in the diagnosis of AD. Patients with AD frequently have eosinophilia and approximately 80% of patients have high serum levels of IgE [(5)].

Atopic Dermatitis should not be regarded as a minor skin disorder but as a condition which has the potential to be a major handicap involving considerable personal, social and financial consequences both for the family and for the community [(6)]. AD affects both sexes almost equally; the proportion between men and women is 1.2:1 [(7)].

The result of study conducted in Baghdad among 9605 pupils in primary schools had showed that 204 of them were had AD represent about 2.12% [(8)]. Unfortunately, few studies were available on the association of Immuunological parameters with AD in Iraq.

The present work was designed to achieve the following objectives:

1- To study some clinico-epidemiological features of the disease in Iraqi patients.

2-To study some of the risk and trigger factors associated with this disease.

3- To estimate some immunological changes (eosinophil counts and total serum IgE) accompanied AD.

Subjects and Methods

A case-control study was conducted and a sample of 30 Iraqi patients with atopic dermatitis were chosen during a period of four months from 15th of November 2017 to 15th March of 2018 in the consultant clinic of the Dermatology and Venereology of Al-Yarmouk Teaching Hospital in Baghdad. The disease was diagnosed clinically by dermatologist. A control group of 30 unrelated healthy nonatopic individuals (matched for age and gender) was selected for the comparison.

Patients who had received corticosteroids, antihistamines or other systemic therapy at least

one month prior to the time of the study were excluded. Data were obtained directly from the participants through a face-to-face interview using questionnaire covered demographic and clinical areas)

All patients and healthy controls were informed about the study and verbal consent for participation was obtained. All data were kept confidential and were not use only for the purpose of the research.

In addition, five milliliters (mls) of blood was obtained from each participant (patient or control) enrolled in this study by venipuncture using disposable syringes. The aspiration was carried out by the researcher himself. The aspirated blood was immediately dispensed into 2 different test tubes. Two mls of the blood was collected in the first test tube (sterilized plain test tube) and was left to stand for 30 minutes at room temperature (25ºC). The tube was then centrifuged at 2500 rpm for 10 minutes. Serum was separated carefully by Pasteur pipette. Finally placed in one ml Appandrof's tube and stored at –20°C to be utilized in the estimation of IgE level. While the remaining of the blood sample was put in the second tube containing EDTA (1.5 mg/ml blood) anticoagulant for the eosinophil counts

Blood eosinophil counts, was achieved by visual examination of blood films. Blood eosinophilia is considered when eosinophil counts >440/mm³. Radioimmunosorbent test (RIST), is two site enzyme-linked immunosorbent assay (ELISA) was used for the serum quantitative determination of IgE. The test was done using the immunoassay analyzer cobas e 411 device.

Statistical analysis was done using Epi info (Version 6) computer software. Descriptive statistic was done using frequency and percentage. The statistical significance of an association between two variables was assessed by Chi-square. An estimated P-value was considered statistically significant if it is less than 0.05.

Results

The present work observed higher rate of disease in females (56.7%) than in males (43.3%), the male to female ratio was 1: 1.3. The overall mean age of the patients was 25.9±8.2 years at the time of examination and with range of 15-44 years. Moreover, this study demonstrated that the prevalence of AD was decreasing according to age. The rate of AD declines from 46.7% at age <25 years to 23.3% at age of 35-44 years.

Assessing the relation between the date of birth according to the season and the development of AD, the finding revealed that those born in autumn showed the highest frequency (43.3%) while those born in spring showed the lowest frequency (6.7%), but this difference was not significant statistically when compared to the controls (Table1). This means that the climate in early infancy does not affect the AD occurrence in future.

Clinical Characteristics of AD

The duration of AD is shown in figure 1, from which it is apparent that half of the patients (50%) were with long duration (>10 years).

In general, respiratory atopy was found in 23 patients (76.7%), 11 patients (36.7%) gave a history of allergic rhinitis, followed by 7(23.3%) were with a history of asthma, while five (16.7%) had a history of both respiratory atopy. On the other hand, seven patients (23.3%) had pure AD (Figure 2).

Interestingly, this study give an evidence that a positive family history of atopy acts as a risk factor to develop AD as a significant positive family history in parents was given by the patients. Patients with AD exhibited almost three-fold higher frequency of a positive family history (70%) compared to 23.3% among control group. (χ^2 =13.13, P=0.00029) as shown in table 2.

Provocation (triggering) factors of AD

The proportion of soap sensitivity was significantly higher among patients with AD (90%). Also, the present study revealed that 86.7% of AD cases were aggravating by wool a clothes. In addition, a significant association was detected between AD and the daily bathing. But the current study failed to detect any significant association between AD development and food allergy. Regarding animals contact, this study illustrates that animals contact play no role in the development of AD (Table 3). This study demonstrated that 83.3% of AD patients aggravated by seasonal variation. The highest exacerbation was during winter (60%) while the lowest was during summer (10%) (Figure 3).

Eosinophil counts and Total serum IgE

The current study revealed that 25 patients with AD (83.3%) had blood eosinophilia (>440/mm³), while only five patients (16.7%) of the controls demonstrated blood eosinophilia. This variation was statistically highly significant (χ^2=26.67, P=0.0000002). In addition, a significant increase of IgE was clearly observed in the sera of 90% of patients (Fig 4).

Table 1: The distribution of the study groups according to the season of birth.

Season of birth	AD		Control	
	No	%	No	%
Autumn	13	43.3	11	36.7
Winter	9	30	10	33.3
Summer	6	20	5	16.7
Spring	2	6.7	4	13.3
Total	30	100	30	100

(χ^2=0.98, P=0.80

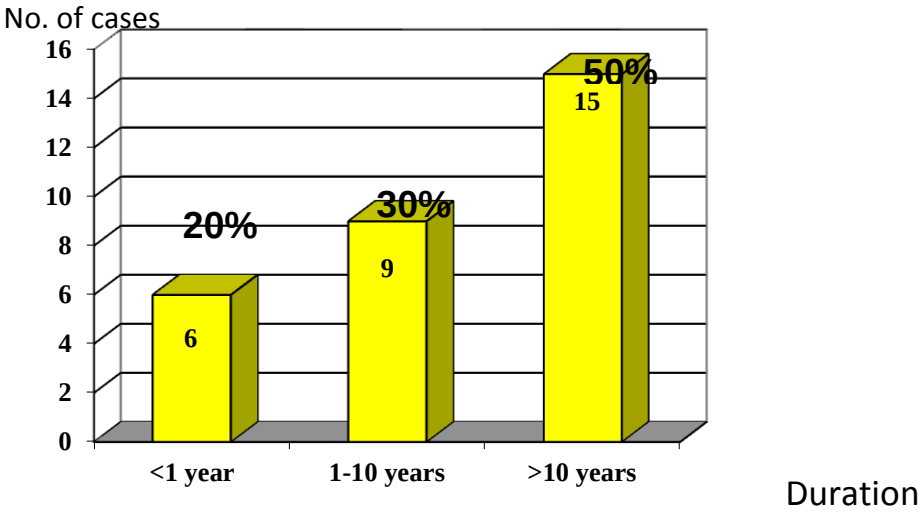

Figure 1: The duration of the dermatitis in patients with AD.

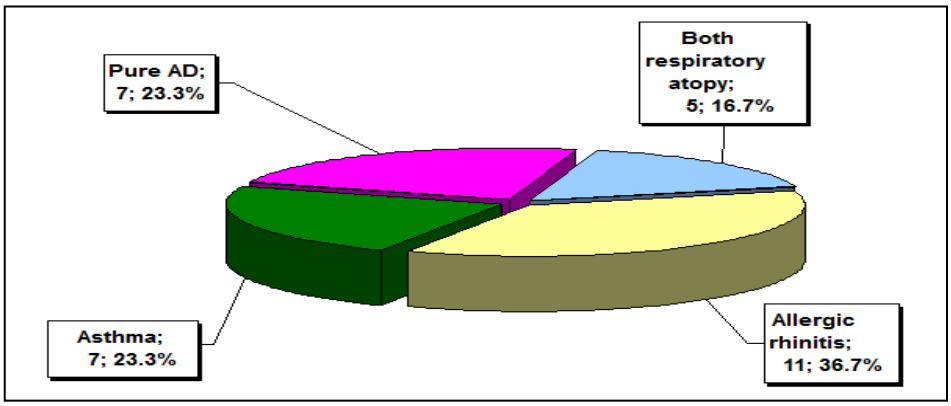

Figure 2: The distribution of patients according to type of personal history of atopy.

Table 2: The association between family history of atopy and occurrence of AD.

Family history	AD		Control	
	No	%	No	%
Positive	21	70	7	23.3
Negative	9	30	23	76.7
total	30	100	30	100

χ^2=13.13, P=0.00029

Table 3: Provocation factors of AD patients compared to the controls.

Provocation factors	AD (cases)		controls		χ^2, P-value
	No	%	No	%	
Sensitivity to soap	27	90	13	43.3	14.7, 0.00012
Wool intolerance	26	86.7	9	30	19.82, 0.0000085
Daily bathing	18	60	7	23.3	8.3, 0.00397
Food allergy	10	33.3	8	26.7	0.32, 0.573
Animals contact	5	16.7	4	13.3	0.13, 0.717

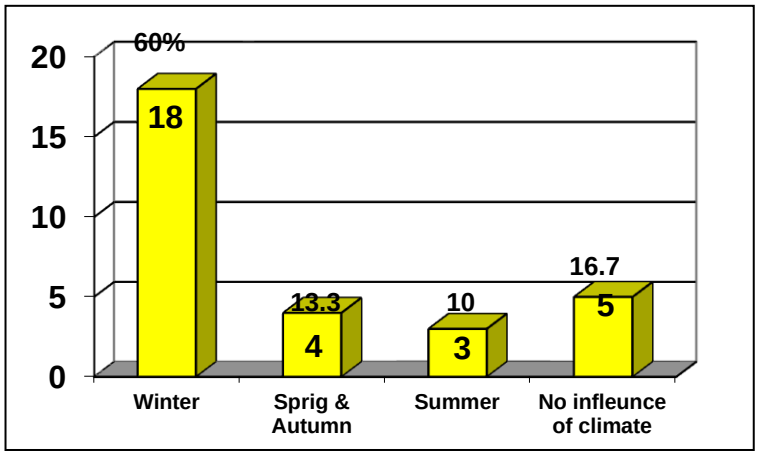

Figure 3: The effect of climate (season) on AD exacerbations

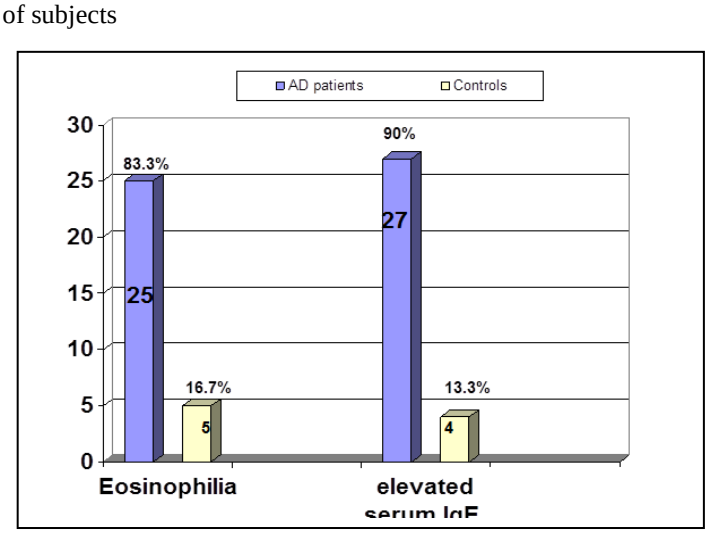

Figure 5: The distribution of patients and controls according to eosinophil counts and total serum IgE

Discussion:

Concerning the gender and its relation to AD, several authors gave controversial results. They either found that females are more prone than males for AD or some reported the reverse result, while other described similar sex distribution and suggested no difference. Our finding comparable to that reported by Schwartz *et al*, 2004 [9]. Similarly, Lopez-Perez *et al*, 2001 in Mexico [10], found that the prevalence in girls (56.7%) higher than boys (43.3%). But our finding disagrees sharply with Tay *et al* (2002), they reported that the prevalence of AD was more among boys Singapore children with ratio of 1.18: 1 [11]. On the other hand, several workers reported equal prevalence in both sexes like Jassim (2004) in Baghdad; and Terr, (2001) in United States population [8, 12].

The current study disagree with Lopez-Perez *et al*, (2001) and McNaly *et al* (2001), they found no significant difference in prevalence of AD according to age [10, 13]. The possible explanation of the decline of AD with age may be due to; there is a general tendency toward spontaneous improvement throughout childhood. Relatively few typical cases persist over the age of 30 years; perhaps half of all cases clear by the age of 13 years [14].

The current study finding confirmed Olesen *et al* study (2003), they found that there was no significant relation between season of birth and risk of AD [15].

The high rate of prolong duration of AD in the current study which is similar to other studies [10], could be attributed to genetic causes and environmental factors. The bad general condition in Iraq may make AD worse and of prolonged course through psychological stress, bad nutrition, and exposure to pollution.

Moreover, this study accords with Tay *et al* (2002), they found that the most common associations of AD are a risk of developing respiratory atopy **[11]**. The explanation for the tendency of AD patients for respiratory atopy may be due to hereditary causes as atopy is a genetically determined disorder inherited as autosomal dominant character in which there is an increased susceptibility to certain diseases, especially asthma, hay fever [14].

Family history has been outlined by several authors abroad and suggested to be an important factor in AD like Wadonda *et al* (2001), who reported that parental history of AD remained the strongest risk factor of developing the lesion of AD [16]. Also, this study is in agreement with Kharfi *et al* (2001) study, which was conducted in Tunisia, they found that 65% of AD affected patients had positive family history of atopy [17]. Additionally, Girolomoni *et al* (2003) in Italy stated that there is strongest association between AD and the presence of AD in at least one parent [18].

Soap sensitivity was confirmed by the current study in which proportion of soap sensitivity was

significantly higher among patients with AD (90%).

The probable explanation for this finding is that most patients with AD have dry skin and some soap promote irritation and inflammation in the atopic patient and remove natural lipid from the surface of the skin [(1)]. Also, the present study revealed that 86.7% of AD cases were aggravating by wool a clothes. For this reason, we recommended that irritant clothing like woolen clothing should not be next to the skin and cotton clothing is more comfortable.

The significant association that detected by this work between AD and the daily bathing is in agreement with that reported by Jassim (2004) in Baghdad, who found that daily bathing was significantly more frequent among the population with AD. The best logic explanation for this association is that the stratum corneum of atopic patients is thinner and had fewer layers of dead cells and intercellular lipid than normal and repeated washing and drying removes water-binding lipids from the first layer of the skin so frequent bathing and lengthy bathing should be avoid, especially hot water baths and soaps [(19)].

Seasonal changes in the course of AD have been documented by several authors. The possible interpretation of seasonal exacerbation of AD could be related to several factors; Low temperature and low relative humidity tended to be risk factors [(1)].

The findings showed a highly significant increase in both eosinophils counts and total serum levels of IgE in patients with AD. These findings were documented by several authors abroad [(10, 20)]. The number of circulating eosinophils is elevated due to increasing release of eosinophils from bone. marrow. Mediators which are involved in this process are the IL-3 and IL-5. Also, the increment of IgE level in AD is quite explainable; the hyper IgE may be caused by an increase in concentration of specific mediators which lead to B cell activation. This could be explained by the immune deviation toward Th2 response with over excretions of IL-4 and IL-13 secretion [(20)]. From above results, one can infer that IgE may play an important role in the genesis of the cutaneous changes and is not only a concomitant phenomenon.

References …

1- **Habif TP.** Atopic dermatitis. In: Clinical Dermatology,
A color guide to diagnosis and therapy. 5th edition, **(2009)** Chapter 5, Mosby pp 105-155.

2- **Klüken H, Wienker T, Bieber T.** Atopic eczema/dermatitis syndrome. A genetically complex disease. New advances in discovering the genetic contribution. Allergy, **2003:**58(1); 5.

3- **Hunter J A A, Savin J A, Dahl M V.** Atopic dermatitis. In: Clinical Dermatology 3rd edition, **(2003)** Black well science. Chapter 7, pp 81-87.

4- **Thijs J L, Knipping K, Bruijnzeel-Koomen C A F, Garssen J, de Bruin-Weller M S, Hijnen D J.** Immunoglobulin free light chains in adult atopic dermatitis patients do not correlate with disease severity. Clin Transl Allergy, **2016;** 6:44.

5- **Werfel, T.** Classification, Clinical Features and Differential Diagnostics of Atopic Dermatitis. In Werfel T, Spergal J, Kiess W(eds). Atopic Dermatits in Childhood and Adolescence. KARGER, Switzerkand, 2011.

6- **Emerson R M, Williams H C, and Allen B R.** The financial impact on families of children with atopic dermatitis. Br J Dermatol, **2001**;143: 514-522.

7- **Schmied C and Saurat J H.** Clinical Aspects of Atopic Eczema. In: **Ruzicka T, Ring J, Przybilla B (Eds)**: Handbook of Atopic Eczema. Spriger-Verlag Berlin Heidelberg Gmbh, Germany, 2013.

8- **Jassim RK.** Prevalence of atopic dermatitis among primary school children in Baghdad-AlKarkh District. A thesis submitted to the College of Medicine, Al-Mustansiriyah University for M. Sc in community medicine. **(**2004).

9- **Schwartz R A, Selvagem F, Lebwohl MC, Butler D, Rico MJ, Craufor GH, Jamg WD.** Atopic dermatitis. Medicine. **2004;** 29: 1-5.

10- **Lopez–Perez G, Morfin-Maciel B, Hernandez T, Barbosa C, Huerta-Lopez J.** Prevalence of atopic dermatitis in a group of children in Mexico city. ACI International. **2001;** 13: 236-241.

11- **Tay Y K, Kong KH, Khoo L, Goh CL, Giam YC.** The prevalence and descriptive epidemiology of atopic dermatitis in Singapore school children. Br J Dermatol. **2002;** 146(1): 101-6.

12- **Terr A I.** The atopic diseases. In: Parslow TG, Stites DP, Terr AI and Imboden JB (Eds.). Medical Immunology, 10th edition. Chapter 26, McGraw-Hill Companies**. 2001,** pp 365-368.

13- **Mc Nally NJ, Williams H C and Phillips DR.** Atopic eczema and the home environment. Br J Dermatol, **2001;** 145: 730-736.

14- **Holden CA and Parish W E.** Atopic dermatitis. In: Champion RH, Burton JL, Burns DA and Breathnach SM (eds). Rook/Wilkinson/Ebling Text book of

Dermatology. Chapter 18, 6th edition, **(2010)** Black well Science; 1: 681-708.

15- **Olesen A B, Juul S, Thestrup-Pedersen K.** Atopic dermatitis is increased following vaccination for measles, mumps and rubella or measles infection. Acta Derm Venereol, **2003;** 83(6): 445-50.

16- **Wadonda N, Golding J, Kennedy C T, Archer C B, Dunnill M G S.** Breast feeding, high social class and maternal smoking influence the risk of atopic dermatitis. Br J Dermatol, **2001;** 145(59):12-26.

17- **Kharfi M, Hadjali B, Khaled H, Mokhtar A, Kamoun I.** Atopic dermatitis in Tunisia: Epidemiological and clinical aspects. Ann Dermatol Venereol, **2001;** 128(5):623-5.

18- **Girolomoni G, Abeni C, Masini F, Sera F, Ayala A, Belloni-Fortina E.** The epidemiology of atopic dermatitis in Italian school children. Allergy, **2003;** 58(5):420-425.

19- **Leicht S and Hanggi, M.** Atopic dermatitis. Postgraduate medicine, **2001;** 109 (6): 119-27.

20- **Wollenberg A, Kraft S, Oppel T, Bieber T.** Atopic dermatitis: pathogenetic mechanisms. Clin. Exp. Dermatol, **2000;** 25:530.