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Estimation the level of IgE in Asthmatic children

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ABSTRACT

Background: This study was done to detect the level of IgE in asthmatic children.

Aim: The aim of this study is to evaluate the relation between asthma in children and IgE level in children.

Study Design: Case-control study.

Patient study: This study was performed in Mosul city from January 2019 to June 2019. The total number of children in this study was 200 (152 patients and 48 control) were recruited from the emergency department, outpatients clinics of Ibn al-Atheer teaching hospital for children, pediatric private clinic and from primary schools of children in Mosul city. The sample size was 152 patients with asthma (109 males and 43 females) whose age between 1-15 years.

Methods: 5 ml of blood were collected by vein puncture using disposable syringe from each patients and control enrolled in this study for determination of IgE levels using enzyme linked immune-sorbent assay (ELISA technique).

Result: IgE levels was significantly elevated in asthmatic children and even in some control cases.

Conclusion: There was a strong association between Asthmatic children and elevated IgE levels in most of patients and some control cases.

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Introduction:

Asthma is a heterogeneous disease is defined by the history of respiratory symptoms [1]. It's worldwide distribution and about 235-330 million of people are affected by asthma at 2011[2]. There are several factors like positive atopic status, exposure and sensitization to environmental allergens and/or familial history of allergic disease [3], viruses, exercise which are involved in suboptimal control of asthma in children [4].Immunoglobulin E is a type of antibody or immunoglobulin (Ig) that has only been found in mammals, IgE is synthesized by plasma cells, monomers of IgE consist of two heavy chains and two light chains, and these two heavy chains containing 4 Ig-like constant domains [5]. IgEs main function is immunity to parasite such as helminthes [6]. IgE is utilized during immune defense against certain protozoan parasites [7]. IgE also has an essential role in type I hypersensitivity, which manifest in various allergic disease, such as allergic asthma, most types of sinusitis[8], allergic rhinitis, food allergies, and specific types of chronic urticaria and atopic dermatitis ,IgE also plays a pivotal role in responses to allergens, such as anaphylactic drugs, bee stings, and antigens preparations used in desensitization immunotherapy[8]. Although IgE is typically the least abundant isotype, blood serum IgE levels in a normal (non-atopic) individual are only 0.05% of the Ig concentration [9].In allergic asthma, IgE is the main cause of the allergic inflammatory reaction, participate in bronchial obstruction, and has a role in allergic asthma exacerbations [10]. Another studies [11], have assessed the relationship between severity of allergic asthma and markers of atopy and inflammation, both in children, and adults [12,13]. Since the identification and initial description of IgE by Ishizaka *et al* [14,15], in 1966 and Johansson and Bennich [16], in 1967, knowledge of the role of IgE in the pathogenesis of allergic disease has increased considerably [17].In 2005, Borish *et al* [18], reported that high levels of total IgE were associated mainly with moderate

and severe asthma, especially in younger patients and in adults whose asthma began in childhood. Naqvi *et al* [11], found an inverse relationship between total IgE levels and lung function and, therefore, the severity of asthma in 3 different ethnic groups [11,19,20].

MATERIALS & METHODS:

This study was performed in Mosul city from January 2019 to June 2019. The patients with asthma were recruited from the emergency department, outpatients' clinics of Ibn al-Atheer Teaching Hospital for children, Mosul general Hospital, pediatric private clinic and from primary schools of children in Mosul city. The sample size was 152 patients with asthma (109 males and 43 females) whose age between 1-15 years, while the control group who were matched to the patients, included 48 children (38 males and 10 females), all of them were healthy children (no sign and symptoms of asthma), they were not received any medication, with no history of asthma or any disease.

RESULTS:

The patients were subdivided according to their age into five groups, the ages in both patients and control ranged between 1 to 15 years (mean ± SD = 8.99 ± 3.43), while in control (mean ± SD = 11.02 ± 1.28). Most patients with asthma and control cases were commonly seen among the age groups of 10 to 12 years was 61 (40.1%) case and 26 (54.2%) patient and control respectively, then followed by the ages of 7 to 9 years was 42 (27.7%) case and 5 (10.4%) case in patient and control respectively, then followed by the ages of 4 to 6 years was 21 (13.8%) case and 6 (12.5%) patient and control respectively, as shown in table (1).

Table1: Distribution of study sample according to age

Age group (yr.)	Patients		Control		χ^2 , df , p* value
	No.	%	No.	%	
1 – 3	12	7.9	4	8.3	1 , 0.999 NS**
4 – 6	21	13.8	6	12.5	0.054 , 1 , 0.816 NS
7 – 9	42	27.7	5	10.4	6.014 , 1 , 0.014 S
10 – 12	61	40.1	26	54.2	2.924 , 1 , 0.087 NS
13 – 15	16	10.5	7	14.6	0.590 , 1 , 0.442 NS
Total	**152**	**100.0**	**48**	**100 .0**	**6.830 , 4 , 0.145 NS**
min – max Mean ± SD	**1 – 16 8.99 ± 3.43**		**9 – 14 11.02 ± 1.28**		**-----**

*Chi-Square test was used ** Fisher Exact test was used NS = Non Significant S = Significant.

Table 2: patients with asthma according to gender

Gender	Patients		Control		χ^2 , df , p* value	OR	95% C.I (OR)
	No.	%	No.	%			
Male	109	71.7	38	79.2	1.041 , 1 , 0.308 NS	0.67	0.31-1.44
Female	43	28.3	10	20.8			
Total	**152**	**100 .0**	**48**	**100.0**			

* Chi-Square test was used OR= Odds Ratio NS = Non-Significant

Table 3: The frequency of patients with asthma according to residence

Residence	Patients		Control		χ^2 , df , p* value	OR	95% C.I (OR)
	No.	%	No.	%			
Urban	140	92.1	40	83.3	3.119 , 1 , 0.077 NS	2.33	0.92-5.97
Rural	12	7.9	8	16.7			
Total	**152**	**100 .0**	**48**	**100.0**			

*Chi-Square test was used OR= Odds Ratio NS = Non-Significant

Table 4: Frequency of IgE in patients with asthma

IgE level IU/ml	Patients		Control		χ^2 , df , p* value	OR	95% C.I (OR)
	No.	%	No.	%			
< 20 IU/ml	27	17.8	14	29.2	0.021 , 1, 0.884 NS	0.94	0.40 – 2.21
20-100I U/ml **	37	24.3	18	37.5	-----	-----	-----
> 100 IU/ml	88	57.9	16	33.3	6.436 , 1, 0.011 S	2.68	1.23 – 5.81
Total	**152**	**100 .0**	**48**	**100 .0**	**8.843, 2, 0.012 S**		

*Chi-Square test was used OR= Odds Ratio NS = Non-Significant ** Reference group S = Significant

Table 5: Frequency of eosinophil count in patients with asthma

Eosinophil Count cell / %	Patients		Control		χ^2 , df , p* value	OR	95% C.I (OR)
	No.	%	No.	%			
High > 6 %	53	34.9	2	4.2	15.681 , 1, 0.000VHS	12.09	3.01–47.92
Normal 2-6 % **	57	37.5	26	54.2	-----	-----	-----
Low < 2 %	42	27.6	20	41.6	0.014 , 1, 0.905 NS	0.96	0.48 – 1.93
Total	**152**	**100.0**	**48**	**100.0**	**17.264, 2, 0.000VHS**		

* Chi-Square test was used OR= Odds Ratio NS = Non-Significant

** Reference group VHS = Very Highly Significant

DISCUSSION:

In this current study, asthma was identified in range of age (1-15) years old (mean ± SD = 8.99 ± 3.43) (P = 0.145 NS),and there was no significant association between asthma and children in most age groups. There was in agreement with the result of AT Kaaviyaa *et al* [21], Meltem Erol *et al* [22] who demonstrated that there was no significant association between asthma in children and age groups. Although the present study was in disagree with Somashekar *et al* [23], Abdulbari Bener *et al* [24] studies may be due to geographical, environmental and immunological differences between children.

Analysis of the gender for children with asthma showed that the incidence was more common in male (71.7%) than females (28.3%)

approximately (3:1), and there was no significant association between gender and asthmatic children. This result was in agreement with Eleazar Suchiang *et al* [25], Laura R Zillmer *et al* [26], on the other hand the present study was in disagreement with Hala G Elnady *et al* [27], Kathi M Naughton [28], who demonstrated that the prevalence of asthma was similar in both sexes. One of the most important reason for the infection with asthma in males than females was explained by Malik *et al* [29] which demonstrated that the high incidence of asthma in males compared to females may be attributed to presence of two X chromosomes which provide greater genetic diversity to the female immunological defenses.

The analysis of residence for children with asthma showed that the incidence was more in urban area (92.1%) than rural area (7.9%), and there was no significant association between asthma in children and residence, this result was in agreement with Ganesh S. kumar *et al* [30], Deepandra Garg et al [31],this result may be due to crowded population in urban area than rural area and also the exposure to passive smoking and environmental triggers such as cars, air conditioners, and carpets were more increased using in urban than rural area, moreover, the green area and trees that can be seen in urban area were very little when it is comparable with rural area, but in contrast the present study was disagreement with M. Lama et al [32], Hala G. Elnady *et al* [33] which they demonstrated that there was association between residence and asthma or acute respiratory tract infection in children which was related to low socioeconomic status of families lived in rural areas.

The analysis of IgE levels in this study revealed that (57.9%) from asthmatic children had been elevated IgE levels, even about third of control cases (33.3%) had been elevated IgE levels and there was significant association between IgE (>100 IU/ml) and asthma in patients and controls, while it is not significant in patients who had IgE levels was less than (<20 IU/ml).This result was in agreement to John M. Brehm [34], Chunlei Hou *et al*

[35],who demonstrated that IgE levels will be elevated in children with asthma and there were a high correlation between IgE and asthma in children. But in contrast this result was in disagreement with Deirdre D- onnelly *et al* [36], Lolanda Chinellato *et al* [37] who demonstrated that IgE levels did not elevated or might be a very little elevation in asthmatic children infected and these no correlation between IgE and asthma in asthmatic and this condition might be related to that children may be exposed to various types of allergens when they played outside such as dust, pollen, air pollution and cold in winter season or even when they been at home by exposing to negative smoking [38]. In this present study the analysis of eosinophil count in asthmatic children showed that there were very high significant association between increase eosinophil count (> 6%) and asthma in children. This result was in agreement with Seung Jin Lee *et al* [39], M. Lama *et al* [32], which demonstrated a significant association between elevated eosinophil count and asthma in children, and this may be due to that eosinophil cell considered one of the most important hematological markers of allergy, in another way eosinophil cell was well recognized as a central cell in the inflamed asthmatic airway, moreover, it was been found that eosinophils release toxic basic proteins and lipid mediators such as cysteinyl-leukotrienes that cause bronchial epithelial and airflow obstruction [40]. But in contrast this result was in disagreement with Huria M Aldubi *et al* [41], Lolanda Chinellato *et al* [37], who demonstrated that there is no significant association between eosinophil count and asthma in children.

CONCLUSIONS:

Asthma was more prevalent among children from 10 to 12 years old group, Its more frequent in males than females and most patients were from Urban area, moreover, the IgE level was elevated in about 57.5% case of asthmatic patients, also the third 33.3% of control cases had been elevation in IgE level, in addition to, the higher

percentage of eosinophil count had been found in 34.9% of asthmatic patients.

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