

## IgE Level and Eosinophil Count in Relation with Type of Feeding in Children with Atopic Dermatitis

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### Abstract

- Background** Atopic dermatitis (AD) is a chronic inflammatory disease of the skin that occurs in persons of all ages but is more common in children.
- Objective** To determine the effect of breast feeding on atopic dermatitis.
- Methods** A descriptive study carried on pediatric patients visiting asthma and allergy center and pediatrics out patient in Tikrit Teaching Hospital from March 2007 to August 2007. This study included 100 patients with AD; 58 cases (58%) were males and 42 cases (42%) were females, they all underwent full history, clinical examination and blood sampling for total WBC count, eosinophil cells count, and total serum IgE.
- Results** Statistical analysis was done by using (ANOVA, Chi-square test). There was significant association between severity of AD according to scorad index (S.I) and type of infant feeding, the mean severity score (S.S) for the breast fed (B.F) children was  $21.48 \pm 4.96$ , while the mean S.S for the formula fed (F.F) children was  $35.70 \pm 9.79$ ,  $p$  value  $\leq 0.05$ . There was a significant association between the hematological parameters of disease activity (total serum IgE level, eosinophil count) and type of infants feeding; the mean total serum IgE level for the B.F children was  $211 \pm 178.7$  IU/ml, was lower than mean total serum IgE level for F.F children ( $638.2 \pm 355.8$  IU/ml). The mean eosinophil cells count for the B.F children ( $355.7 \pm 193.1$ ) cell/ $\mu$ l was lower than the mean eosinophil cells count for the F.F children ( $654.8 \pm 236.3$ ) cell/ $\mu$ l.
- Conclusions** There is significant association between the type of feeding and the level of hematological parameters (IgE and eosinophil count), and that breast feeding is protective against development of severe AD.
- Key words** atopic dermatitis, breast feeding, IgE, eosinophil

### Introduction

Atopic dermatitis (AD) is a chronic inflammatory skin disease that occurs with a peak onset in infancy and the majority of cases presenting in the first few years of life <sup>(1)</sup>. Atopic dermatitis is also known as atopic eczema. Exclusive breast feeding seems to have a preventive effect on the early development of allergic disease up to 2 years of age <sup>(2)</sup>. It is widely believed that B.F should be recommended

for primary prevention of allergic disease. Exclusive B.F beyond four months of age reduces the development of atopic disease in early life <sup>(3,4)</sup>. Hanifin and Rajka (1980) proposed major and minor criteria based on their clinical experience. To diagnose atopic dermatitis we must have 3 or more of these major features plus three or more of minor features <sup>(5)</sup>. Elevated IgE levels are found in up to 80 % of affected patients, IgE

levels are also elevated in patients with other atopic diseases <sup>(6)</sup>. IgE antibodies mediate the immediate hypersensitivity reactions <sup>(7)</sup>.

Serum IgE level are elevated above 200 IU/ml in 80-90% of patient with AD. Patient with very active disease may have IgE levels greater than 1000 IU/ml. However, 20% of patients with AD have normal or below normal levels of IgE, suggest that IgE elevations are a coincident feature of disordered cell regulation rather than pathogenic factor <sup>(8)</sup>. Increased number of eosinophils in blood is frequently present in a variety of allergic conditions especially in atopic disorder. Eosinophilia is generally defined as the presence of more than 450 eosinophils/ $\mu$ l of blood. Seasonal increases in the number of circulating eosinophils may be observed in sensitized patients after exposure to allergens such as tree, grass, and weed pollens <sup>(9)</sup>. The clinical severity of AD was assessed by the Scord index <sup>(10)</sup>:

The aim of this study was to clarify the association between breast feeding and severity of atopic dermatitis, total serum IgE level and eosinophil count.

### **Methods**

A descriptive study was carried on pediatric patients visiting Asthma and Allergy Center & pediatric outpatient in Tikrit Teaching Hospital from March 2007 to August 2007.

#### **Study population:**

This study included 100 patients with atopic dermatitis (58 males & 42 females). Their ages were less than 18 year. All the patients met the diagnostic criteria for atopic dermatitis, as defined by Hanifin and Rajka <sup>(5)</sup>. None of these patients had received antihistamines, systemic or topical corticosteroids during the period of 3 weeks before clinical evaluation.

#### **Data collection:**

Each patient was assessed by full history and physical examination.

Early feeding method, the milk feeding history during the first 6 month of life was obtained for each child and classified as follow:

A. Breast feeding (children who had been totally breast fed since birth and never received cow's milk).

B. Bottle feeding (children who had been totally bottle fed since birth and never received breast milk).

C. Mixed feeding (children who had been breast fed but had received some cow's milk before 6 months of age).

Each patient was generally examined for chest, face, color, eyes, nose, neck, hands and feet. Local examination included the skin lesions site, size, types; xerosis, erythema, edema, papulation, oozing, crusting, excoriation and lichenification.

The severity of atopic dermatitis was measured by using the Scord index. The child must have 3 or more major features plus 3 or more minor features <sup>(5)</sup>. The diagnosis of atopic dermatitis depends on history and clinical examination and supported by differential white blood cell (WBC) cells count, eosinophil cell count and total serum IgE level.

#### **Investigations:**

The laboratory tests included:

1. Eosinophil count; eosinophil cells count of more than 450 cell/ $\mu$ l was considered pathological.

2. Total serum IgE which was determined by enzyme linked immuno-sorbant assay kit (Biomagreb) was determined in 32 sera of AD patients. Serum values of more than 200 IU/ml were considered high.

#### **Statistical analysis:**

The results were given as mean  $\pm$  SD. Values and data were statistically analyzed using SPSS version (4). The difference between the study groups were tested by using (ANOVA, Chi- square).  $P < 0.05$  was considered as statistically significant.

**Results**

Family history was positive in 84 cases (84%) while 16 cases (16%) had negative family history.

The mean S.S for the B.F patients was  $21.48 \pm 4.96$ , for the mixed type of feeding was  $33.34 \pm 12.92$  while for the formula fed patients it was  $35.7 \pm 9.7$  as shown in Table 1.

**Table 1: The mean severity score according to feeding history**

Feeding history	Severity score		
	No.	Mean	SD
B.F	42	21.48	4.96
Mixed	16	33.34	12.9
Formula	42	35.70	9.79
Total	100	29.35	11.0

*p*-value = 0.000 (significant), B.F (breast feeding)

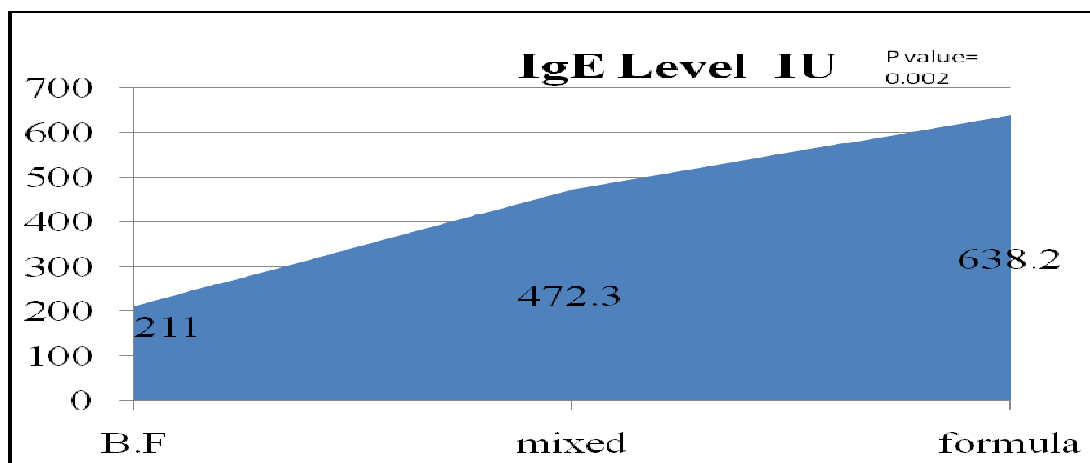
Table 2 reveals that most of the patients whose total serum IgE levels below 200 IU/ml (7 cases, 87.5%) were B.F, while most of the patients whose total serum IgE was above 200 IU/ml were formula fed patients (13 cases, 54.2%, *p*-value = 0.003). The mean IgE levels for the breast fed patients .002.

were significantly decreased as compared to mixed fed group & formula fed patients, the mean IgE level for the breast fed patients was  $211 \pm 178.7$  IU/ml, for the mixed fed was  $472.3 \pm 22.4$  IU/ml and for the formula fed patients was  $638.2 \pm 355.8$  IU/ml as shown in Figure 1, *p*-value = 0

**Table 2: Patient distribution according to the total serum IgE level) and feeding history**

Feeding history	IgE count IU		Total
	<200	>200	
B.F	7(87.5%)	5 (20.8%)	12 (37.5%)
Mixed	0(0%)	6 (25%)	6 (18.8%)
Formula	1(12.5%)	13 (54.2%)	14 (43.8%)
Total	8(100%)	24 (100%)	32 (100%)

*p*-value = 0.003 (significant)



**Figure 1: Mean IgE level according to feeding history**

B.F (breast feeding), *p*-value = 0.002

Table 3 shows that most of the patients who had eosinophil count below 450 cell/ $\mu$ l were B.F (26 cases out of 34, 76.5%) and

most of the patients that had eosinophil count above 450 cell / $\mu$ l were formula fed (35 out of 66 cases, 53%,  $p$ -value = 0.000).

**Table 3: The patient’s distribution according to Eosinophil cells count and feeding history**

Feeding history	Eosinophil cells count				Total	
	< 450		> 450			
	No.	Percentage	No.	Percentage	No.	Percentage
B.F	26	76.5 %	16	24.2 %	42	42 %
Mixed	1	2.9 %	15	22.7 %	16	16 %
Formula	7	20.6 %	35	53.0 %	42	42 %
Total	34	100 %	66	100 %	100	100 %

$p$ -value = 0.000 (significant)

The mean eosinophils count for the B.F patients was 355.7 $\pm$ 193.1 cell/ $\mu$ l, for the mixed fed patients was 688.1 $\pm$ 217.8 cell/ $\mu$ l,

while for the formula fed patient were 654.8 $\pm$ 236.3 cell/ $\mu$ l ( $p$  < 0.001) as shown in table 4.

**Table 4: The Mean eosinophil cells count according to feeding history**

Feeding history	Eosinophil cells count		
	No.	Mean	SD
B.F	42	355.7	193.1
Mixed	16	688.1	217.8
Formula	42	654.8	236.3
Total	100	534.5	263.2

$p$ -value < 0.001 No. (number) B.F (breast feeding)

### Discussion

Atopic dermatitis is a distressing inflammatory skin disease affecting large number of children worldwide, with its variable clinical presentations and course, constitutes a syndrome made up of an identifiable group of signs and symptoms that represents the dermatological manifestation of the atopic diathesis<sup>(11)</sup>.

The total number of the cases included in the study was 100 cases; most of the patients were males (58%). This goes with Adriana et al that showed 41.3% of AD patients were females and 58.7% were males<sup>(12)</sup>. It is well known fact that both sexes are affected, but in adults the disease is more common in females, while in children, atopic dermatitis is more common in males<sup>(13)</sup>.

Male gender, and family history of atopy, was associated with increased risk of AD in the first 6 months of life. These findings suggest that the genetic and perinatal influences are important for this difference in both genders<sup>(14)</sup>. There is no clear reason for this difference; in that it is more common in males in childhood.

Family history was positive in 84 cases (84%) while, 16 cases (16%) had negative family history. This agrees with what was found by Blumenthal who showed that most of the cases with AD had positive family history<sup>(15)</sup>. This may be due to the fact that AD is an inherited disease that runs in families but there is no clear way of inheritance and this explains why clinically normal parents may have affected children,

which excludes simple dominant inheritance. On the other hand, in other families both parents may be affected but the children are normal excluding a simple recessive trait<sup>(16)</sup>.

Regarding the mean severity score according to feeding history, the mean S.S for the B.F patients were (21.49±4.97), the mean S.S for the mixed fed patients were (33.34±12.92) while the mean S.S for the formula fed patients were (35.70± 9.79). These results were consistent with another study by Host et al (1999) which showed that B.F has the ability to modifying the diseases severity<sup>(17)</sup>. Typically B.F can decrease the severity of AD, but cannot prevent its occurrence. It is widely recommended for the first 4-6 months. Human colostrums/milk facilitates maturation of the gut and provides passive protection against infectious agents and antigens<sup>(17)</sup>. Saarinen et al, 1979 reported also that the intensity of the manifestations of atopy were softened in children who were on B.F for the first 6 months compared with children who were not ,or who were B.F but for shorter periods of time (up to 2 months)<sup>(18)</sup>.

Exclusive B.F is a protective factor for development of AD if compared with conventional cow's milk formula<sup>(19)</sup>. This protective effect may be related to the fact that allergic conditions in children are often related to food sensitivity, and B.F helps prevent this problem through a variety of mechanisms. Exclusive breast-feeding for 6 months means to avoid feeding the baby any food known as allergen and as precipitation factor of allergic diseases. Breast milk being rich in immunoglobulin A (IgA) can help to protect the gastrointestinal tract by binding foreign protein which has a potential to be allergenic and inhibit its absorption. Nutritional contents of breast milk will stimulate the maturation of gastrointestinal tract, so that it is ready to receive the

antigens, maintain normal flora of gastrointestinal tract, and maintain the immunomodulatory factors<sup>(20)</sup>.

Most of the patients whose total serum IgE levels were below 200 IU/ml were B.F, 7 cases (87.5%), while most of the patients who had total serum IgE above 200 IU/ml were formula fed, (54.2%). This goes with another study conducted by Businco et al. in 2005 who reported that the B.F patients had a total IgE level less than that of patients who were bottle fed<sup>(22)</sup>. This is due to the same reason mentioned above in that B.F is a protective factor against having an allergic disease while cow milk and cow milk protein are an aggravating factor for allergic disorder with subsequent increase in IgE level.

The results of IgE of the present study go with that found by Businco et al. (1983) who observed that the children fed breast milk until the age of 6 months presented significantly lower levels of IgE compared with children fed cow's milk. This may be due to that B.F avoiding the child from early sensitization to cow's milk protein and IgE over production<sup>(21)</sup>.

Most of the study patients who had eosinophil counts below 450 cell / $\mu$ l were B.F, 26 cases (76.5%) while most of the study patients who had eosinophil count above 450 cell / $\mu$ l were formula fed (53%).

The eosinophils count for the present patients are in agreement with the fact that milk protein allergy can induce eosinophilia<sup>(9)</sup>. Infants suffering from severe AD reveal a low serum albumin level, and electrolyte disturbances, and have significantly higher number of eosinophils and eosinophilic nuclear lobes, platelets, and total serum IgE level<sup>(22)</sup>. The clinical activity of the disease as recorded by the scorad index can be used as an indicator of the hematological abnormalities as well as to some extent as a prognostic indicator<sup>(23)</sup>.

**Conclusions** Breast feeding can decrease the severity of the atopic dermatitis &

decrease the peripheral blood eosinophil count and total serum IgE level.

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