Original Article

Assessment of Serum Interleukin 6 in Atopic Dermatitis Paediatric Patients in Najaf Province

Eshraq Haider Hussain Albalaghy and Fouad Shareef Dleikh

ABSTRACT

Objective: To investigate IL-6 levels in pediatric patients with atopic dermatitis based on their feeding methods.
Study Design: Cross-sectional study
Place and Duration of Study: This study was conducted at the Al-Ashraf Hospital, Al-Najaf from 1st October 2024 and 1st January 2025.
Methods: Sixty pediatric patients (aged 3months –13 years) of both genders were included and divided into two groups: 30 breastfed and 30 bottle-fed children were enrolled. IL-6 levels were measured, along with immunological markers (IgA, IgE) and hematological parameters.
Results: IL-6 levels were higher in bottle-fed children (median = 2.8, IQR = 3.9) compared to breastfed children (median = 1.9, IQR = 2.2); however, this difference was not statistically significant (p = 0.4). Sociodemographic factors showed no significant associations in either group. In the correlation analysis, a significant negative correlation was found between IL-6 and platelet count among breastfed children (r = -0.373, p = 0.042), while in bottle-fed children, IL-6 was negatively correlated with mean platelet volume (MPV) (r = -0.366, p = 0.047).
Conclusion: IL-6 levels tend to be elevated in pediatric patients with atopic dermatitis, particularly among those who are bottle-fed. Additionally, IL-6 shows a negative correlation with platelet count and MPV, suggesting potential immunological and hematological implications based on feeding type.
Key Words: Interleukin-6 (IL-6), Atopic Dermatitis, Breastfeeding

Citation of article: Albalaghy EHH, Dleikh FS. Assessment of Serum Interleukin 6 in Atopic Dermatitis Paediatric Patients in Najaf Province. Med Forum 2025;36(4):70-73. doi:10.60110/medforum.360415.

INTRODUCTION

Interlucin-6 (IL-6) is an important cytokin involved in immune control, especially in inflammatory reactions and acute phase reaction. It is produced by macrophages, T cells and fibroblasts in response to infection or tissue damage, which stimulates the liver to produce acute phase proteins such as C-reactive protein (CRP). In addition, IL-6 Th17 supports immunity by promoting cell discrimination and activating B cells.[1]

IL-6 has also been shown to increase fibroblast proliferation and encourage migration and spread of keratinocytes. It shows a wide range of biological activities, including cell growth, cytotoxic T-cell discrimination and spread and discrimination of different cell types. In addition, IL-6 promotes the formation of hematopoetic stem cells through synergistic action with 3 IL-3, G-CSF and GM-CSF.[2]

IL-6 has a protective role of in the skin physiology. It has been shown to heal wounds and support skin regeneration and repair under the state of wounds and inflammatory skin conditions.[3] Despite these beneficial effects, the overproduction of IL-6 is associated with many pathological conditions, including multiple myeloma and autoimmune diseases such as rheumatic and systemic lupus erythematosus. Targeted treatment, such as Tocilizumab, is used to block the elevated IL -6 levels due to immunity and their role in chronic inflammation.

In the context of atopic dermatitis (AD), IL-6 contributes to chronic inflammation by promoting the development of Th17 cells and activating keratinocytes, leading to sustained skin irritation and itching. Its over expression enhances T helper cell responses and acute-phase protein synthesis, worsening the severity of the disease. This pro-inflammatory environment promotes disease progression by maintaining inflammation and impairing the epidermal barrier.

The role of breastfeeding in preventing allergic diseases remains inconclusive, potentially due to individual differences in the composition of breast milk. IL-6 has been detected in the majority of both colostrum and mature milk samples, whereas other cytokines are less frequently observed. A positive correlation has been found between levels of IL-6, IL-10, and transforming

Department of Physiology, College of Medicine, University of Kufa.

Correspondence: Dr. Eshraq Haider Hussain Albalaghy, M.Sc. Student, Department of Physiology, College of Medicine, University of Kufa.
Contact No: 07805810691
Email: eshraqh.albalaghy@student.uokufa.edu.iq

Received: January, 2025
Reviewed: February, 2025
Accepted: March, 2025

growth factor-β-cytokines involved in IgA production and total IgA concentrations in colostrums.[4]

Based on this background, the present study was designed to measure serum IL-6 levels in patients with atopic dermatitis and to investigate whether the type of early feeding is associated with differences in IL-6 expression.

METHODS

This cross-sectional study included a total sample of 60 paediatric patients diagnosed with atopic dermatitis (AD). The participants were divided into two groups based on their type of infant feeding: 30 patients who were breastfed and 30 patients who were bottle-fed. This was conducted between Al-Ashraf Hospital, Al-Najaf, Iraq from 1st October 2024 and 1st January 2025. All patients (36 males and 24 females) were clinically diagnosed with AD by a certified dermatologist, based on established clinical signs and symptoms.

Participants were categorised according to their early feeding history, as either exclusively breastfed or exclusively bottle-fed during infancy. Sociodemographic and personal information was collected through structured face-to-face interviews with patient's parents. Patients included in the study were between the ages of 3 months and 13 years, newly diagnosed with AD, and had no prior history of immunosuppressive therapy. Only patients with a clear history of exclusive breastfeeding or bottle feeding during the first six months of life were considered.

Patients were excluded if they had any other dermatological or systemic conditions, recent infections, or a history of mixed feeding. Each participant had 4-5 ml of blood drawn via vein puncture using disposable plastic 5 ml syringes. The sample was then allowed to clot at room temperature in clot activator gel tubes before being centrifuged for 15 minutes at about 5000 rpm to obtain serum free of unhemolyzed cells. Following that, the samples were labelled with the time of collection, gender, and reference code. Before the IL-6 measurement using standard curve, sera were frozen and kept at -20°C. The amounts in the patients' serum were measured using an ELISA kit in (Humaredre HS) washer for ELISA. The data was entered and analyzed through SPSS-25.

RESULTS

Statistical analysis showed that IL-6 levels were higher in bottle-fed children (median = 2.8, IQR = 3.9) compared to breastfed children (median = 1.9, IQR = 2.2), although the difference was not statistically significant (p=0.4) [Table 1, Fig. 1]. No statistically significant differences in IL-6 levels were observed between feeding groups across sociodemographic variables (p > 0.05) [Table 2].

Correlation analysis among breastfed children showed a significant negative correlation between IL-6 and platelet count (r = -0.373, p = 0.042). Among bottle-fed children, a significant negative correlation was found between IL-6 and MPV (r = -0.366, p = 0.047) [Tables 3-, Figs. 2-3).

Table No.1: Comparison of IL-6 level between breast fed and bottle fed children

	Breast feeding (Median IQR)	Bottle feeding (Median IQR)	P value
IL-6	1.9 (2.2)	2.8 (3.9)	0.4

Table No.2: Comparison of sociodemographics with feeding

Variable	Breast feeding (Mean±SD)	Bottle feeding (Mean±SD)	P value
Gender			
Male	1.7±2.2	2.8±4.4	0.4
Female	2.0±6.5	3.0±3.7)	0.9
Age (years)			
0-3	3.1±2.1	3±3.1	0.9
4-6	1.6±4.8	3.4±3.8	0.4
7-10	2.0±7.0	2.0±2.9	0.6
11-13	1.5±2.9	2.7±5.1	0.4
Nutritional status			
Normal	2.1±4.1	2.7±3.1	0.7
Underweight	1.2±0.4	-	-
Overweight	1.3±0.6	3.9±5.0	0.5

Table No.3: Correlation of IL-6 with IgA, IgE and hematological variables among breastfed children (n=30)

Variable	Pearson Correlation (r)	P value
IgA	-0.080	0.673
IgE	0.220	0.243
WBC	0.114	0.550
HB	-0.046	0.810
Platelets	-0.373	0.042
MPV	0.156	0.411
Neutrophil	-0.043	0.8

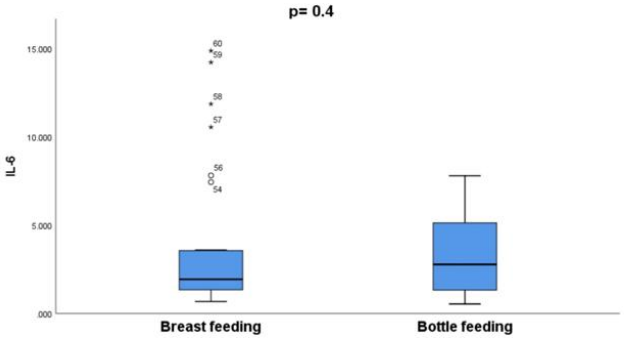

Figure No. 1: Types of feeding

Table No.4: Correlation of IL-6 with IgA, IgE and hematological variables among bottle-fed children (n=30)

Variable	Pearson Correlation (r)	P value
IgA	-0.175	0.354
IgE	-0.146	0.442

WBC	0.130	0.493
HB	0.085	0.657
Platelets	0.131	0.49
MPV	-0.366	0.047
Neutrophil	0.160	0.397

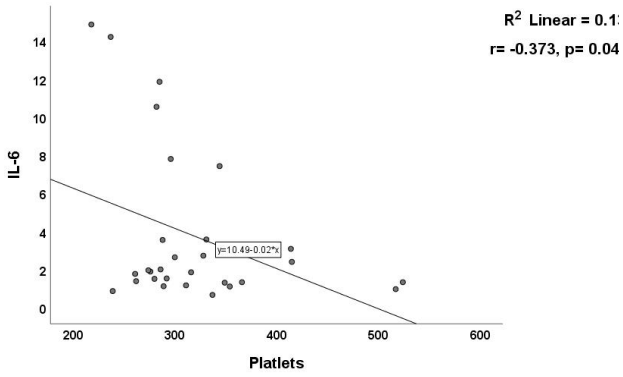

Figure No. 2: Correlation of platelets and IL-6 among breastfed children (n=30)

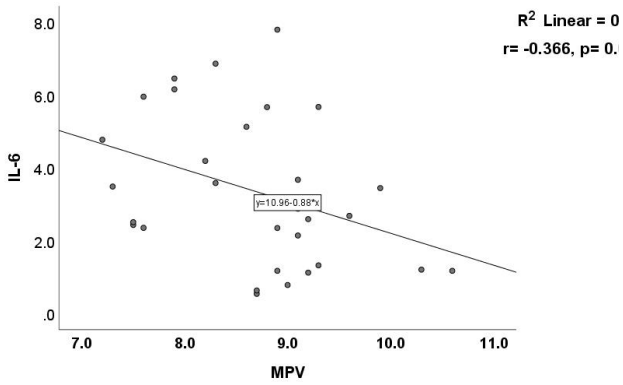

Figure No. 3: correlation of MPV and IL-6 among bottle-fed children (n=30)

DISCUSSION

The role of interleukin 6 (IL-6) in atopic dermatitis (AD) and allergic inflammation is multifaceted, with emerging evidence indicating its involvement in both the immune response and disease progression. Previous studies suggest that T cells in AD patients produce elevated levels of IL-6, which contributes to inflammation and the pathophysiology of atopic disorders.[5] In peripheral blood, monocytes are considered the primary source of IL-6, which emphasizes the importance of this cytokine in immunity of allergic diseases.

Although the exact function of IL-6 in AD is unclear, it is released as part of the skin's allergic reaction in atopic individuals, playing an important role in excessive production with dendritic cells.[6] IL-6 is an important cytokin for maintaining homeostasis, produced in response to rapid infection or tissue damage. Production triggers acute phase reactions and controls immunity, which is important to protect against external stresses. However, when IL-6 is overproduced and continuously performed, it contributes to pathological conditions such as systemic inflammatory response syndrome.[7] It highlights the double role of IL-6 both as a protective agent and potential intermediary of the disease when dysregulation is complete.

When it comes to AD, the level of elevated IL -6 is strongly associated with the severity of the disease. The level of high serum IL-6 is often found in patients with more severe AD patients than people with mild or moderate forms of the disease, making IL-6 a potential biomarker to assess the severity of the disease.[6] Interestingly, IL-6 TH2 plays a regulatory role in allergic diseases by preventing discrimination of T cells in cells, which are heavily associated with allergic reactions, including asthma. In situations in which IL-6 signalling is weakened, for example in hyper-IGE syndrome, T cells are more likely to distinguish in TH2 cells, which contributes to allergies development. This new discovery shows that IL-6 may be involved in not only promoting inflammation, but also to prevent excessive immune activation by regulating Th2 cell development.

In addition, IL-6 is present in both colostrum and mature breast milk, where it is associated with other cytokines, such as IL-10 and transforms growth factor-oil (TGF-ß), which plays an important role in immune control and in the synthesis of immunoglobulin A (IGA). This suggests that IL-6 may also play an important role in early immune reactions, potentially affects the development of the immune system in newborns.[4] The results of this study highlight a complex relationship between interleukin -6 (IL -6) levels, platelet numbers and mean platelet volume (MPV) in cases of atopic dermatitis (AD).

It was observed that the number of platelets was higher in AD patients than healthy controls, but no significant differences were found in MPV values between patients and control groups. The discovery corresponds to previous studies, which had no significant impact on MPV values.[8]

It is well established that platelets play an important role in allergy inflammation, which shows changes in platelet activation, volume and allergic status in quantity and MPV values.[9] In this study, the MPV value for AD patients was equal to the control group, which suggested that other factors may affect MPV values in addition to the disease.

On the other hand, the study on conditions such as chronic atopic dermatitis and asthma has reported changes in MPV associated with immune responses, with some studies, Urticaria shows less MPV values in patients.[10,11] This variability may be caused by various immune responses in various allergic diseases.

In the case of the negative correlation between IL-6 and platelets, the results of this study indicate that high IL-6 levels are associated with changes platelet numbers and

reduction in MPV. This suggests that the elevated IL-6 during inflammation can induce platelet changes, and supports the idea that platelet activation plays an important role in inflammatory diseases such as atopic dermatitis.[12,13]

CONCLUSION

IL-6 is an important cytokine that contributes to the development and course of atopic dermatitis and is important for immunological control. Its complex significance in allergic disorders is exposed by its double role in the induction of inflammation and regulation of the TH2 cell development. Future treatment methods that target IL-6 signalling can be made possible as a biomarker for the severity of the disease in the capacity of IL-6 and its regulatory roles in inflammation of allergies, which provide significant insight into the pathophysiology of atopic dermatitis.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Eshraq Haider Hussain Albalaghy, Fouad Shareef Dleikh
Drafting or Revising Critically:	Eshraq Haider Hussain Albalaghy, Fouad Shareef Dleikh
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No. 2361 Dated 09.07.2024.

REFERENCES

1. Murphy K, Weaver C, Janeway CA. Janeway's immunobiology. 9th ed. New York: Garland Science 2017. Available at https://pmc.ncbi.nlm.nih.gov/ articles/PMC5045153/
2. Gallucci RM, Simeonova PP, Matheson JM, Kommineni C, Guriel JL, Sugawara T, et al. Impaired cutaneous wound healing in interleukin-6-deficient and immunosuppressed mice. FASEB J 2004; 14(15): 2525–31.
3. McFarland-Mancini MM, Funk HM, Paluch AM, Zhou M, Giridhar PV, Mercer CA, Kozlowski JM. Differences in wound healing in mice with deficiency of IL-6 versus IL-6 receptor. J Immunol 2010; 184(12): 7219–28.
4. Böttcher MF, Höllsberg P, Søe H, Schjerling P, Heickendorff L Bjerregaard N. Cytokines in breast milk from allergic and nonallergic mothers. Clin Experiment Allergy 2000; 30(6): 853-9.
5. Wong CK, Leung KM, Qiu HN, Chow JY, Choi AO, Lam CW. Activation of eosinophils interacting with dermal fibroblasts by pruritogenic cytokine IL-31 and alarmin IL-33: implications in atopic dermatitis. PLoS One 2012;7(1):e29815.
6. Naji AA, Mousa HM. Evaluation of interleukin-6 (IL-6) levels in atopic dermatitis patients in Thi-Qar province. Univ Thi-Qar J Sci 2022;9(1).
7. Tanaka T, Narazaki M, Kishimoto T. Interleukin (IL-6) immunotherapy. Cold Spring Harbor Perspectives in Biology 2018; 10(8):a028456.
8. Akcal O, Taskırdı İ. Do platelet count and mean platelet volume have a predictive role as a marker in children with atopic dermatitis? Indian J Dermatol 2022; 67(6): 688–92.
9. Page C, Pitchford S. Platelets and allergic inflammation. Clin Experimental Allergy 2014; 44(7): 901–13.
10. Akelma AZ, Mete E, Cizmeci MN, Kanburoglu MK, Malli DD, Bozkaya D. The role of mean platelet volume as an inflammatory marker in children with chronic spontaneous urticaria. Allergol Immunopathol (Madrid) 2015;43:10–13.
11. Esparza-Gordillo J, Schaarschmidt H, Liang L, Cookson W, Bauerfeind A, Lee-Kirsch MA, et al. A functional IL-6 receptor (IL6R) variant is a risk factor for persistent atopic dermatitis. J Allerg Clin Immunol 2013;132(2): 371–7.
12. Topal E, Celiksoy MH, Catal F, Karakoç HT, Karadağ A, Sancak R. The platelet parameters as inflammatory markers in preschool children with atopic eczema. Clin Lab 2015; 61: 493-6.
13. Puel A. Casanova JL. The nature of human IL-6. J Experiment Med 2019;216(9):1969–71.