

The level of serum zinc and its relation to the severity of atopic dermatitis among a sample of Iraqi patients: a clinical investigational study

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Objective: To estimate serum zinc level among patients and a normal healthy control group, and to find out if it's related to the severity of atopic dermatitis (AD) or not.

Methodology: A total of 108 patients participated in this study; 54 of them had AD, and the remaining were healthy control individuals. The patients with QAD were consulting Al-Sader Teaching Hospital and two private dermatology clinics. All were interviewed, and a detailed history and clinical examination were done. Serum zinc levels were estimated from all study samples at the same laboratory.

Results: Serum zinc was found to be lower in patients

with AD (63.44 ± 23.60 $\mu\text{g/dl}$) in comparison to the control group (96.93 ± 20.33 $\mu\text{g/dl}$). Most patients (85.1%) with AD had moderate to severe AD. The serum level was correlated with the severity of the disease.

Conclusion: Serum zinc levels were significantly lower in AD patients and showed a strong correlation with disease severity, being lower in those with moderate to severe forms. Regular intake of zinc-rich foods with fewer chelating agents is linked to less frequent and milder AD.

Keywords: Serum, zinc, severity, atopic dermatitis, AD.

INTRODUCTION

Atopic dermatitis (AD) is a common skin disease characterized by the triad of itching, erythema, and scales, affecting globally about 20% of children and 10% of adults in high-income countries.^{1,2} It may be a part of topic diathesis, including bronchial asthma and allergic rhinitis in addition to AD.^{3,4} Family history of atopic diathesis was reported in 2/3 of patients with atopic dermatitis, while the remaining 1/3 of patients have a personal history of atopy.⁵

AD is divided into three stages according to age: mainly infantile, childhood, and adult type.⁶ Many genetic, environmental, nutritional, psychological, elemental, and other factors may play a role in the pathogenesis, exacerbation, improvement, course of disease, recurrence, and response to treatment.^{6,7}

Next to iron, zinc is considered the most common mineral in the body that is present in every cell. It helps in wound healing and plays an important role in maintaining the immune system, reproduction, growth, taste, vision, smelling, blood clotting, and other endocrine functions.⁸ Although the exact relationship between zinc and AD is not well understood, there are a few reports that serum zinc is relatively lower than in the non-atopic control group.^{6,8} To the best of our knowledge, at least nationally, no previous study was conducted to find the relationship between zinc and AD. This study aimed to estimate the level of serum zinc in patients with AD in comparison with a

non-atopic control group.

METHODOLOGY

This cross-sectional comparative study included 108 patients, 54 of whom had AD, and the remaining were healthy control individuals from January to June 2025. The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the IRB of Al-Sader Teaching Hospital and two private dermatology clinics, Iraq (Ref. No. IRB approval No. 193, dated 1 April 2025). Written informed consent was obtained from all participants (or from parents/legal guardians in the case of minors) before enrollment.

Detailed history was taken in the form of a questionnaire, which included age, sex, occupation, family history, marital status, residency, and detailed dietary recall involving all zinc-rich foods, foods that contain chelating agents, and drugs that impair zinc absorption. Clinical examinations included patients with AD who were diagnosed by the dermatologist; their age range was from 1 to 60 years, and patients with malabsorption, chronic liver and kidney diseases, or any chronic disease or chronic drug use were excluded from the study.

The patients were divided into mild, moderate, and severe AD according to Scoring Atopic Dermatitis (SCORAD).⁹ The SCORAD index is a validated clinical tool that combines the extent of skin involvement, intensity of clinical signs, and subjective symptoms. Based on the total SCO-

RAD score, patients were classified as follows: mild AD (SCORAD <25), moderate AD (SCORAD 25–50), and severe AD (SCORAD >50).

Then serum zinc was measured using atomic absorption spectrophotometry (AAS). Dietary recall refers to a method of dietary assessment in which participants are asked to remember and report all foods and beverages consumed over a specified period, most commonly the previous 24 hours or over usual eating patterns. It was used to evaluate nutrient intake, such as zinc-rich foods or foods containing chelating agents, and to assess the relationship between dietary habits and health conditions.

Statistical Analysis: The data were analyzed with SPSS version 24. We used the t-test or ANOVA to compare continuous variables (serum zinc) by showing them as mean±SD. We used Fisher's Exact Test and Chi-square test to look at categorical variables like age, gender, family history, marital status, and dietary recall. $P<0.05$ was deemed statistically significant.

RESULTS

Out of 54 patients, 39 (50.6%) were females, and 15 (48.4%) were males (Table 1). The association between patients with AD and dietary recall and the difference in the mean serum zinc according to group is shown in Table 2. Patients with AD had serum levels of zinc as 63.44 ± 23.60 compared to 96.93 ± 20.33 in control subjects ($p=0.0001$) (Table 3).

Serum zinc levels demonstrated a progressive and statistically significant decline with increasing disease severity among patients with AD. Patients with mild AD had the highest mean serum zinc concentration (84.83 ± 6.87 µg/dL), followed by those with moderate AD (72.75 ± 17.13 µg/dL). The lowest levels were observed in patients with severe AD (45.50 ± 21.41 µg/dL) (Table 4). This downward trend across severity categories was highly significant ($p=0.0001$), indicating a strong inverse association between serum zinc levels and AD severity, and suggesting that zinc deficiency may be linked to disease progression.

DISCUSSION

AD is a chronic inflammatory disease that is characterized by the triad of severe itching, erythema, and scales that runs in families alone or is associated with asthma, allergic rhinitis, and allergic conjunctivitis, affecting all age groups.^{6,10} Zinc has been used topically because of its antioxidant, antibacterial, and anti-inflammatory properties. However, scientific studies supporting the use of oral zinc supplements in the treatment of AD are still limited,⁸ requiring more research to confirm this issue. Therefore, this study was designed to highlight whether zinc level is

Table 1: Association between patients with AD and study variables.

Variable	Group		p-value
Age groups	Atopic dermatitis	Normal	
1–10	17 (68.0%)	8 (32.0%)	0.0001
11–20	18 (66.7%)	9 (33.3%)	
21–30	8 (61.5%)	5 (38.5%)	
31–40	9 (39.1%)	14 (60.9%)	
>40	2 (10.0%)	18 (90.0%)	
Gender	Atopic dermatitis	Normal	P-value
Female	39 (50.6%)	38 (49.4%)	1.000
Male	15 (48.4%)	16 (51.6%)	
Family history	Atopic dermatitis	Normal	P-value
Negative	6 (13.6%)	38 (86.4%)	0.0001
Positive	48 (75.0%)	16 (25.0%)	
Marital state	Atopic dermatitis	Normal	P-value
Married	15 (34.9%)	28 (65.1%)	0.018
Single	39 (60.0%)	26 (40.0%)	
Residency	Atopic dermatitis	Normal	P-value
Rural	15 (45.5%)	18 (54.5%)	0.6
Urban	39 (52.0%)	36 (48.0%)	

Fisher's Exact Test and Chi-square test

Table 2: Association between patients with AD and dietary recall and the difference in the mean of serum zinc according to group.

Variable	Group		p-value
Dietary recall	Atopic dermatitis	Normal	
Rarely	19 (100.0%)	0 (0.0%)	0.0001
Occasionally	25 (56.8%)	19 (43.2%)	
Frequent	10 (22.2%)	35 (77.8%)	

Fisher's Exact Test

Table 3: Comparison of serum zinc levels between groups (n=54).

Group	Serum zinc (Mean $\pm$ SD)	p-value
Atopic dermatitis	63.44 $\pm$ 23.60	0.0001
Normal	96.93 $\pm$ 20.33	

T-test.

Table 4: Serum zinc levels by severity.

Severity	N	Serum zinc	p-value
Mild	8	84.83 $\pm$ 6.87	0.0001
Moderate	24	72.75 $\pm$ 17.13	
Severe	22	45.50 $\pm$ 21.41	

ANOVA test

deficient in patients with AD or not and its relation, if any, to the severity of the disease.

The study revealed that adults may consume more chelating agents that interfere with zinc and eat certain foods that trigger AD. The reported prevalence of AD among children and young adults is variable, where it varies from 15% to 30% in some studies¹¹ depending on many factors such as family history, dietary habits, environmental factors, and others.^{6,7}

In the present study, the prevalence among children is possibly attributed to the nature of the sample included and other factors. The prevalence among different sexes is almost equal, as in other studies.¹² AD was found to be less common in rural areas than urban ones, but because of the lifestyle changes, recent developments in rural areas, and decrease in agriculture, the differences in lifestyle, sun exposure, type of food, and relevant factors have lessened.

Dietary habits were strongly linked with AD occurrence, where those consuming zinc-rich food and fewer chelating agents like tea, coffee, and others are at less risk of having AD (22.2%), in contrast to those who rarely eat this food, where the risk is 100%. The difference was statistically significant ($p=0.0001$). This result is like what has been mentioned in the literature.¹³

The mean serum zinc was found to be significantly lower in controls (96.93 $\pm$ 20.33 μ g/dl). The difference is statistically significant ($p=0.0001$), suggesting a strong association between zinc deficiency and AD. This is possibly attributed to the role of zinc as an immunomodulator and anti-inflammatory and its being essential for the integrity of the skin.^{13,14}

We found that 90.7% of included patients did not use zinc supplements, making them more liable for zinc deficiency,

with resulting increased chance of AD. Lastly, the study showed that the majority of patients (85.15) having moderate to severe AD is correlated to the level of serum zinc. This result emphasized that zinc is an important element for AD, playing a crucial role in its pathogenesis. The role of zinc and its relation to the severity of disease have been studied by many researchers, where many studies found that the level of serum zinc is lower among patients with atopic dermatitis and it is strongly linked to its severity.^{9,14}

The limitation of this study is a relatively small sample size and the requirement for the study of different types of food, a more detailed history, including dietary habits, supplements, and drug intake. Further studies with larger samples of patients and more detailed histories about dietary habits, food frequency, chelating intake, and more detailed drug history are advisable. A further therapeutic study with zinc supplements for patients with AD is needed to assess the therapeutic efficacy of zinc treatment.

CONCLUSION

Serum zinc was significantly lower among AD patients in comparison to the healthy control group. Most patients with low serum zinc had moderate to severe AD, and accordingly, serum zinc level is significantly correlated to the severity of the disease. AD is less frequent and of a mild form in those consuming zinc-rich food with less chelating agent intake.

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REFERENCES

1. Deckers IA, McLean S, Linssen S, Mommers M, van Schayck CP, Sheikh A. Investigating international time trends in the incidence and prevalence of atopic eczema 1990-2010: a systematic review of epidemiological studies. *PLoS One* 2012;7:e39803.
2. Abuabara K, Yu AM, Okhovat JP, Allen IE, Langan SM. The prevalence of atopic dermatitis beyond childhood: A systematic review and meta-analysis of longitudinal studies. *Allergy* 2018;73:696-704.
3. Silverberg JI, Hanifin JM. Adult eczema prevalence and

- associations with asthma and other health and demographic factors: a US population-based study. *J Allergy Clin Immunol* 2013;132:1132-8.
4. Weidinger S, Beck LA, Bieber T, Kabashima K, Irvine AD. Atopic dermatitis. *Nat Rev Dis Primers* 2018;4:1-3.
5. Tsuge M, Ikeda M, Matsumoto N, Yorifuji T, Tsukahara H. Current Insights into Atopic March. *Children (Basel)* 2021;8:1067-9.
6. Bolognia, Julie V. Schaffer, Lorenzo Cerroni. Atopic dermatitis. In: Bolognia JL, Jorizzo JJ, Schaffer JV, editors. *Dermatology*. 4th ed. Philadelphia: Elsevier; 2017. p. 208-27.
7. Kim J, Kim BE, Leung DYM. Pathophysiology of atopic dermatitis: clinical implications. *Allergy Asthma Proc* 2019;40:84-92.
8. Gray NA, Dhana A, Stein DJ, Khumalo NP. Zinc and atopic dermatitis: a systematic review and meta-analysis. *J Eur Acad Dermatol Venereol* 2019;33:1042-50.
9. Farhood IG, Ahmed MA, Al-Bandar RT, Farhood RG. Assessment of serum zinc level in patients with atopic dermatitis. *Iraqi J Med Sci* 2019;17:103-7.
10. Jeskey J, Kurien C, Blunk H, Sehmi K, Areti S, Nguyen D, et al. Atopic Dermatitis: A Review of Diagnosis and Treatment. *J Pediatr Pharmacol Ther* 2024;29:587-603.
11. Garde J, Hervás D, Marco N, Milan JM, Dolores Martos M. Calculating the prevalence of atopy in children. *Allergol Immunopathol (Madr)* 2009;37:129-34.
12. Johansson EK, Bergström A, Kull I, Melén E, Jonsson M, Lundin S, et al. Prevalence and characteristics of atopic dermatitis among young adult females and males-report from the Swedish population-based study BAMSE. *J Eur Acad Dermatol Venereol* 2022;36:698-704.
13. Takahashi H, Nakazawa M, Takahashi K, Aihara M, Minami M, Hirasawa T, et al. Effects of zinc deficient diet on development of atopic dermatitis-like eruptions in DS-Nh mice. *J Dermatol Sci* 2008;50:31-9.
14. Maywald M, Rink L. Zinc Deficiency and Zinc Supplementation in Allergic Diseases. *Biomolecules* 2024;14:863.