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Relationship between serum zinc levels and acne severity across facial sites in some Iraqi women

Dhuha Sabah Hasan
National Center of Hematology, Mustansiriyah University, Baghdad, 11001, Iraq.

Corresponding Author email: (dhuha.sabah@uomustansiriyah.edu.iq)

Abstract

Objective: The aim of the study is to assess zinc levels in women with acne vulgaris and their relationship to the severity of the clinical acne lesions and the facial sites involvement with acne vulgaris

Methods: This study included 100 women aged 19-25 years. Fifty of them had acne, and 50 did not, serving as a control group. Serum zinc levels were measured using the Bromo-PAP-5 colorimetric method. Acne severity was assessed, and the most affected areas on the face were identified.

Result: The results showed a significant and highly significant decrease in zinc levels in women with acne (63.6 ± 16.7 µg/dL) compared to healthy women (control group), whose levels were (91.9 ± 8.8 µg/dL). Fifty percent of the patients had moderate acne. The most commonly affected areas on the face were the cheeks (60%), the forehead (30%), and the chin (10%). A significant correlation was found between acne severity and serum zinc levels.

Conclusion: The study suggests a link between low zinc levels and increased acne in some women. Therefore, zinc can be considered an important element for skin health and may be used as an adjunctive treatment for acne.

Keyword: Zinc Levels, Acne, Zinc Serum, Acne Severity

1. Introduction

Zinc is a vital trace mineral involved in more than 300 different enzymes in the human body, an essential component of many metalloenzymes, or enzymes containing metal ions, and is crucial for protein, DNA, and RNA synthesis, cellular metabolism, hormone production, and function, catalyzing many biochemical reactions, regulating transcription, and stabilizing ribosomes. Zinc is critical for immune function and is essential for growth and reproduction [1]. Zinc deficiency has adverse effects on multiple body systems, leading to several unintended health problems and critical complications, including impaired neurological functions, reduced wound healing, reduced immune responses, impaired taste and smell, delayed growth and development, impaired reproductive function, low fertility rates, pregnancy complications, intrapartum complications, and labour difficulties [2]. Studies have reported different rates of zinc deficiency among women in Iraq, especially in reproductive years and during gestation. A study conducted in Duhok, Iraq, revealed that more than one-third of the sample had mild, moderate, or severe zinc deficiency.

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The study also states that more than half of the sample had zinc deficiency during pregnancy in Baghdad. Another study in Baghdad also reported that zinc levels were significantly lower in the blood of breast cancer patients compared to controls [3]. These findings indicate the importance of assessing the nutritional status of Iraqi women, especially zinc deficiency, at the national level on a periodic basis. Measuring zinc levels in the blood of Iraqi women is critical for several reasons: When focusing on the health of women of childbearing age, it is vital to pay attention to the impact of low birth weight, premature birth, and low fetal growth on future reproductive health problems of mothers and children all over the world, which are apparently affected by maternal zinc deficiency [4], Modern technologies have made specific diseases possible to define, and general susceptibility to most non-communicable diseases is apparently influenced by low zinc levels before and after menopause, including osteoporosis and its fractures, cardiovascular diseases, and obesity [4] and Assessing exposure to zinc is important for optimal public health and nutrition policy and planning, taking the exposure distribution into account so that decision-makers can take steps toward organizing nutritional fortification programs or specific supplementation programs covering all risk groups or only targeting sensitive groups [4].

The objective of this study was to evaluate zinc levels in the serum of a representative sample of Iraqi women and to investigate the known determinants of zinc levels in various groups, including age, marital status, dietary habits, and gestational age or number of pregnancies, to compare the observed results with the cutoffs recommended by the WHO. The study aims to evaluate the zinc levels comprehensively to provide scientific references that could help plan feasible nutrition and public health programs in Iraq. Acne vulgaris is one of the most common skin illnesses, affecting approximately 80% of people between the ages of 11 and 30 [5], and its prevalence rates among adolescents range from 35% to more than 90% [6]. This condition causes a disturbance in the hair follicles and sebaceous glands, and is characterized by a variety of skin lesions, including comedones (blackheads and whiteheads), papules, pustules, inflamed nodules, and sometimes deep cysts filled with pus [7]. These lesions typically appear in areas rich in hormone-sensitive sebaceous glands, such as the face, neck, chest, upper back and upper arms. Acne can last for years, causing permanent scarring and disfigurement in some cases. It can also have negative psychological and social effects, including anxiety, self-doubt, depression and low self-esteem [8].

Follicular hyperkeratinisation, increased sebaceous activity, and inflammation are the basic pathophysiological mechanisms underlying acne. The first change observed in the pilosebaceous unit was identified as follicular hyperkeratinisation due to increased hair follicle keratinocyte mitosis and decreased desquamation of keratinocytes of the infundibulum [9]. The initial trigger of the inflammatory cascade is unclear. There is insufficient data on the beneficial effect of specific dietary factors such as zinc, omega-3 fatty acids, antioxidants, retinol, and dietary fiber on acne vulgaris. Histopathological changes in acne vulgaris include inflammatory cell infiltration into the papule, comedo hyperkeratosis, and sebaceous gland hypertrophy. Acne-like papulopustular lesions have been reported in individuals with zinc deficiency [10]. This study aims to evaluate serum zinc levels in female patients with acne vulgaris and compare them with the control group, and to explore the relationship between the severity and facial site of facial acne with serum zinc levels.

2. Materials and methods

2.1 Data Collection

This study was conducted at Baghdad Medical City Hospital, and included female patients who visited the outpatient clinic, as well as female students from Hatten High School, during the period

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from February 2023 to November 2024. A total of 100 participants were selected: 50 with acne and 50 as a control, all aged between 19 and 25 years. The control group consisted of 50 healthy women of the same age group, who had normal clinical and laboratory test results and no history of acne.

2.2 Inclusion criteria:

Women with acne with no history of treatment for acne vulgaris in the last six months before screening visit.

2.3 Exclusion criteria:

- Any dermatological disorder other than acne vulgaris affecting the face.
- Any malignancy within the past 5 years.
- Treatment with systemic immunosuppressive agents.
- Pregnant or lactating women.
- Alcohol use disorder.

2.4 Ethical considerations

The study was approved by the Ethics Committee of the National Center for Blood Diseases Research and Treatment. Informed verbal consent was obtained from all patients and healthy controls before sample collection.

2.5 Sample collection

A venous blood sample (5 mL) was drawn from each subject into metal-free plastic tubes. After clotting, the blood was centrifuged at 3000 rpm for 10 min to obtain serum, which was stored at −20 °C before analysis.

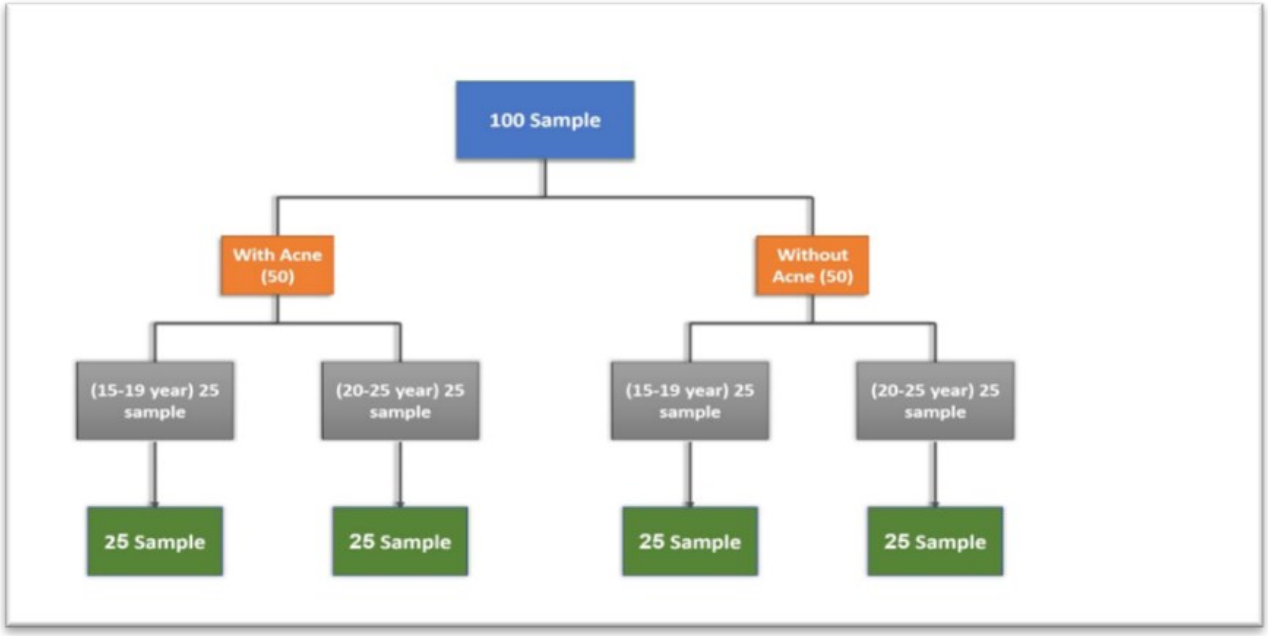

Fig. 1 Sample collection

2.6 Statistical Analysis

All collected data were statistically analyzed by using Microsoft Excel 2019. Descriptive statistics, including mean, standard deviation (SD), and frequency distributions, were calculated for all variables. Results are presented in tables and graphs for clarity.

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3. Results and discussion

Table (1) and Figure (2) present the mean concentration of zinc in the blood serum of participants in the study group and the control group. The mean concentration of zinc in the blood serum of patients was (63.6 ± 16.7 µg/dL), while in the control group it was (91.9 ± 8.8 µg/dL). The study demonstrated that the concentration of zinc in the blood serum of patients was lower than that of healthy individuals, which was consistent with the research conducted by [11]. In concluded that there was a significant decrease in the level of serum zinc in women with severe acne compared to healthy women. The authors suggested that low serum zinc levels may justify the high efficacy of oral zinc supplementation, which has been observed in several clinical practices. Zinc is an important nutrient that is useful for the skin. It contributes to the barrier function of the epidermis and is important for sebaceous gland activity, skin hormones, skin cell metabolism, inflammation, skin integrity, and wound healing. Oral zinc supplementation is effective in managing many cases of acne. As described by Preston in 2002, zinc deficiency may lead to acne. According to Nasiri et al. [12], the anti-inflammatory role of zinc should be investigated further regarding its effect on acne pathogenesis.

Table (1): Zn level in patients and controls.

Groups	No. of groups	Mean ± SD of Zinc level (µg/dl).
Patients	50	63.6±16.7
Control	50	91.9±8.8
p-value	0.000	

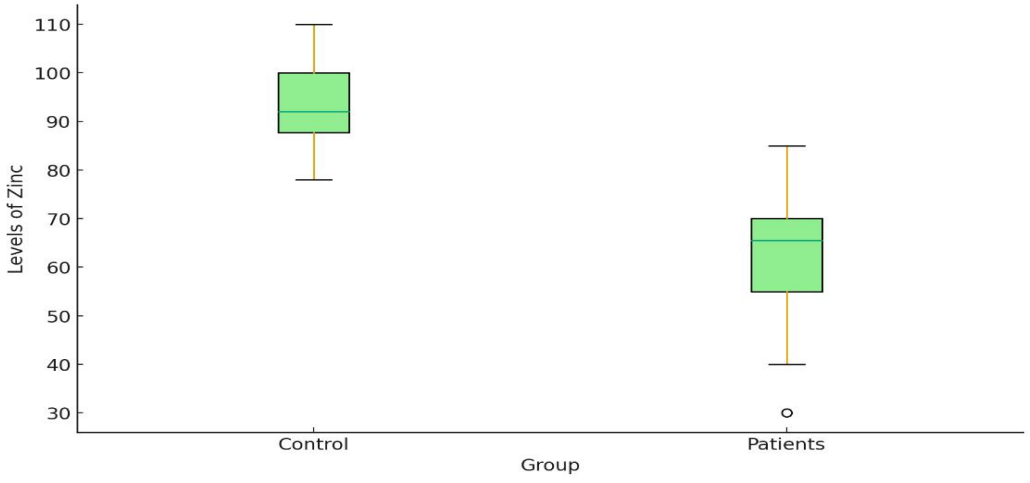

Fig. 2 Zn concentration in patients and controls.

Fig. 3 presents the distribution of acne severity among the female subjects. It was observed that the largest number of participants showed moderate acne, with 25 out of 50 women exhibiting this condition, followed by mild acne with 18 women, while the severe type was the least represented, with 7 women. This indicates that the highest prevalence of acne among the study sample was with moderate acne. Different studies have reported similar patterns, revealing higher rates of moderate

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acne among adult female populations as opposed to mild or severe acne. This is attributed to a combination of hormonal, genetic, and lifestyle factors that contribute to the pathogenesis of acne [13], [14]. A particular cross-sectional study in Iraq involving women dermatology clinic attendees also supports these findings, indicating a higher prevalence of moderate acne over other severities, while severe acne cases were not as prevalent [15]. This prevalence pattern may be attributed to the extensive evaluation and accurate diagnosis in conjunction with timely management that focuses on preventing disease progression to higher severity categories.

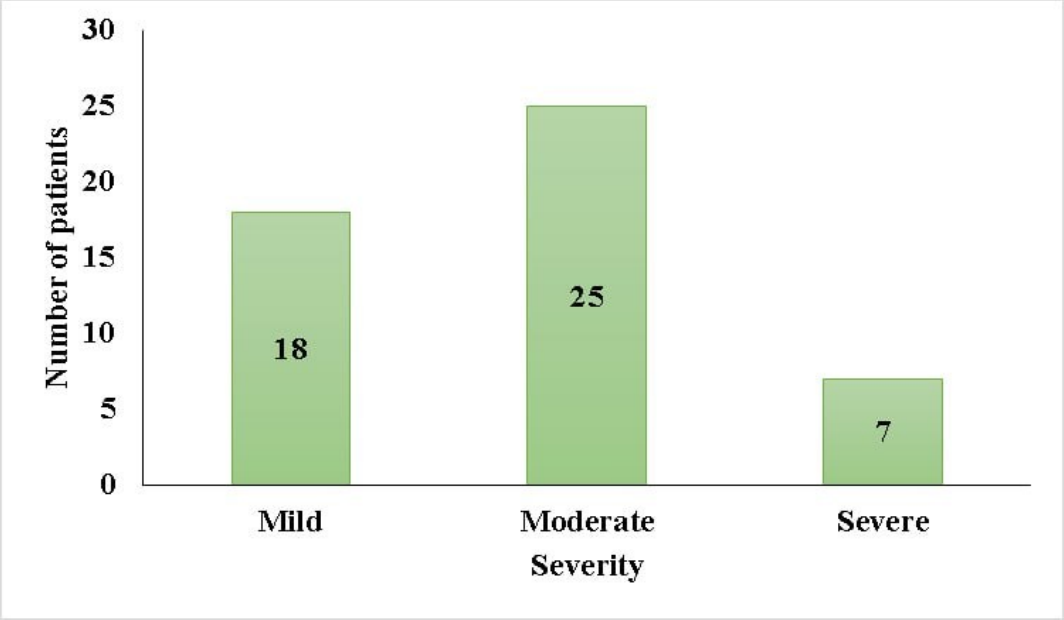

Fig. 3 Sites of acne in a patient woman

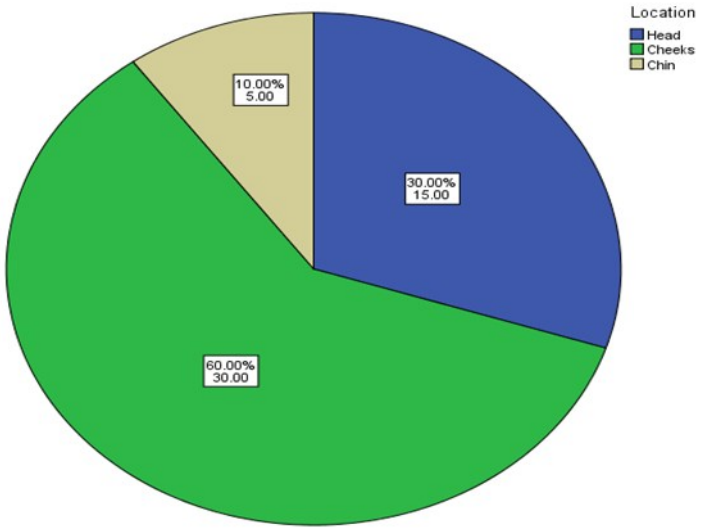

Fig. 4 Type of acne in a patient woman

Figure 4 shows the distribution of acne sites in the studied female population. The majority of women presented acne on the cheeks (60%; n=30), followed by the forehead/head (30%; n=15) and the chin (10%; n=5). It was concluded that the site most affected by acne in women was the cheeks. These findings are similar to those of [11], who reported that acne predominantly affected the face, specifically the cheeks and forehead area, in adult women, while other sites presented low prevalence rates. Additionally, in an evaluation by Zaenglein et al. [16], it was found that the most affected site

by acne was the face due to the hair follicles abundant in sebaceous glands. A cross-sectional study done by Al-Hamamy et al. [15], reported similar findings among 99 Iraqi females with acne vulgaris, with the face as the most affected site and a high prevalence in the cheek region. The fact that acne lesions have a predilection for the cheeks and forehead could be attributed to the higher number and concentration of sebaceous glands in these anatomical zones. Factors such as secretion of androgens by the adrenal glands, gonads, or sebaceous glands, which stimulates the activity of sebaceous glands and subsequent pollution, the use of cosmetics in the latter, a large number of pilosebaceous units, cumulative exposure to Cut bacterium acnes in the same region, and inflammatory response in those areas all contribute to the aforementioned zones showing high colonization. This could also explain the high proportion of participants who had acne in the early phases of development. Our study focused on regions that are more prone to acne vulgaris lesions, which may give the individual time to take preventive.

4. Conclusion

Women with acne often have lower blood zinc levels than those without. Zinc deficiency is strongly linked to increased acne severity, and the most common type of acne in those with zinc deficiency is acne mitigate, where lesions typically cover a wider area of the face. Zinc plays a vital role in immunity and skin health, making it a potentially beneficial factor in acne treatment.

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