

Evaluation Serum Zinc Level in Acne and Correlation with Severity Acne Vulgaris Benghazi - Libya

Case Report

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Abstract

Background: Acne vulgaris is one of the most common cutaneous disorder affecting young and adolescents. Some investigators assessed the relationship between serum zinc levels and acne. Results of these studies suggest that lower serum zinc levels may be related to the involvement of acne and the degree of disease severity.

Aim: The aim of our study was to evaluate the serum zinc level in patients with acne vulgaris and healthy controls and its association with acne severity.

Subjects and Methods: The study included 65 patients with acne vulgaris and 65 healthy control subjects. Atomic absorption spectrophotometer was used to measure serum zinc level in the acne patients compared with controls. Acne severity was classified according to Global Acne Grading System (GAGS).

Results: There was high statistical significant difference between the low zinc level among acne cases and higher levels among controls. The acne patients had low zinc levels at a rate of 30% compared to 0% in the control group. Correlation studies showed no relation between the zinc level and the degree of acne or disease duration.

Conclusion: It is concluded that low serum zinc level in acne patients could be one of the causes of acne and also that zinc levels may not be related to the severity.

Keywords: Zinc; Acne vulgaris; Global Acne Grading System (GAGS); Inflammation.

Abbreviations: GAGS: Global Acne Grading System; SPSS: Statistical Package for Social Science.

Introduction

Acne vulgaris is the most common skin disease, it nearly affects 80 percent of persons at some time between the ages of 11 and 30 years [1, 2]. Acne vulgaris is a disorder of the pilosebaceous follicles that is the most common cutaneous disorder affecting adolescents and young adults. It has four main pathogenetic contributors: follicular hyperkeratinization, increased sebum production, *Propionibacterium acnes* (*P. acnes*) within the follicle, and inflammation. The earliest change in the pilosebaceous unit is thought to be follicular hyperkeratinization, which is associated with both increased proliferation and decreased desquamation of keratinocytes lining the follicular orifice. Acne vulgaris is characterized by comedones, papules, pustules, inflamed nodules, and canalizing and deep, inflamed, and sometimes purulent sacs [3, 4].

Zinc is a trace element found in the structure of many metallo-enzymes that play a role in important functions such as; protein synthesis, DNA and RNA replication and cell division. Zinc is therefore required for growth and development [5]. It plays a role in the regulation of inflammation, normal keratogenesis and many enzymatic reactions. Zinc is also a structural component of many hormones such as growth hormone, insulin, sex hormones and influences the activity of these hormones [6, 7].

Some investigators assessed the relationship between serum zinc levels and acne after observing that acne-like papulopustular lesions occurred as a result of zinc deficiency and their rapid improvement with zinc supplementation. These studies are few in number but have shown that patients with acne have low serum zinc levels although these levels do not correlate with the severity of disease [8]. Therefore, some authors related zinc deficiency to

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inflammatory acne and the success of treatment using zinc supplement, but it is still used with varying rates of success [9-11].

Aim of the Study

The aim of our study was to evaluate the serum zinc level in patients with acne vulgaris and healthy controls and its association with acne severity.

Subjects and Methods

Study Design

Case control design was applied to this study.

Cases and Controls

Acne vulgaris cases were selected from Dermatology outpatient clinic - Elfwayhat - OPD Benghazi (65 cases). Sixty five controls were selected from sam medical outpatient clinic with no acne or abnormal dermatological or systemic findings and included the study. The acne and control groups were matched by age and gender.

The inclusion criterion of cases: Acne cases who had not received any treatment for acne vulgaris during the last 6 months before the study.

Study Duration

The study was conducted during the period April 2017 to April 2018.

Ethical Consideration

Approval from the director of the hospital was taken before starting the study as there is no ethical committee in the hospital. Verbal consent was taken from cases and controls.

Tools and Procedures

Global Acne Grading System (GAGS), it is a quantitative scoring system to assess acne severity. The severity was graded as mild if the score was 1-18, moderate with scores from 19 to 30, severe with scores from 31 to 38, and very severe if the score is more than 38. This scoring system was applied to grade all acne cases. All controls were referred to laboratory for routine tests [12].

Atomic absorption spectrophotometry was used to measure serum zinc levels in both groups. The normal value of serum zinc level in adults was accepted as 70-140 micrograms per deciliter.

Statistical Analysis

Data were analyzed using statistical package for social science (SPSS) version 23. Descriptive statistics as: mean, standard deviation and median were used. Inferential statistics were used when needed: test to find the difference between the means of the two groups, and Chi-square(χ^2) to find the difference in the distribution of the variables between the two groups, P-value were considered significant when < 0.05 . Data were presented in form of tables and figures. The figures were done using Microsoft Excel 2010.

Results

Sixty five patients with acne and their 65 matched controls were studied. Each group included 11 (16.9%) male subjects and 54 (83.1%) female subjects. The mean age of the patients was 12 ± 6.3 years and control was $22 \text{ years} \pm 7.4$ years with a minimum and maximum age of both group was range from 11 to 37 years. The two groups showed no statistically significant differences in age or sex. The range duration of acne was 1 week to 10 years with mean duration was 1.6 ± 1.9 years.

Table 1 shows that the serum zinc level of controls ranged from 70 to 112 micrograms per deciliters with a mean value of 94 ± 13.4 micrograms per deciliter. Serum zinc levels in acne patients ranged from 40 to 100 micrograms per deciliter with a mean value of 74.5 ± 14.7 micrograms per deciliter. The serum zinc level was low in 30.8 % of acne patients while 0% of control group subjects. The result illustrates that there was a highly significant difference between means of serum zinc acne patients and their controls (P value = 0.0001).

The serum zinc levels were lower in patients with mild to moderate acne compared with patients who had severe acne. There was no correlation between serum zinc level and severity of acne and the results were statistically not significant (P value = 0.522). Table 2 Distribution of patients according to level of zinc and age, sex were not significant, $p = 0.659$. Serum zinc level and duration of acne was assessed, but the results were not significant (P value = 0.462).

Table 1. Distribution of patients and control according to level of zinc.

Level of zinc/mg	Cases		Control		Total	
	No.	%	No.	%	No.	%
<70	20	30.8	0	0	20	15.4
70 - 115	45	69.2	65	100	110	84.6
Total	65	100	65	100	130	100

$\chi^2=21.332$, $df= 1$ and $p= 0.0001$ (Highly Significant).

Cases: Mean = 74.5. Standard.Deviation = 14.7. Median = 79, Minimum = 40, Maximum = 100.

Control: Mean = 94. Standard.Deviation = 13.4. Median = 99, Minimum = 70, Maximum = 112.

$t = -7.904$, $df= 128$ and $p = 0.000$ (Highly Significant).

Table 2. Distribution of patients according to level of zinc and severity.

Severity	Zinc level				Total	
	< 70		70 - 115			
	No.	%	No.	%	No.	%
Mild	9	45	22	48.9	31	47.7
Moderate	6	30	11	24.4	17	26.2
Severe	1	5	7	15.6	8	12.8
Very severe	4	20	5	11.1	9	13.8
Total	20	100	45	100	65	100

$X^2 = 2.251$, $df = 3$; $p = 0.522$ (Not Significant).

Discussion

Zinc is steadily maintained in the level of 2-3 g [13], it is a cofactor for over 1000 enzymatic reactions [14, 15] and is necessary for over 2000 transcription factors [15]. It is required for the proliferation of KCs and the suppression of inflammation in KCs. Several human disorders were accompanied with skin manifestations are caused by mutations or dysregulation in Zn transporters [16].

Zn deficiency (ZnD) is reported in some skin disorders including inflammatory diseases (atopic dermatitis [17, 18], oral lichen planus [19], and Behcet's disease [20, 21]), autoimmune bullous diseases (pemphigus vulgaris [22] and bullous pemphigoid [23]).

Some investigators had reported an association between low serum zinc levels and acne vulgaris, while others have not found the same [10]. In our study, there was highly significant difference between serum zinc levels of acne patients and healthy subjects and there was no a significant correlation between serum zinc levels with acne severity. Amer and his colleagues found lower serum zinc levels in the acne patients compared to his control subjects [20]. Ozugus found a negative correlation between serum zinc level and severity of acne vulgaris [25]. These findings are consistent with results of our study. Although, another study reported that there was no significant difference in serum zinc levels between acne patients and healthy subjects. There was a significant correlation between serum zinc levels with severity and type of acne lesions Cochran et al., These findings were not noticed in our study [24, 26].

ZnD is a current problem in both developing and developed countries, so low serum zinc in Libyan patients might be associated with nutritional deficiency, dieting patients, and decreased absorption. Accumulation of evidence is required to determine the relationship between Zn deficiency and acne vulgaris as well as its correlation with acne vulgaris severity. Some authors have therefore combined zinc to inflammatory acne treatment, which is still used with varying rates of success [9-11].

Conclusion

It is concluded that low serum zinc level in the studied acne patients could be one of the causes of acne. The findings of the present study could not relate between zinc levels and the severity of acne vulgaris.

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