



## EVALUATION OF SERUM ZINC LEVEL; SUDANESE FEMALES PATIENTS WITH ACNE VULGARISIN KHARTOUM STATE.

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**ABSTRACT... Back ground:** Acne vulgaris is a common chronic inflammatory disease of the skin. Zinc is a trace element, exists in high amounts within the skin and especially the epidermis. Its importance for human metabolism has been noted by the dramatic improvement of acrodermatitis enteropathica following zinc supplementation. **Objectives:** To evaluate the serum zinc level among patients with acne vulgaris, and to correlate age, grade and duration of acne vulgaris with serum zinc level. **Study Design:** Case- control hospital base study. **Setting:** Khartoum state at Khartoum Dermatology & Venerology Hospital. **Period:** February to September 2017. **Materials Methods:** 100 samples were collected from patients attending to Khartoum Dermatology & Venerology hospital suffering from acne vulgaris. Acne severity was classified according to Global Acne Grading System (GAGS). In addition to other 100 samples collected from healthy individuals (students and nurse) sex and age matched as control. The levels of serum zinc was measured in each group by atomic absorption spectroscopy. **Results:** The study showed significant decrease in the zinc concentrations in acne vulgaris patients when compared with the reference group ( $0.207 \pm 0.04$  mg/l versus  $0.788 \pm 0.14$  mg/l) ( $p = 0.000$ ). The study observed decreased serum zinc level with advanced grade of acne; mild 47 patients (47%) ( $0.247 \pm 0.05$ ), moderate 33 (33%) ( $0.1925 \pm 0.04$ ) and severe in 20 (20%) ( $0.180 \pm 0.03$ ), based on the anova test analysis mean serum zinc levels were significantly lower in patients with mild to moderate and to severe acne vulgaris when compared between acne vulgairs grades and with reference group ( $p \leq 0.001$ ,  $p \leq 0.01$ ,  $p \leq 0.05$  respectively). The present study showed no correlation between zinc level (mg/l) and age in patient with acne vulgaris (years) ( $r = 0.032$ ,  $P = 0.827$ ). On the other hand significant correlation was recorded between serum zinc level (mg/l) and duration of the acne vulgaris in the study group ( $r = -0.311$ ,  $p = 0.028$ ). **Conclusion:** Study revealed that serum zinc levels is significantly decreased in patients with acne vulgaris, and prescribing zinc supplement treatments help increasing the success rate of acne treatment.

**Key words:** Acne Vulgrais, Serum Zinc, Female Patients, Sudanese.

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## INTRODUCTION

Acne is a common inflammatory skin disease; although not life-threatening, acne markedly influences quality of life and constitutes a socioeconomic problem<sup>1970</sup>.<sup>1</sup> About 15–30% of acne patients require medical treatment due to the severity of their clinical condition, 2–7% of them experience lifelong post-acne scars which can be disfiguring<sup>1970</sup>.<sup>1,2</sup> Acne vulgaris is a distressing condition which can carry with it significant psychological effects, like embarrassment, anxiety and shame that have an impact upon both social lives and employment;

furthermore patients with acne are at increased risk of depression, suicidal thoughts and even suicide itself<sup>1970</sup>.<sup>2,3</sup> A significant improvement in self-esteem is achieved with treatment of acne; therefore, successful treatment promotes much more than just cosmetic benefits.<sup>1,3,4</sup>

Deficiency of certain nutrients like zinc, folic acid, selenium, chromium and  $\omega$ -3 fatty acids, have been shown to influence depression, anger, anxiety, and also have a role in acne vulgaris and so increase the risk of psychological sequel in acne vulgaris. Administration of these nutrients

may improve inflammatory acne lesions and general aspects of well-being<sup>1970.3,5</sup>

Zinc is one of the most important minerals in the body it is required for, growth and development, regulation of inflammation and proper wound healing reproduction<sup>3,6</sup>, and many others functions. In recent years, it has been found that acne is tightly linked to zinc deficiency, as zinc is known to facilitate the production and regulation of about 200 hormones, most important one is testosterone, the main promoter of acne<sup>1970.4,7</sup>

Zinc deficiency in acne patients has been associated mainly with nutritional deficiency. The inflammation in acne patients is another factor that decreases serum zinc levels, however, whether Zinc deficiency in the epidermis causes acne or its increased consumption in the course of inflammatory acne is not known.<sup>4,7</sup>

Modern diets are so deficient in zinc as a result of agricultural practices and extensive use of fertilizers. Low concentrations of zinc in animal feed also lead to low concentrations in animal products<sup>1970.4</sup> In addition food processing and food additives further deplete zinc in diet and decrease it is absorption. Iron supplementation during pregnancy aggravates maternal zinc deficiency by diminishing zinc absorption and stores.<sup>4,5,8</sup>

This being the case, on the basis of current evidence, the treatment with zinc supplementation should become a normal in all cases of anorexia, bulimia, immunodeficiency, alcoholism, mental depression, infertility both male and female as well as acne and other skin diseases.<sup>5,8,9</sup>

In view of all the data we presented above it seem it is necessary to study the level of zinc in acne vulgaris patients. Since there is strong relation between serum zinc level and patients with acne, especially the effect of zinc on inflammatory cells. Hence this study is designed to highlight the relationship between serum zinc level and acne vulgaris infection.

## MATERIALS AND METHODS

### Study Population

A case- control hospital base study was done in the patients who attended the outpatient department of dermatology in Khartoum dermatology & Venerology Hospital in Khartoum state, diseased with acne vulgaris were selected for this study in the period from February to September 2017. 100 cases (females) in the age group of (20.76 ± 2.92) years were included in this group. The control group consisted of 100 ages and sex matched healthy individuals, with normal physical examination and laboratory findings. None of them had a history acne vulgaris infection.

### Inclusion Criteria

Female patients presented with acne vulgaris

### Exclusion Criteria

Pregnant woman, Females using oral contraceptive pill, Patients who were on treatment with systemic tetracyclines or vitamins, Presence of known systemic diseases or other dermatological diseases, Patients with other variants of acne vulgaris (drug induce acne, acne fulminans and Acne conglobata )

### Ethical Consideration

The study was approved by the ethical committee of Alneelain University. An informed verbal consent was obtained from each participant prior to specimen collection.

### Data Collection and Clinical Examination

Each site used a standardized questionnaire which collected the demographic and symptom information assessed in this study. Clinical examinations done by clinicians in above mentioned hospital. Case group a systematic random selection was adopted to select the patients from the outpatient clinic. The first patient with acne was randomly selected, and then we left one and selected the third one, if the patient refused the next in row was selected.

Control subjects for this group were randomly selected from nurse and collage students taking into consideration matching in age and sex.

### Sample Collection

Subjects who met the criteria were then included in the study and their serum zinc level was estimated. 2 ml of venous blood was drawn from the cubital vein, collected in a plain metal free glass bottles. The blood samples were allowed to coagulate for 2 hours and after centrifugation at 5000 RPM for 10 min the serum was separated and stored at  $-20^{\circ}\text{C}$  prior to analysis.

### Measurement of Zinc

Serum zinc estimation was performed by atomic absorption spectrometry (AAS) method with Zeeman background correction (Z-2000 instrument, Hitachi, Japan). Certified reference material of human serum (Seronom Trace Elements, Serum Level 1, 0903106, Sero AS, Norway) was used to test the accuracy of methods, in the Laboratory of National Center for Research.

### Quality Control

Sample representing the normal and pathological level of serum zinc, was used for assessment of the quality control. Result  $\pm 2\text{SD}$  of the target values of the control sera were accepted.

### Statistical Analysis

Data was analyzed by computer software, by using SPSS program manual Master sheet. The mean and standard deviation of zinc level was obtained, and the T- test and anova were used for the comparison of zinc levels between the test and control group, between different acne grades, and the mean difference is significant at  $p \leq 0.05$ , Correlation(r) between zinc levels with age and duration is considered to be statistically significant at  $P \leq 0.05$ .

## RESULTS

The study population comprised of 100 female patients with acne vulgaris as test group, with age ( $20.76 \pm 2.917$  years). The mean duration of acne was ( $4.700 \pm 2.032$ ) years, with a range between 1 and 10 years. In addition to other 100 healthy volunteer's female as control group, age and gender matched.

Figure-1 shows baseline characteristic of study

group between patients and control group, which presented the mean of zinc in mg/l in study group patients and control group ( $0.207 \pm 0.04\text{mg/l}$  versus  $0.788 \pm 0.14 \text{ mg/l}$ ) and shows significant difference between the mean of zinc in mg/l in study group patients when compared with their control group ( $P = 0.000$ ).

In Table-II The mean serum zinc level decreased with advanced grade of acne patients, mild 47 patients (47%), moderate 33(33%), and severe in 20 (20%) ( $0.247 \pm 0.05$ ,  $0.1925 \pm 0.04$ ,  $0.180 \pm 0.03$  respectively), based on the Anova test analysis mean serum zinc levels were significantly lower in patients with mild to moderate and to severe acne vulgaris when compared between acne vulgaris grades and with reference group( $p \leq 0.001$ ,  $p \leq 0.01$ ,  $p \leq 0.05$  respectively).

As illustrated in Figure-2 there is significant negative correlation between mean serum zinc level and duration of acne vulgaris in the study group patients ( $r = -0.311$ ,  $p = 0.028$ ). Where as there is insignificant correlation between serum zinc level and the patients age in the study group ( $r = 0.032$ ), ( $p = 0.827$ ) plot 4.3.

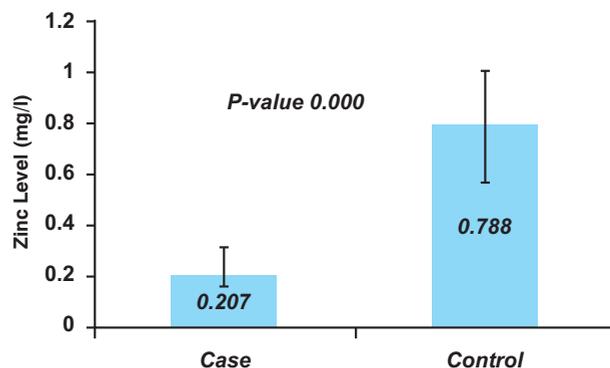


Figure-1. Descriptive bar plot shows zinc level (mg/l) in study group and their control group

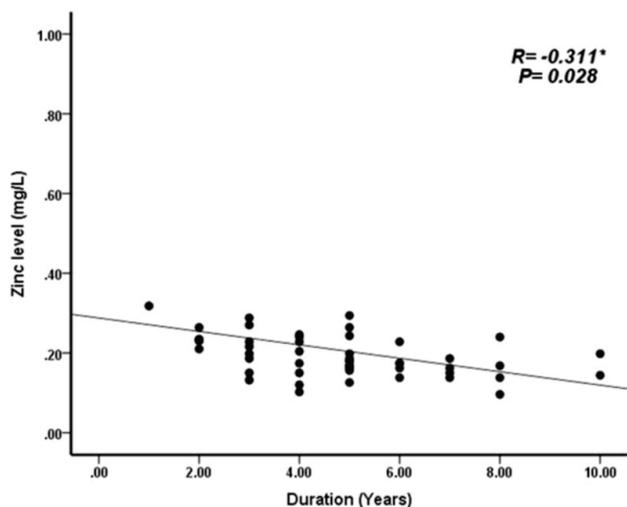
P-value	Mean $\pm$ SD	N	Groups
0.000	0.207 $\pm$ 0.04	100	Case
	0.788 $\pm$ 0.14	100	Control

Table-I. Comparison of serum Zinc level (mg/l) in the study group with their control

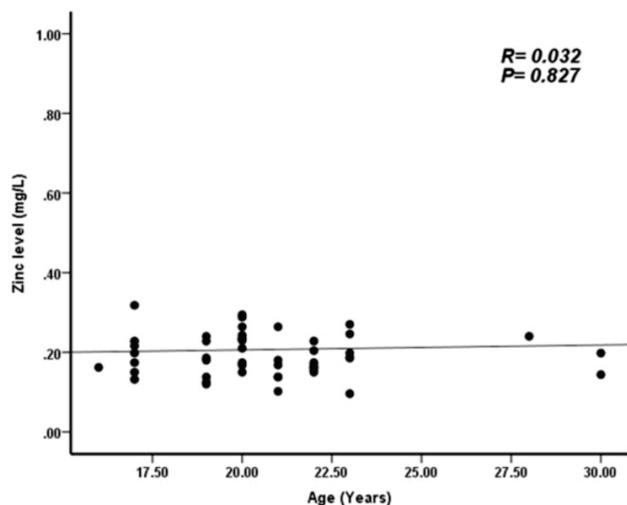
Acne severity	Number of patients	Zinc level mg/dl (mean ± SD)	Mean difference	p value
Control	100	0.788 ± 0.14	-	
Mild	47 (47%)	0.247 ± 0.05	0.55	0,001***
Moderate	33(33%)	0.193± 0.04	0.054	0.01**
Severe	20 (20%)	0.140 ± 0.03	0.053	0,03*

**Table-II. The relationship between zinc levels and severity of acne vulgaris in the study group**

\* The mean difference is significant at the  $p \leq 0.05$   
 \*\*The mean difference is significant at the  $p \leq 0.01$   
 \*\*\*The mean difference is significant at the  $p \leq 0.001$



**Figure-2. Scatter plot correlation between serum zinc level and duration in study group**



**Figure-3. Scatter plot correlation between serum zinc level and age in study group**

**DISCUSSION**

The importance of zinc in general human health and specifically on the health and integrity of the skin has been demonstrated in recent years.<sup>4</sup> A

great number of studies appeared in the literature exposing the relationship between zinc deficiency and, general health, male infertility as well as skin diseases<sup>1970</sup>.<sup>3</sup> The fact that females are more concerned with their appearance than males and are therefore seen more in clinics at the slightest change of appearance and even with minor pimples so our study concerned in females.

In the current study there was high statistically difference in the mean serum zinc levels between the study group and the control group. Serum zinc level is significantly decreased in the test group when compared with reference one. ( $P \leq 0.000$ ) Which agree with the study performed by Yeşim kaymak etal (2007).<sup>10</sup> This study came to the conclusion that there is a significant association between low level of serum zinc and the presence of acne. The main expected causes of zinc deficiency detected in acne patients during adolescents is due to increased requirement without increase intake as a result of bad dietary habits. The inflammatory reaction present in acne lesions is another factor that could decrease the serum zinc level.<sup>11,12</sup> The exact mechanisms by which zinc participates, by one way or another in the pathogenesis of acne vulgaris, is unknown; the possible relationship between zinc and acne has been based on the anti-inflammatory effect of zinc<sup>13</sup>, its role in androgen metabolism<sup>14</sup>, and vitamin A metabolism.<sup>15</sup> According to our data the mean serum zinc value in the acne patients was  $0.207 \pm 0.04$  mg/l and in the control group was  $0.788 \pm 0.14$  mg/l, there was obvious lower mean values in the acne group; with significant p value  $\leq 0.000$ , this finding is similar to the finding in the Turkish studies in the literature<sup>16</sup> but differ from the Korean study which shows the statistical significant difference only between the severe

type of acne compared with the healthy controls.

The present study observed decreasing of serum zinc level with the progressing of the acne vulgaris from mild, moderate to severe lesion. which is consistent with the finding obtained by Yeşim Kaymak et al (2007).<sup>10</sup> Whom deduced that serum zinc levels is related to the severity of acne lesions in patients with acne vulgaris. They found significant lower zinc levels in advanced grades of acne patients compared to the control group.

The present data demonstrated no correlation between zinc (mg/l) and age of patients, this result agree with the result observed by Majid Rostami et al(2014)).<sup>17</sup> Whom deduced that there was no relation between the patients age and serum zinc level in patients with acne vulgaris.

In our study correlation of the serum zinc values for patients who had the disease with duration of the acne vulgaris, showed significant effect of the duration, this result disagree with the result shown by Yeşim Kaymak et al (2007).<sup>10</sup> whom deduced there was no relation between duration and serum zinc level in patients diseased with acne vulgaris.

## CONCLUSION

Acne patients show significantly decreased serum zinc levels and is affected by duration and the severity of acne. Zinc supplementation in acne patients with low serum zinc levels will increase the success rate of treatment

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*There is not limit to the good you can do if you don't mind who gets the credit.*

– George C. Marshall –

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1	Thiga Mohammed Mohammed Osman Alhassan	Collection, Analysis and sample	
2	Abdelmula Mohamed Abdalla	Designing, Correction, Follow up of research	
3	Eshtiag Mohammed Mohammed Osman Alhassan	Clinical diagnosis of patient	
4	Suhair Abdelrahman Ahmed	aid in statistical analysis	