



ASSOCIATION OF THE TRACE ELEMENTS (SERUM ZINC AND COPPER) IN PATHOGENESIS AND SEVERITY OF ACNE VULGARIS.

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ABSTRACT

Acne vulgaris is a common skin disorder that affects a large percentage of the population. Although the exact pathogenesis of acne is not fully understood, it is known that various factors including genetics, hormonal changes, and environmental factors play a role in the development of this condition. Recently, the role of trace elements in the pathogenesis and severity of acne has gained attention. In this review, we summarize the current understanding of the role of some trace elements, including zinc and copper, in the pathogenesis and severity of acne vulgaris. The mean value of copper did not differ significantly between the patient (all severities combined) and control groups. However, serum Zn level was significantly decreased in severe acne group compared with controls ($P=0.0001$), mild ($P=0.0001$) and moderate ($P=0.003$) acne groups. $P<0.05$ being significant value.

KEYWORDS : Zinc, Copper, acne vulgaris, trace elements

INTRODUCTION:

Acne vulgaris is a chronic inflammatory skin disease that affects the pilosebaceous gland. The exact cause of acne is not fully understood, but it is believed to be a multifactorial disease that results from the interaction between genetic, hormonal, and environmental factors.¹ The pathogenesis of acne involves the hyperproliferation of keratinocytes, increased sebum production, inflammation, and the colonization of the hair follicles by *Propionibacterium acnes* (*P. acnes*) bacteria.² Recent studies have suggested that trace elements may play a role in the pathogenesis and severity of acne.

Zinc is an essential trace element that plays an important role in various physiological processes, including immune function, wound healing, and skin health.³ Zinc deficiency has been associated with the development of acne. Zinc has been shown to have anti-inflammatory properties and to inhibit the growth of *P. acnes*. Studies have shown that topical and oral zinc supplementation can improve acne symptoms. One study found that zinc supplementation was effective in reducing the severity of acne in patients with moderate to severe acne.

Copper is an essential trace element that is involved in various physiological processes, including the formation of collagen and elastin, wound healing, and immune function. Copper deficiency has been associated with the development of skin disorders, including acne.⁴ One study found that patients with acne had lower levels of copper in their blood than healthy controls. Another study found that copper supplementation improved acne symptoms in patients with moderate to severe acne.

METHODOLOGY:

This study was carried out in the Department of Biochemistry in collaboration with Department of Dermatology, Gandhi Medical college, Bhopal. The study involved 45 male patients with acne vulgaris, aged range between 16-30 years (mean \pm SD; 21.82 ± 3.77 years). Cases were divided into three groups according to the severity of their acne. A mild acne group that

included 15 patients, a moderate acne group of 15 patients and severe acne group of 15 patients. Scoring the severity of acne was according to the following rule:

Mild acne- Count of papules <10 and pustules < 20
Moderate acne- Papules- 10 to 30 and pustules 20 to 40
Severe acne- Papules >30 and Pustules > 40

Inclusion criteria:

- Recently diagnosed patients of acne vulgaris
- Male patients attending Dermatology OPD
- Age group between 16-30 years.

Exclusion criteria:

- Intake of oral Zinc or Copper supplements or multivitamins containing such elements three months before the study and presence of any metabolic disease that affected serum elements level.
- H/O any medication for acne vulgaris in previous 3 months.
- Control group consisted of 45 healthy males without acne and were matched for age 16-30 years (mean \pm SD; 22.18 ± 3.85 years). Five ml of peripheral venous sample was collected from each patient and control in plain test tubes, left for clot formation, then centrifuged at 2500 rpm for 10 minutes. The separated serum stored at -20 degree Celsius until the time of mineral assay.
- Serum Zinc estimation was done by the Akita Abe, Yamashita, S., (1989) Tetsuo Makino, (1991) method⁵ and Copper estimation by Sodium Diethyl dithiocarbamate method⁶.
- MS excel was used for data compilation and Epi info 7 was used for all statistical tests. Statistical significance was assessed by ANOVA and student t-tests. The linear regression and the significance for the r- value was checked using t-test. P-values of less than 0.05 were considered significant.

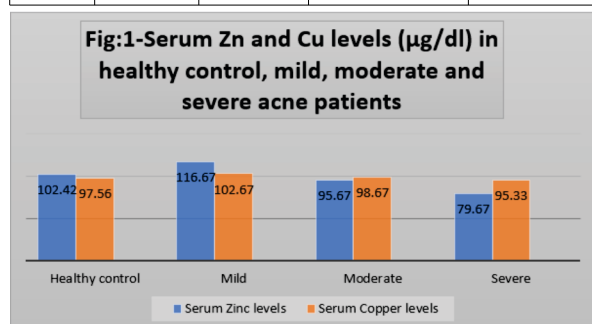
RESULTS:

Table:1- Age and serum levels of zinc and copper in healthy male subjects and patients with acne vulgaris.

Parameters	Controls (n=45)	Acne Patients (n=45)	P- value
Age (year)	22.18 ± 3.85	21.82 ± 3.77	0.651
Zn (mg/dl)	102.42 ± 18.10	97.33 ± 17.50	0.178
Cu (mg/dl)	97.56 ± 14.48	98.89 ± 18.98	0.709

Table-2: Mean (± SD) values of Serum Zinc and Copper levels in Healthy Male controls and Patients with Mild-, Moderate-, and Severe Acne Vulgaris

Parameters	Controls (n=45)	Mild acne (n=15)	Moderate acne (n=15)	Severe acne (n=15)
Zn (mg/dl)	102.42 ± 18.10	116.67 ± 12.34 (p= 0.0001)	95.67 ± 4.58 (p= 0.0001)	79.67 ± 7.19 (p< 0.003)
Cu (mg/dl)	97.56 ± 14.48	102.67 ± 22.82 (p= 0.3140)	98.67 ± 18.85 (p= 0.8128)	95.33 ± 15.06 (p=0.6109)



DISCUSSION:

The current study showed that serum Zn level was lower in acne patients than in healthy male controls but the difference was not significant. This finding was consistent with that observed by Nasiri et al in 20097 who also found insignificant decrease in serum Zn levels.

However, the current study found that serum Zn levels in severe acne were significantly reduced in patients compared to controls which agreed to the study done by Michaelsson 8 et al and Amer et al9. These authors suggested that low levels of Zn in the serum of patients with severe acne may provide a rationale for the beneficial effect of oral Zn treatment seen in clinical practice8

Copper is an important element for numerous metallo enzymes and metalloproteins such as superoxide dismutase that are involved in energy and antioxidant metabolism. Superoxide dismutase (Cu-metalloenzyme) protects human skin cell from peroxidative damage10. However, further studies are needed to show the beneficial effect of Zn and Cu compounds in prevention and treatment of acne vulgaris.

CONCLUSION:

The pathogenesis of acne is a complex process that involves various factors. Recent studies have suggested that trace elements, including zinc and copper, may play a role in the pathogenesis and severity of acne. Zinc and copper have been shown to have anti-inflammatory properties and to inhibit the growth of *P. acnes* bacteria. Supplementation with these trace elements may be beneficial in improving acne symptoms. Further studies are needed to determine the optimal dose and duration of supplementation for each trace element and to investigate the mechanisms underlying their effects on acne.

Limitations:

The nutritional status of the study participants was not assessed. Hence we were unable to comment on the dietary effects on the variables.

Also emotional and Hormonal effects do contribute to acne, that may be one of the confounding factors that was not covered.

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