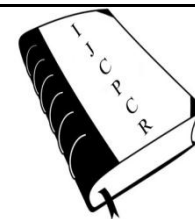International Journal of
Current Pharmaceutical & Clinical Research

www.ijcpcr.com

A STUDY ON ROLE OF VITAMIN A , E AND ZINC LEVELS IN SEVERITY OF ACNE VULGARIS- A CASE CONTROL STUDY

Ram mohan.Ch [1*],   Srikanth Reddy V [2], Ajay M [2], Aiswarya Reddy [2]

[1]Assistant professor, Dept of DVL, G.M.C/Govt General Hospital, Mahaboob Nagar, Telanagana, India.
[2]Senior Resident, Dept of DVL, G.M.C/Govt General Hospital, Mahaboob Nagar, Telanagana, India.

ABSTRACT

Acne vulgaris is a common chronic inflammatory disease of the skin which is usually seen in adolescence. In hyperseborrhea, follicular hyperkeratinization, Propionibacterium acnes colonization and inflammation are found to be responsible in the pathogenesis of acne, the exact mechanisms are unknown. Vitamin A and E are basic antioxidants vital for health. Zinc is also an essential element for human. But these parameters of the effects on skin are not fully understood. The aim of the present study to evaluate plasma levels of vitamin A, E and zinc in acne patients in relation to the severity of the disease. In the present study total 100 acne patients who were referred to our clinic, all new diagnosed and 50 age and sex matched healthy volunteers as control group. All patients are assessed according to standard grading system. We can divide into 3 groups named as mild, moderate, severe and very severe. In our study, Acne patients further grouped as group 1 consist of patients with mild to moderate disease; and group 2 consist of patients with severe to very severe acne. The patients with the controls and group 1 with group 2 were compared. The level of vitamin E, vitamin A and zinc were significantly lower than the control group (Table 1, p 0.001). When the patient group is compared among each other there was no statistically significant difference for plasma vitamin A levels between group 1 and 2 whereas vitamin E and zinc levels were significantly low in group 2 than group 1. Thus there was a negative correlation between acne severity and vitamin E and zinc levels. Our study focused and stated that significance and incorporation of different supplements in diet to patients with acne. Our study finally concluded that supportive dietary measures with foods rich in vitamin A and E and zinc in the acne prophylaxis and treatment.

Key words: Vitamin A, Zinc, Acne, Propionibacterium.

INTRODUCTION

Acne vulgaris is regarded as a common chronic inflammatory disease of the skin which is commonly seen in adolescence [1]. The condition may lead to psychological problems such as impaired social contact, anxiety and lack of confidence [2]. Acne is a disease of pilosebaceous unit that affects adolescent and young adults. Although hyper seborrhea, follicular hyperkeratinization, Propionibacterium acnes colonization and inflammation are found to be responsible in the pathogenesis, the exact mechanisms are not known1. The effect of diet on acne has been a debate in recent years. Thus, there are few studies that evaluate vitamin and mineral levels in acne patients to elucidate this relationship. Different results were achieved from these studies [3]. For instance, vitamin A which is also used in treatment, measured by retinol binding protein levels, and low levels are reported4. On the other hand, in some studies, zinc levels are found to be low in proportion to acne severity, whereas no relation has been stated by some others5.

Corresponding Author :- **Ram mohan.Ch** Email:- Rammohanchdvl@gmail.com

Vitamin A is an essential fat-soluble element in addition to its important role in vision, haematopoiesis, embryologic development, function of immune system, gene transcription and many other physiological activities; it is also required for integrity and differentiation of skin and skin appendages [3,4]. Deficiency of vitamins A and E can lead to some diseases. Vitamin A deficiency is observed in chronic illness, malabsorption, liver diseases as well as diet with low levels and may result with xerosis, follicular keratosis and metaplasia of mucous membranes. Although synthetic derivatives of vitamin A have a wide range of side-effects, it may have excellent results when appropriate doses are used in dermatology [4].

The role of vitamin E in skin biology has not yet been illuminated. It is known to protect biological membranes from free radicals by antioxidant activity. Free radicals are produced when body is exposed to environmental factors as foods, cigarette smoke and ionizing radiation. Vitamin E has a role in immune system and metabolic processes as well. Vegetable oils, nuts, seeds, grains and green leafy vegetables are sources known to be rich for vitamin E. Many people get enough levels of this vitamin. D-a-tocopherol is the stabilizing unsaturated lipid form of vitamin E in plasma, known to protect against auto-oxidation. It accumulates lipoproteins and cellular membrane by rapidly reacting with free radicals and molecular oxygen, accentuates immune system, protects skin against UV radiation and preserves the membranes from peroxidation [5]. For example, it is used in dermolytic epidermolysis bullosa although there are controversial results.

The beneficial effects of zinc salts in mild and moderate acne lesions were also stated in studies. However, the mechanism of zinc salts isonly partially understood yet. In fact, zinc inhibit leucocyte chemotaxis and proliferation of P. acnes, and increase phagocytic capacity of natural killer cells and granulocytes. The anti-inflammatory effect of zinc is by reduction of TNF-a and IL-6 production and modulation of expression of integrins, especially ICAM-1 and LFA-3. In vitro studiesshowed the specific effect of zinc on 5a-reductase. We aimed to evaluate plasma levels of vitamins A and Eand zinc in acne patients in relation to the severity of the disease [4,5].

MATERIALS AND METHODS
Study Design
In total, 100 acne patients who were referred to our clinicbetween December 2015 and January 2016 and 50 age and sex matched healthy volunteers as control group were included in the study.

Exclusion and Inclusion Criteria
The control group was not under any treatment and had no past or family history of acne. Bothgroups were not having any vitamin pills. Detailed procedure was discussed with all participants and they signed the informed consent. All patients were assessed according to Global Acne Grading System and grouped as mild, moderate, severe and very severe cases.

Study Groups
Acne patients further grouped as group 1 consisted of patients with mild to moderate disease; and group 2 consisted of patients with severe to very severe acne.

Estimation of Biochemical Parameters
Venous blood samples after 12–14 h fastening werecollected in EDTA tubes. Tubes were centrifuged without delay, in slightly oblique position with low velocity coolingmethod (Hettich Zentifugen D.78532; Tuttlingen, Germany) and plasma was separated in 30 min. Plasma vitamins A and E concentrations were studied by standard methods and serum zinc levels were measured spectrophotometrically. Vitamins A and E were dissolved by hexane and dried by nitrogen steam. The remnant was dissolved by diethyl ether and solvent is mixed before dilution with methanol. To avoid photodestruction of vitamins, light-protected, dark environment was supplied.

Statistical Analysis
Data were recorded and analyzed by using SPSS statistical analysis software version 18. A p-value of 0.05 was considered significant.

RESULTS
In the present study, Of the 100 patients included in the study, 65 were women\and 35 were men. The mean age of patients was 27.54 8.30.The level of vitamins E and A and zinc were significantly lower than the control group (Table 1). When the patient group is compared among each other there was no statistically significant difference for plasma vitamin A levels between groups 1 and 2, whereas vitamin E and zinc levels were significantly low in group 2 than group 1. Thus, there was a negative correlation between acne severity and vitamin E and zinc levels.

DISCUSSION
The pathogenesis of acne, a common disease in dermatology practice is not known exactly. There are some studies to understand relationship of diet and acne. Besides vitamin A, which is also used in the treatment, there are studies that evaluate vitamin E and minerals such as zinc and copper4,5, Vitamins A and E are a group of organic compounds, which are fat-soluble and naturally found in food. They are basic antioxidants vital for health. The deficiency of these vitamins can lead to many diseases. In addition to primary deficiency, secondary deficiency of vitamin A is observed when lipid and zinc absorption which are also necessary for vitamin A absorption, are impaired [6].

Table 1. The levels of Vitamin A, E and Zinc levels in both acne and control groups.

	Patients (n-100)	Control (50)	P value	Group 1 (n-35)	Group 2(n-65)	P Value
Sex female/Male	65/35	35/15	0.02	27/8	40/25	0.023
Age	27.50± 8.30	31.45±9.56	>0.05	28.46±10.42	27.06±6.76	>0.05
Vitamin A	0.45±0.25	0.65±0.21	<0.001	0.50±0.26	0.35±0.43	>0.05
Vitamin E	7.58±2.00	12.00±3.06	<0.001	8.50±4.12	4.50±2.45	>0.05
Zinc	65.12±16.11	90.25±21.33	<0.001	70.12±16.40	52.13±14.52	0.001

The low concentration of vitamin A leads to cell desquamation, increased adhesiveness of follicular cells and keratin production thus result in acne ranging in severity from mild comedonal to severe inflammatory lesions, also with prolonged duration of disease. Acne severity is increased in patients with low levels of vitamin A. In addition, although the severe acne patients in our study had low levels of vitamin A, this was not statistically significant. These studies support the low levels of vitamin A as a risk factor for acne and improve acne lesions with oral vitamin A [5]. Some previous studies found low levels of both vitamins A and E in acne patients in comparison to control group and additionally, lower levels were obtained in severe acne patients when compared with mild patients.

In our study, all three molecules, vitamins A and E and zinc levels, were found low and thus may reflect a relation between diet and acne. The low intake or secondary reasons for the low levels may be a risk factor for acne [5,6]. The study by El Akawi et al. found that vitamin E levels were significantly lower than controls but they did not associate this finding with dietary factors. They thought that an indirect relation exists between low vitamin E level and acne [11,12]. The low level was thought to be due to depletion as an antioxidant, produced against oxygen radicals during the inflammatory phase. Besides, the reactive oxygen radicals produced during inflammatory factors as smoking, were reported to deplete vitamins A and E levels. In the study, smokers were found to be high among those with low levels of vitamins A and E, but this was statistically not significant. The role of smoking should be investigated carefully in further studies [7]. Combined treatment of acne with oral vitamins A and E was reported to have a synergistic effect by regulating keratinization.Some studies stated that vitamin E levels decreased during isotretinoin treatment. We had correlated acne severity and vitamin E levels. When the eating habits of our patients were asked, dominance of diet with high glycemic index, poor in fruits and vegetables were stated [8].

There are few studies regarding the relationship between zinc deficiency and acne. Zinc is an essential element for human, but the effects on skin are not fully understood. Zinc and vitamin A are essential for pubertal development and normal epithelial differentiation. About 6% of the zinc in human body is localized in the skin [8]. The human retinol binding protein is a specific transporter protein with low molecular weight. Retinol binding protein reflects the vitamin A levels in target organs. Zinc is a co-factor for metallo enzymes in many cellular pathways. It can be used in acne treatment based on its anti-inflammatory effects. Zinc levels are estimated to better understand acne pathogenesis and different results are yielded [9].

Nasiri et al [10]. found low levels of vitamin A among Iranian acne patients but zinc levels were similar in both acne and control groups. In our study, zinc levels in all patients were decreased and this finding correlates with acne severity. Limitations in our study are: low number of study population, not having noted detailed dietary habits and smoking habits. On the other hand, these parameters should be given as treatment to note final effects in comparison to control group.

CONCLUSION

In conclusion, our study marks the importance of diet in patients with acne. In our patients group, depletion of foods with high glycemic index as fast foods are clearly important. We offer supportive dietary measures with foods rich in vitamins A and E and zinc in the acne prophylaxis and treatment. Supportive treatment with these vitamins and zinc in severe acne may lead to satisfactory results. Further studies with larger patient groups are required to understand the role of these vitamins and minerals in acne.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

REFERENCES
1. Habif TP .Clinical dermatology 4th ed. Edinburg: Mosby. 2004, 162-171.
2. Jowett S, Ryan T. Skin disease and handicap: an analysis of the impact of skin conditions. *Soc Sci Med,* 20, 1985, 425-9.
3. Traber MG, Packer L. Vitamin E: beyond antioxidant function. *Am J Clin Nutr*, 62, 1995, 1501–1509.

4. Xu HQ, Liang CR, Xi YP. Changes in serum copper, zinc,vitamin A and E and their significances in patients with acne vulgaris–observation of therapeutic effect in 56 cases treated with zhenye baishecao. *Zhong Xi Yi Jie He Za Zhi* , 6, 1986, 169–170.

5. Ste´phan F, Revuz J. Zinc salts in dermatology. *Ann Dermatol Venereol* , 131, 2004, 455–460.

6. Vahlquist A, Michae¨lsson G, Juhlin L. Acne treatment with oral zinc and vitamin A: effects on the serum levels of zinc and retinol binding protein (RBP). *Acta Derm Venereol* 58, 1978, 437–442.

7. Michae¨lsson G, Juhlin L, Vahlquist A. Effects of oral zinc and vitamin A in acne. *Arch Dermatol ,* 113, 1977, 31–36.

8. Doshi A, Zaheer A, Stiller MJ. A comparison of current acne grading systems and proposal of a new system. *Int J Dermatol,* 36, 1997, 416–418.

9. Mascio PD, Murphy ME, Sies H. Antioxidant defense system: the role of carotenoids, tocopherols, and thiols. *Am J Clin Nutr,* 53, 1991, 194–200.

10. El-Akawi Z, Abdel-Latif N, Abdul-Razzak K. Does the plasma level of vitamins A and E affect acne condition? Clin Exp Dermatol, 31, 2006, 430–434.

11. Ayres Jr S, Angeles L. Acne vulgaris: correcting pathophysiologic defects versus antibacterial therapy. *Int J Dermatol,* 5, 1986, 335.

12. Ayres Jr S, Mihan R, Angeles L. Synergism of vitamin A and E in acne vulgaris. *Int J Dermatol, 20,* 1981, 616