

ASSOCIATION BETWEEN ACNE VULGARIS AND CIRCULATORY ZINC STATUS AMONG ADOLESCENTS AND YOUNG ADULTS

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ABSTRACT

Background: There is increasing evidence on the association between low serum zinc levels and acne vulgaris; there are some reports on Zinc level and severity of acne vulgaris. The aim of the study was to measure the level of serum zinc in patients with acne vulgaris and to ascertain the impact of zinc on its severity.

Materials and Methods: This study was conducted at Azadi Teaching Hospital, Duhok city, Kurdistan Region - Iraq, throughout the period from the 1st of January to the 30th of April 2019. It was a case-control study Design, in which 100 patients with acne vulgaris and 100 apparently healthy controls without acne vulgaris were enrolled. The two groups were matched for age, sex and body mass index.

Levels of serum zinc, triglycerides and albumin were measured. The classification of acne severity was done according to the American Academy of Dermatology Acne Consensus Conference.

Results: Significantly, higher prevalence of hypozincemia ($p=0.017$) were found in acne vulgaris patients than in apparently healthy controls without acne vulgaris. Significant lower zinc/Triglycerides ratio and zinc /albumin ratio was observed in the patients' group compared to apparently healthy controls without acne vulgaris. In patients with acne vulgaris, serum zinc correlated positively with zinc/ Triglycerides and zinc/albumin ratio ($p =0.001$ and <0.001 respectively). Statistically, there were no significant differences ($p>0.05$) between patients with different forms of acne regarding the zinc level and other parameters.

Conclusions: Low level of serum zinc has been found in patient with acne vulgaris especially those with severe form of the disease, but there is no relation between low serum zinc levels and the severity of the acne vulgaris.

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Keywords: Acne vulgaris, Serum zinc status.

Acne vulgaris is considered as the most common skin disease. Approximately 80% of people mainly at the ages between 11 and 30 years can be affected (Zaenglein et al., 2016). The prevalence of acne vulgaris in adolescents is ranged from 35 to over 90 percent as it had been estimated (Collier et al., 2008). It is a chronic disease that may persist for

many years and result in permanent scarring and disfigurement that represent the most terrible sequel. Moreover, acne could lead to a critical adverse effect on development of psychosocial disorders resulting in emotional troubles, depression and society withdrawal (Matho, 2017). Acne vulgaris is a pilosebaceous unit disorder which is characterized by

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development comedones, papules, pustules, inflamed nodules, deep inflamed and sometimes purulent sacs (Dawson et al., 2013).

Face, neck, chest, upper arms, and upper back are the most common areas of the body for developing acne vulgaris as the hormonal sensitive sebaceous glands presented in these regions (Kutlubay et al., 2017). The major pathogenic factors which are responsible for acne vulgaris development include increased sebum, keratinization of middle part of the infundibulum, bacterial colonization of the follicle and inflammation of the follicle and surrounding tissues (Kurokawa et al., 2009).

In acne vulgaris, the earliest change in the pilosebaceous unit is a follicular hyper keratinization which is associated with both excessive proliferation and reduced desquamation of keratinocytes that lining the follicular orifice which leads to sebum- and keratin-filled microcomedones (Kim et al., 2002).

Zinc is one of the important trace elements required for the development and growth and is related to health and disease (Kamer et al., 2012). Zinc is essential for normal function of cells, tissues and organs. It is found in quite high levels in the epidermis of the skin, and plays a role in delayed type hypersensitivity reactions, regulation of inflammation, normal keratogenesis, cell membrane stabilization and many enzymatic reactions (Arora et al., 2002; Kaymak et al 2007).

Deficiency of certain nutrients like zinc has a significant role in acne vulgaris and may increase the risk of psychological sequel in acne vulgaris (Pappas, 2009). Zinc is known to facilitate the production

and regulation of about 200 hormones. The most important one is testosterone which is considered as a main promoter of acne (Baltaci et al., 2019).

The correlation between acne vulgaris and serum zinc levels have been reported by some studies (Majid et al., 2014; Alhassan et al., 2018; Gaber et al., 2019). To gain insight into the association between serum zinc level and acne vulgaris, serum zinc, triglycerides and albumin were measured in acne vulgaris patients and compared with the levels in apparently healthy controls without acne vulgaris group.

MATERIALS AND METHODS

Patients and Controls

The study was designed as a case-control. Acne vulgaris patients who visited the out-patient clinic in the Dermatology Department of Azadi Teaching Hospital in Duhok city/Kurdistan Region-Iraq, during 1st of January to the 30th of April 2019 were enrolled as the subjects for study. The population of this study consisted of 100 patients who consulted the dermatology clinic for acne vulgaris management and 100 apparently healthy subjects without acne lesions selected from workers of Azadi Teaching Hospital in Duhok city, some students of the fourth stage of the college of nursing and the students of the college of physical education were included as controls. The two groups were matched for age sex and body mass index. This study was approved by the Ethics Committee of the Directorate of Health of Duhok and the Scientific Committee of the College of Medicine of Duhok University.

The inclusion criteria for the acne vulgaris patients and healthy controls were as follows: being over 11 years for age and did not take treatment for any purpose and accept to contribute in our study.

Patients were excluded from this study if they had any facial disfiguring conditions and conditions other than acne vulgaris, history of any chronic hematological disease, hepatic or renal disease, pregnancy or on supplement containing elemental zinc for the last 6 months were also excluded. Written informed consent from the participants has been obtained.

Grouping of patients

The classification of acne severity has been developed by the American Academy of Dermatology Acne Consensus Conference (ACC). This classification was based on the number and type of lesion present (Goh et al 2015).

The patients group was subdivided into 3 subgroups according to the American Academy of Dermatology Acne Consensus Conference as follows:

Mild: patients present with few to several number of papules and pustules without any nodules.

Moderate: patients present with several to many papules with pustules lesions and few nodules.

Severe: Patients with many to extensive papules as well as pustules lesions with numerous nodules.

Grouping of patients was performed according to the acne lesions severity into three main groups as the following:

- Subgroup 1: comprising 28 patients suffering from Mild degree of acne vulgaris represented by comedones and a few papulopustules.

Subgroup 2: comprising 44 patients suffering from moderate degree of acne vulgaris characterized by comedones, inflammatory papules and pustules. Greater numbers of lesions are present than in milder inflammatory acne.

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Subgroup 3: Comprising 28 patients suffering from severe degree of acne vulgaris characterized by presence of comedones, inflammatory lesions, and large nodules greater than 5 mm in diameter. Scarring is often evident.

Data collection

A questionnaire was designed to collect information from all participants on age, gender, marital status, socioeconomic status, education levels, family history of similar condition and drug history. This study was approved by the Ethics Committee of the Directorate of Health of Duhok and the Scientific Committee of the College of Medicine of Duhok University.

Anthropometric measurements

Body Mass Index (BMI): was calculated by dividing weight (kg) over squared height (M²) (Nuttall, 2015).

Weight was measured by digital balance with straight standing individual without shoes and light wearing clothes as closely as possible.

Height was measured by a special tape measure (height bar) with straight standing individual without shoes.

According to the National Institute of Health, the BMI was defined as follows (Weir & Jan, 2020):

Underweight	<18.5 Kg / m ²
Normal weight	18.5-24.9 Kg / m ²
Overweight	25-29.9 Kg / m ²
Obese	> 30 Kg / m ²

Assessment of zinc status

Definition of zinc status was as follows (WHO, 1995; Al-Timimi et al., 2005):

Severe zinc deficiency: serum zinc concentration <50 µg/dl.

Marginal zinc deficiency: serum zinc concentration 50-70 µg/dl.

Normal zinc level: serum zinc concentration between 70-130 µg/dl.

High zinc level: serum zinc concentration >130 µg/dl.

Collection of samples

After overnight fasting for 12-14 hours, blood sample had been collected from participants. For sera blood, samples were collected in BD vacutainer system CAT-plain tuber (5ml), by using medical centrifuge at 3000 rpm (revolution per minute). The serum was separated for 10 minutes and then the serum had been stored at -28 °C for later analysis of serum zinc, albumin and triglycerides.

Biochemical Measurements

Serum Zinc: Serum level of zinc was measured by spectrophotometer using colorimetric procedure. The Kit was manufactured by LTA s.r.l. via Milano 15/F ITALY Code CC02750.

Test summary

Zinc reacts with the chromogen present in the reagent forming a colored compound which color intensity is proportional to the zinc concentration present in the sample.

Calculation:

In serum\plasma

$$\text{Zn } \mu\text{g/dl} = \left[\frac{A (\text{sample})}{A (\text{standard})} \right] \times \text{conc. of standard (200 } \mu\text{g/dl)}.$$

Serum Albumin: Roche Cobas 6000 (c501 module) was used to measure serum albumin levels. This method utilizes the

dye bromocresol purple (BCP). In a pH range of 5.2-6.8 the dye binds selectively with albumin, later a color change occurs that is measured at 600 nm. The secondary wavelength is 700 nm. This is a 2-point, end point reaction that is specific for albumin.

The normal range of serum albumin was accepted as 3.5 to 5.0 g/dl or 35-05 g/liter (Moman et al., 2020).

Serum Triglycerides: The Roche/Hitachi Cobas 6000 analyzer series is a fully automated, random-access, software-controlled system for immunoassay and photometric analyses intended for qualitative and quantitative in vitro determinations of a wide variety of tests one of them is serum triglycerides (Eckfeldt, 2014).

The normal value of serum triglycerides levels was accepted as less than 150 mg/dl. A value of 150 to 199 mg/dl was considered as borderline and value >200 mg/dl was considered as hypertriglyceridemia (Ritter et al., 2019).

STATISTICAL ANALYSES

The statistical calculations were performed in Statistical Package for Social Sciences version 25 (SPSS 25; IBM Corp; USA). The descriptive purposes of the study were presented as a mean (standard deviation) for numerical variables as well as number and frequency for categorical variables. The number of the patients with different severity was determined in number and percent. The comparison of general characteristics between controls and patients with acne was examined in independent t-test or Pearson Chi-squared tests. The comparison of biochemical parameters between controls and acne

patients was examined by an independent t-test. Analysis of variance (ANOVA) one-way was carried out to detect the difference in the level of serum zinc and biochemical parameters in acne patients with different severities. The comparison between serum albumin in both groups was examined in post-hoc LSD (least significant difference) test. The presentation of biochemical parameters among patients with different severities was drawn in Box plots. The correlation of serum zinc with biochemical parameters with adjustment for age, sex, and BMI was determined in bivariate correlation. The significant level of difference was determined in a p-value of less than 0.05.

RESULTS

The study includes 100 patients suffering from acne vulgaris and 100 apparently healthy controls without acne lesions. The patients were divided clinically according to the severity of disease as follows:

28(28%) patients with mild form of acne, moderate acne in 44(44%) and 28(28%) with severe condition (Figure 1)

Table 1, shows the baseline characteristics of apparently healthy controls without acne lesions and patients with acne vulgaris with respect to age, gender and BMI (body mass index), no significant differences were found. The Socioeconomic status, marital status and occupation distribution were nearly similar between patients and apparently healthy controls without acne lesions. The positive family history distribution of acne was significantly higher in patients compared to healthy controls ($p = 0.012$).

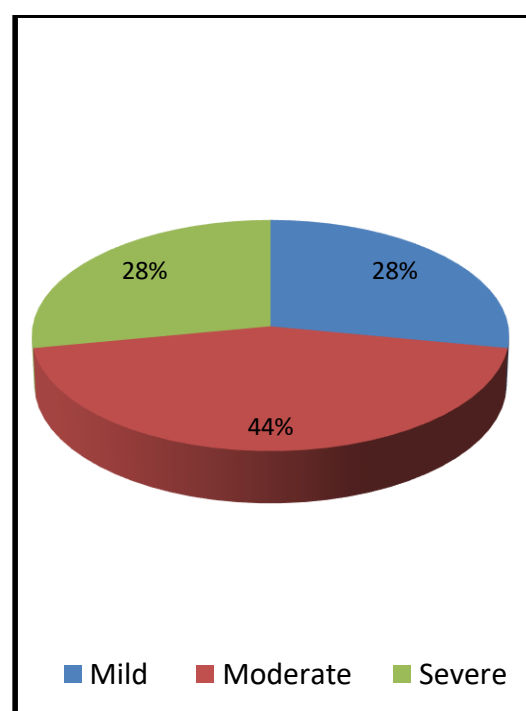


Figure 1 Distribution of patients with acne vulgaris

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Table1. Baseline characteristics of studied groups

Characteristics	Controls (n=100)	Cases (n=100)	p-value
Age (Years)	20.06	17.57	0.075*
BMI(kg/m2)	18.34	17.65	0.180*
Sex			0.479**
Male	50	45	
Female	50	55	
Socioeconomic Status			0.060**
Mild	16	11	
Moderate	55	76	
Good	29	13	
Marital status			0.118**
Single	89	95	
Married	11	5	
Occupation			0.116**
Student	61	80	
Self-employed	3	0	
Not employed	19	12	
Employed	17	8	
Family history of acne			0.012
Positive	10	58	
Negative	90	42	

*Independent t-test and Pearson

**Chi-squared tests were performed for statistical analyses.

The Mean \pm SD of serum zinc, triglycerides and albumin in apparently healthy controls without acne lesions and patients with acne vulgaris are presented in Table 2. Significantly, lower zinc, and albumin levels were observed in patients

compared with apparently healthy controls without acne lesions ($p=0.001$ and $p=0.009$, respectively). A significant lower zinc/TG ratio and zinc /albumin ratio was found in the patients group compared to healthy controls without acne lesions.

Table 2. Serum zinc level and related parameters in controls and patients with acne vulgaris

Biochemical parameters	Study Groups		p-Value
	Controls (n=100)	Cases (n=100)	
Serum Zinc(μ g/dl)	110.77 (23.06)	93.29 (19.39)	0.001
Serum TG (mg/dl)	83.42 (27.34)	80.46 (23.78)	0.443
Serum Albumin(g/dl)	4.80 (0.26)	4.70 (0.28)	0.009
Zinc/TG Ratio	1.35 (0.59)	1.14 (0.46)	0.004
Zinc/Albumin Ratio	23.33 (5.22)	19.88 (4.04)	0.001

Independent t-test was performed for statistical analyses.

Figure 2. shows the range of serum zinc in the controls and acne patients. In controls serum zinc levels were ranged from (62 to 165 μ g/dl) with a mean value of 110.77 \pm 23.06 μ g/dl. In acne patients, serum zinc levels ranged from (48 to 137 μ g/dl) with a mean value of 93.29 \pm 19.39 μ g/dl.

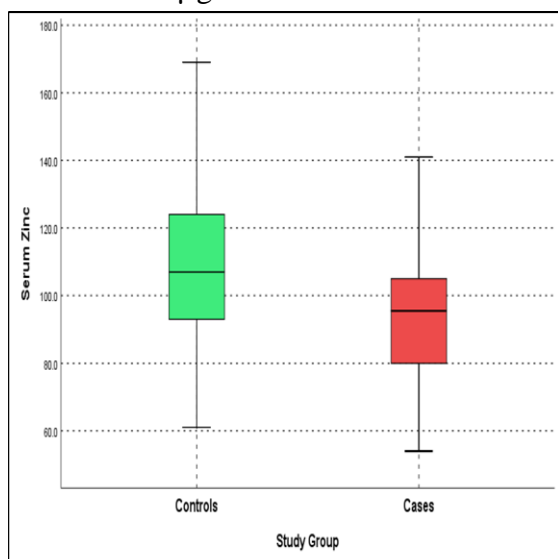


Figure 2 Comparison Between the mean of serum zinc in patients and control subjects.

Table 3 shows the frequency of zinc deficiency in apparently healthy controls without acne lesions and patients with acne vulgaris. Of the one hundred patients, 17(17.0%) were zinc deficient (Serum zinc<70 μ g/dl) compared to 5(5.0%) of healthy controls ($p=0.017$). Severe zinc

deficiency was found in 1(1.0%) of acne patients and 16(16.0%) of patients were with mild-to-moderate zinc deficiency. Nobody of the apparently healthy controls without acne lesions had severe- zinc deficiency and mild-to-moderate zinc deficiency was found in 5(5.0%).

Table 3. Frequency of zinc deficiency in apparently healthy controls without acne lesions and patients with acne vulgaris.

Serum zinc (μ g/dl)	Controls	Cases	P-value
< 50	0(0.0)	1(1.0)	-
50-70	5(5.0)	16(16.0)	0.017
>70	95(95.0)	83(83.0)	0.430

To determine which of the studied parameters was significantly related to the different forms of acne (see Table 4).As shown, statistically there was no significant differences ($p>0.05$) between patients subgroups as regard zinc level and other parameters.

Table 4. Intra-comparisons of Serum zinc and related parameters in patients with different degrees of acne vulgaris.

Parameters	Form of Acne			p-value
	Mild (n=28)	Moderate (n=44)	Severe (n=28)	
Serum Zinc (μ g/dl)	93.45 (19.46)	91.98 (18.89)	95.19 (20.62)	0.794
Serum TG(mg/dl)	81.46 (31.00)	79.64 (21.50)	78.78 (16.93)	0.918
Serum Albumin(g/dl)	4.74 (0.24)	4.61 (0.28)	4.76 (0.09)	0.300
Zinc/TG Ratio	1.25 (0.63)	1.05 (0.32)	1.18 (0.50)	0.203
Zinc/Albumin Ratio	19.59 (3.93)	19.88 (3.81)	20.18 (4.61)	0.865

One-way ANOVA test was performed for statistical analyses.

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The relationship between zinc and both triglycerides and albumin in patients group is presented in Table 5. As shown, in the patients with acne, serum zinc was correlated positively with zinc/TG and

zinc/albumin ratio ($p=0.001$ and <0.001 respectively). Figure 3 and figure 4 shows the Scatter plot of correlation of serum zinc with zinc/TG ratio and zinc/albumin ratio.

Table 5. Correlation coefficients of serum zinc with related parameters in patients with acne vulgaris.

Serum Zinc	Correlation			
	TG	Albumin	Zinc/TG Ratio	Zinc/Albumin Ratio
Correlation	0.010	0.131	0.599	0.959
Significance (2-tailed)	0.930	0.237	0.001	<0.001

The correlation was adjusted for age, sex, and BMI.
The bold numbers shows the significant correlation.

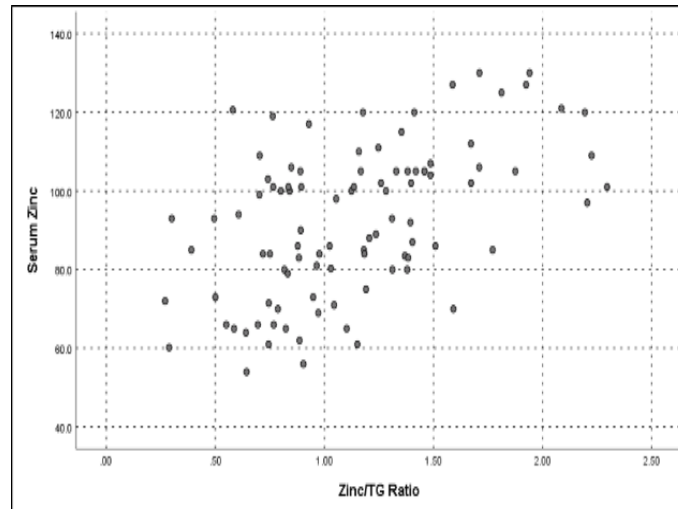


Fig 3. Scatter plot of correlation of serum zinc with zinc/TG Ratio

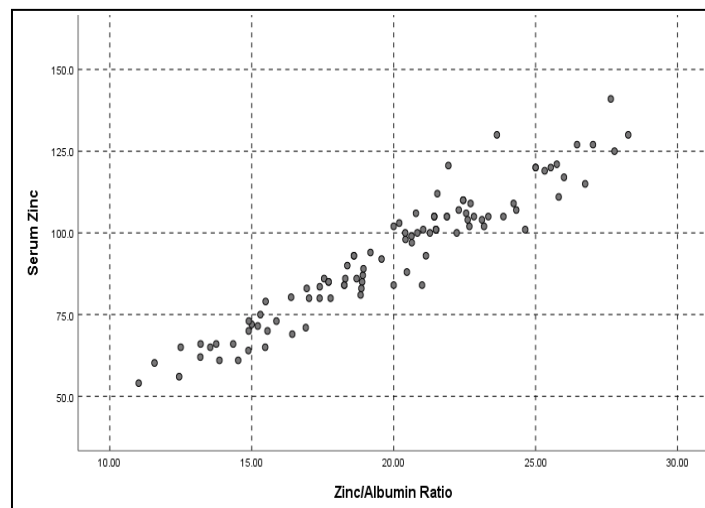


Fig 4. Scatter plot of correlation of serum zinc with zinc/Albumin Ratio.

DISCUSSION

In the last decade numerous studies have shown the importance of zinc in human health and a disease (Bhowmik.et al., 2010; Al-Timimi.et al., 2011; Angelova.et al., 2013). Zinc is one of the trace elements which is essential for the health and integrity of the skin (Prashanth.et al., 2015; Bagherani & Smoller, 2016). Zinc deficiency is reported in some chronic inflammatory diseases of the skin including acne vulgaris (Arota, et al., 2002; Park et al., 2009; Kawamura et al., 2012, Kumar, et al., 2020). Moreover, the relation between serum zinc levels and the severity of acne has been revealed in recent years (Gaber.et al., 2019; AL-Khair.et al., 2019). It has been found that acne is tightly linked to zinc deficiency. Zinc is known to facilitate the production and regulation of about 200 hormones. The most important one is testosterone which is considered the main promoter of acne (Saleh.et al., 2011; Karabay & Cermen, 2019).

In several developing countries mild to moderate zinc deficiency is common (Tuerk.et al., 2009; Hess.et al., 2017; Vuralli.et al., 2017) because of the commonly consumed staple foods which are rich in phytates and have low zinc contents. The phytate contents of several proteins is known to decrease the availability of zinc and thus the prevalence of zinc deficiency is likely to be high in population consuming large quantities of cereal proteins (Al-Timimi.et al., 2012; Gupta.et al., 2015; Al Hasan.et al., 2016). In Iraq, a growing evidence has shown that low serum zinc was found at a high percentage among the Iraqi population, particularly in adolescents and young

adults (Al-Timimi, 2005; Al-Timimi, et al., 2018; Al-Timimi.et al., 2019; Al-Zubaedi.et al., 2019;). Thus, marginal zinc deficiency is significant but unrecognized public health problem in Iraq (Al-Timimi.et al., 2009).

In the current study, an attempt was done to evaluate the serum zinc level in patients with acne vulgaris and clarify its relation with severity of the disease. Reported data in many other studies was the appearance of low levels of the serum zinc in acne vulgaris patients compared with data for healthy controls. It was remarkable that the majority of the patients had low serum zinc status, although the readings were within the lower limit of the normal range, and around one third of the acne patients had severe acne. On the other hand, most of the healthy controls (95.0%) had normal serum zinc level. These results are in accordance with previous studies (Fouqiya.et al., 2013; Rad.et al., 2016). Moreover, in the present study, it has been noticed a significant correlation of zinc/TG and zinc/albumin with zinc in patients with acne vulgaris. To the best of our knowledge, our study is the first study to examine the association of zinc with measurements of triglycerides and albumin among patients with acne. These results confirm that both triglycerides and albumin may play a role in the acne pathogenesis -related pathologies.

The high frequency of low zinc status in patients with acne vulgaris compared to healthy controls is especially notable because many factors are known to impact negatively on zinc status including insufficient intake of dietary zinc, malabsorption and micronutrient interactions (Al-Timimi.2017; Sanna, et

al., 2019). Of the one hundred patients with acne vulgaris, 17 presented with zinc deficiency $<70\mu\text{g/dl}$, but on the other hand, most of the patients were with the lower border line of the normal range of serum zinc between $70\mu\text{g/dl}$ - $90\mu\text{g/dl}$. The results of this study were concordant with that of (Alhassan.et al., 2018), who compared the levels of serum zinc in 100 acne vulgaris patients and 100 control individuals and observed statistically significant lower serum zinc levels in acne vulgaris patients compared to its level in control group.

The association between serum zinc level and the severity of acne has been reported in many studies (Majid.et al., 2011; Ozuguz.et al., 2014; Kumar et al., 2018) they have shown a negative correlation between acne severity and serum zinc levels, on the contrary other studies have found a positive association between serum zinc levels and acne severity (Mogaddam.et al., 2014). Furthermore, Gaber.et al., 2019 reported that there was no significant difference in serum zinc levels between acne patients and healthy subjects. Meanwhile, there was a significant correlation between serum zinc levels with severity and type of acne lesions.

The present study obtained low values for serum zinc in acne patients in comparison to controls. Similarly, (Ahmed.et al., 2016) reported that there was a significant difference in serum zinc levels between acne patients and healthy subjects. For instance (El-Dibany & Elhassi, 2019) conducted a case control study in Benghazi – Libya from April 2017 to April 2018. The study included 65 patients with acne vulgaris and 65 healthy control subjects, the result of this study illustrates that there

was a highly significant difference between serum zinc level in acne patients and the controls ($p\text{-value} = 0.0001$). Some other studies did not prove any difference between serum zinc in

acne patients and controls for example (Erpolat, et al., 2016)

studied 43 patients with acne vulgaris and 37 healthy control subjects they have been involved in case control study in Turkey, but the results interpreted no statistically significant difference of serum zinc level between acne patients and control subjects ($p\text{-value} = 0.46$).

In this study, It has noticed that there is no statistically significant difference in BMI between acne vulgaris patients and those who are apparently healthy people ($p\text{-value} 0.180$), Moreover the comparison of serum albumin level between acne patients and those that considered as controls has shown a significant difference in serum albumin level ($p\text{-value} 0.009$). As it has been emphasized by many studies there is a strong relation between serum zinc and serum albumin because serum albumin is the key carrier protein of zinc in the blood stream and 70% of the transported zinc bound to albumin (Coverdale et al., 2019). Our data suggest a statistical correlation between zinc and albumin ratio in both healthy subjects and patients ($p\text{-value} 0.001$) and this has been confirmed by some other studies (Tsutsumi.et al., 2014).

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پوخته

په یوه نډی د نافعې را زیبکېن بهر به لاف و رهوشا زینکی ل ده ف سنټله و جه ټلان

باگراوند و نارمانج:

به له یېن زېده هغه ل سهر هغه بنډیا د نافعې را کیمبوونا ناستین زینک د خوینافیدا و زیبکان، ل کارتیکنرا کیمبوونا زینکی نه هاتیه هغه دیتن وهک مه ترسیهک بو دیاربوونا زیبکان. نارمانج ژ فکولینې بو پېشان ناستی زینکی یه د خوینافیدا ل نک نه خوشین زیبکېن بهر به لاف و دوو پاتکرن ژ کارتیکنرا زینکی ل سهر تونډیا وئ.

کهرسته و رټک:

پېشان ناستین زینک و دوهنی سیانی و نه لبومین هاته کړن بو خوینافیدا د 100 نه خوشین کو گازندې ژ زیبکېن بهر به لاف دکهن و 100 کسین ساخلم ب شیوهکې بهرچاف. ههردوو کومه له هاتنه وهک هغه کړن ژ لایې رهگهزی و تهمه نی و نیشاندې باراسته نی له شی. تونډیا زیبکان هاته پو لینکرن لدویف کونگرې هغه دنگیا زیبکان یا نه کادیمیا نه مریکی یا پیستی .

نه نجام:

ناستین کیم ژ زینکی ($P = 0.001$) هاتنه دیتن، مل ب مل دگهل بلندبوونا ریژه یا به لاف هبوونا کیمبوونا زینکی دخوینیدا ($P = 0.017$) لنک نه خوشین گازندې دکهن ژ زیبکېن بهر به لاف ب بهراوردکرن دگهل مهرجین ساخلمی، کیم بوونا ریژه یا زینک/دوهنی سیانی و ریژا زینک/ نه لبومین هاته تیبینکرن د کومه لا نه خوشان ب بهراوردکرن ب مهرجین ساخلمی. جیاوازی ب به لگه کا ناماری ($P > 0.05$) نه بوون د ناستین جیاوازی بین زینکی دناف بهرا کسین ساخلم و نه خوشین زیبکا لدویف ناستین زینکی و بین دی

د مرته نجام:

ناستی زینکی ل نک نه خوشین زیبکا کیم بوویه ل هه مبهری کسین د بهرچافدا ساخلم ل کروبین فی فکولینې . ز لایه کی دی هیج هغه بنډی د نافعې را ناستی زینکی و دزواریا زیبکا نینه.

الخلاصة

العلاقة بين حب الشباب وحالة الزنك عند المراهقين والشباب

الخلفية والأهداف : هناك أدلة متزايدة على العلاقة بين انخفاض مستويات الزنك في مصل الدم وحب الشباب ، ولكن لم يتم الكشف عن تأثير نقص الزنك كخطر لظهور حب الشباب. ان الهدف من الدراسة هو قياس مستوى الزنك في مصل الدم لدى مرضى حب الشباب والتأكد من تأثير الزنك على شدته .

المواد والطرق: تم قياس مستويات الزنك والدهون الثلاثية والألبومين لمصل الدم لـ 100 مريض يعانون من حب الشباب و 100 من المجموعة الضابطة الصحية بشكل ملحوظ. تم مطابقة المجموعتين من حيث الجنس والعمر ومؤشر كتلة الجسم. تم تصنيف شدة حب الشباب وفقاً للأكاديمية الجلدية الأمريكية مؤتمر إجماع حب الشباب .

النتائج : تم العثور على مستويات منخفضة من الزنك ($p = 0.001$) ، جنباً إلى جنب مع ارتفاع معدل انتشار نقص الزنك في الدم ($p = 0.017$) في المرضى الذين يعانون من حب الشباب الشائع مقارنة مع المجموعة الضابطة الصحية. لوحظ نسبة قليلة من الزنك / الدهون الثلاثية ونسبة الزنك / الألبومين في مجموعة المرضى مقارنة بالمجموعة الضابطة الصحية. لم تكن هناك فروق ذات دلالة إحصائية ($p > 0.05$) بين المرضى الذين يعانون من أشكال مختلفة من حب الشباب فيما يتعلق بمستوى الزنك وغيرها من المعلمات.

الاستنتاجات: هناك انخفاض في مستوى الزنك عند المرضى المصابين بحب الشباب وخصوصاً في الحالات الشديدة ولكن لا توجد أية علاقة بين مستوى الزنك في مصل الدم وشدة المرض.