

The Relationship between Lipid Profile and Testosterone in Acne Vulgaris

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Abstract

Acne vulgaris is a multifactorial disease affecting a majority of the adolescent population. The objective of this study was to estimate the lipid profile and hormone testosterone in patients with acne and in control groups, also to test the correlation between lipid profiles levels and testosterone level in acne patients. Prospective study was performed in 60 patients of acne vulgaris . Lipid profile and serum testosterone levels were measured. Their results were compared with a group of 30 age-matched healthy groups .Total cholesterol (TC), HDL-C and LDL-C levels were lower in acne patients. Testosterone levels were increased in acne patients. Positive correlation was found between testosterone and TC. In conclusion, acne patients have some abnormality in lipid profile and hormone testosterone. These abnormalities must be considered in the pathogenesis as well as in the treatment of acne patients.

Key words: Acne, lipid profile, testosterone,

Introduction

Acne vulgaris is a common disease that affects the majority of the adolescent population and a large number of young adults [1]. It is a common human skin disease, characterized by areas of skin with seborrhea (scaly red skin), comedones (blackheads and whiteheads), papules (pinheads), pustules (pimples), nodules (large papules) and possibly scarring[2]. Facial acne is the cause for many visits to primary care physicians and dermatologists, which can involve enormous costs [3]. Acne is a disease of the pilosebaceous unit hair follicles in the skin that are associated with an oil gland [4]. The clinical features of acne include seborrhoea (excess grease), non-inflammatory lesions (open and closed comedones), inflammatory lesions (papules and pustules), and various degrees of scarring. The distribution of acne corresponds to the highest density of pilosebaceous units (face, neck, upper chest, shoulders, and back). Nodules and cysts comprise severe nodulocystic acne. Acne classification, scarring, acne rosacea, chloracne, acne associated with polycystic ovary syndrome, infantile acne, acne inversa, and drug-induced acne have been reviewed elsewhere [5-12]

Little is known about the natural history of acne, despite its prevalence and its toll in scarring and psychological damage [4]. Acne appears very early in puberty during the preteen years, often before menarche in girls [5]. Because many adolescents have acne, it is difficult to predict which individuals are prone to severe cases. The four primary factors determining its development are abnormal follicular epithelial desquamation, hyperactivity of the sebaceous glands, proliferation of *Propionibacterium acnes*, and follicular inflammation [5]. Some degree of acne affects almost all people aged 15 to 17 years [7-9] and is moderate to severe in about 15–20 % [10]. Acne vulgaris is a chronic disease that often persists for many years [11]. There is little research about what factors might predict whether acne will last into adulthood [12]. Acne typically starts in early puberty with increased facial grease production, and mid-facial comedones followed by inflammatory lesions [10].

Acne occurs most commonly during adolescence, and often continues into adulthood. In adolescence, acne is usually caused by an increase in testosterone, which people of both genders accrue during puberty [13]. For most people, acne diminishes over time and tends to disappear or at the very least decrease after one reaches one's early twenties. There is, however, no way to predict how long it will take to disappear entirely, and some individuals will carry this condition well into their thirties, forties, and beyond [14].

These modifications were undertaken to reduce the potential risk of thromboembolic events, hepatic tumors, hypertension, altered glucose metabolism, and androgenic side-effects [15]. The relationship between blood lipids such as cholesterol, triglycerides, HDL-C and LDL-C and acne is not widely reported. Measuring plasma total cholesterol, triglycerides, HDL-C and LDL-C levels in 166 Jordanian acne patients as well as females have significantly low plasma HDL-C levels compared with those of age and sex matched healthy controls. These results came to confirm what has been observed by Vergani and Finzi et al. [16]. They found that males with severe acne have significantly reduced levels of HDL-C compared with those of healthy individuals. The mean plasma total cholesterol, triglycerides and LDL-C levels in males and females were found not to be significantly different from those of healthy controls, except that for LDL-C levels in patients with severe grades of acne, where they observed a significant decrease in this parameter compared with controls. Obtained results concerning plasma total cholesterol and triglycerides were similar to those demonstrated by Vergani and Finzi et al. where they did not find any significant differences in the triglyceride and total cholesterol levels between patients and controls.

Materials & Methods

The control groups consisted of 30 non-hospitalized adults with no history of systemic disease (matched for age and sex).

A total of 60 diagnosed adult acne patients admitted to Al Karama hospital/Wasit. Subject was fasting 12-14 hr. at the time of blood withdrawal . Their age range between 17-30 years where included in this study throughout the period between January –march 2012.

Sample Collection:

Venous blood specimens were collected in ethylenediaminetetraacetic acid (EDTA) tubes, and then centrifugation was done for plasma separation. Blood samples were centrifuged at 2000 rpm for 10 minutes. The serum samples were freezed at -20°C till analyzed.

Plasma total cholesterol, triglycerides and high density lipoproteins cholesterol levels were estimated by enzymatic colorimetric tests, commercially available , according to the manufacturer recommended procedure .To estimate the level of low-density lipoproteins cholesterol Friedewald formula [17] was used :-

$$\text{LDL} = \text{TC} - \text{HDL} - \text{TG}/5.0 \text{ (mg/dL)}$$

Plasma lipids concentrations were determined using Shimadzu spectrophotometer (Shimadzu, Japan).Plasma testosterone levels were estimated by using ELISA system.

Statistical analysis of the data was performed and the results were expressed as mean \pm standard deviation. T-test was used to compare the significance of the mean differences between two groups. The differences were considered significant if the obtained p value was less than or equal to 0.05.

Results and discussion

Sixty acne patients and thirty healthy controls were included in this study. Because there are some differences in lipids profile between males and females, in this study we decided to present results obtained in two groups male and female acne patients and these results were compared with healthy individuals.

Table (1): plasma lipid profile and hormone testosterone of male's acne patients and controls:

Parameter mmol/L	Acne (male)(n=30)	Control (male)(n=15)	P value
TC	3.44 \pm 0.09	3.81 \pm 0.02	P < 0.05
TG	0.63 \pm 0.1	0.94 \pm 0.04	P > 0.05
LDL-C	2.10 \pm 0.05	2.14 \pm 0.01	P > 0.05
HDL-C	1.06 \pm 0.08	1.25 \pm 0.03	P < 0.05
Testosterone	5.86 \pm 0.09	5.4 \pm 0.06	P < 0.05

Table (2): plasma lipid profile and hormone testosterone of female's acne patients and controls:

Parameter mmol/L	Acne (female)(n=30)	Control (female)(n=15)	P value
TC	4.20 \pm 0.11	4.81 \pm 0.06	P < 0.05
TG	0.86 \pm 0.09	0.74 \pm 0.03	P > 0.05
LDL-C	2.49 \pm 0.04	2.58 \pm 0.08	P > 0.05
HDL-C	1.09 \pm 0.14	1.19 \pm 0.01	P < 0.05
Testosterone.	0.42 \pm 0.12	0.38 \pm 0.02	P < 0.05

Results are presented as mean \pm S.D., where n is the number of individuals. TC: triglycerides, HDL-C: high density lipoprotein cholesterol, LDL-C: low density lipoprotein cholesterol, Testo: testosterone hormone. Significant differences are indicated by $p \leq 0.05$.

Table (3): Comparison between plasma lipid profile and hormone testosterone of male's and females acne patients.

Parameter mmol/L	Acne (male)	Acne (female)	P value
TC	3.44 \pm 0.09	4.20 \pm 0.11	P < 0.05
TG	0.43 \pm 0.1	0.86 \pm 0.09	P < 0.05
LDL-C	2.10 \pm 0.05	2.49 \pm 0.04	P < 0.05
HDL-C	1.06 \pm 0.08	1.32 \pm 0.14	P < 0.05
Testosterone.	5.86 \pm 0.09	0.42 \pm 0.12	P < 0.05

Table 4: Comparison between plasma total cholesterol and hormone testosterone of male's and females acne patients

Gender	Acne TC	.Control TC	Acne Testo.	Control Testosterone
Male	3.44 \pm 0.09	3.81 \pm 0.02	5.86 \pm 0.09	5.4 \pm 0.06
Female	4.20 \pm 0.11	4.81 \pm 0.06	0.42 \pm 0.12	0.38 \pm 0.02

The results presented in table (1) shows that significantly ($p < 0.05$) decrease in total cholesterol and HDL-C in male acne patients compared with control group, in contrast the level of testosterone was significantly ($p < 0.05$) increase in male acne patients in comparison of control group.

The results in table (2) shows that significantly ($p < 0.05$) decrease in total cholesterol and HDL-C in female acne patients in comparison of control group and significant ($p < 0.05$) increase in testosterone level of female acne patients in comparison of control group. These results came to confirm what has been observed by other studies.

Serum lipid concentration are affected by many factors such as environmental factors, alcohol intake, smoking, dietary intake and genetic factors. Therefore, we might find some differences in these levels between different races and ethnic groups [18]. It has been observed that saturated fatty acids elevate plasma triglycerides and LDL-C levels, and carbohydrates lower the plasma HDL-C levels [19].

Most acne patients consumed foods rich in carbohydrates, saturated fatty acids and low in carbohydrates, saturated fatty acids and this might lead to marked changes in the fat composition of HDL and LDL lipoproteins, which might reflected on their plasma levels [20]. The abnormality in the lipid profile might due to different factors that must be considered in the pathogenesis as well as in the treatment of acne patients.

The results in table (3) shows a comparison between plasma total cholesterol and hormone testosterone of males and females acne patients, the data shows that a significant ($p < 0.05$) decrease in lipid profile in male in comparison of

lipid profile of female. The results also showed significant increase in hormone testosterone in males in comparison with that in females.

Acne by its very nature can be considered a hormonal disease. Hormones are responsible for the maturation of the oil glands in our skin. This is why children do not experience acne [21]. While it is not known exactly how hormones affect acne, we do know that the skin is a target for hormones and can even produce hormones itself [22].

As presented in table (4) the results showed significant correlation between total cholesterol and hormone testosterone in both males and females.

There is a sharp increase in androgen hormones during puberty, which is why acne suddenly erupts during adolescence. Testosterone is present in both males and females, but it is found in higher levels in the male body. This may explain why, while acne strikes both young men and young women equally, males tend to have more severe and longer lasting acne than their female counterparts.

Testosterone works with the enzyme reductase to create di-hydrotestosterone. Di-hydrotestosterone stimulates the sebaceous glands, causing an increase in sebum production and leading to an oilier skin. As the follicles are filled with excess oil, they become blocked more easily. The blockage of the follicle creates a comedo, or acne breakout.

Testosterone also impacts adult acne, specifically adult women. When the female body is lacking estrogen (typically known as a female sex hormone) there is often an increase of testosterone production.

This sharp decrease in estrogen and rise in testosterone is most often seen during ovulation and menstruation, pregnancy, perimenopause, and menopause, and can also be caused by using certain birth control medications. It is during these periods of life that women are more likely to develop, or have worsening, acne breakouts [21].

In conclusion, acne patients have some abnormality in lipid profile and hormone testosterone. These abnormalities that we demonstrated in this different factors that must be considered in the pathogenesis as well as in the treatment of acne patients.

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العلاقة بين المحتوى الدهني وهورمون التيستسترون عند مرضى حب الشباب

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الخلاصة

إن مرض حب الشباب هو متعدد العوامل التي تؤثر على غالبية السكان في سن المراهقة. إن الهدف من هذه الدراسة هو تقدير المحتوى الدهني وكذلك مستوى هورمون التيستوستيرون عند المصابين في حب الشباب ومقارنته مع مجاميع السيطرة من الأصحاء. تم إيجاد علاقة ترابط بين المحتوى الدهني ومستوى التوستوستيرون عند المصابين بحب الشباب. تم إجراء هذه الدراسة على 60 مصاباً بحب الشباب ومن كلا الجنسين وعلى 30 من الأصحاء كمجموعة سيطرة. لقد أوضحت النتائج بأن هناك نقصان في مستوى الكوليسترول الكلي والكوليسترول عالي الكثافة عند المصابين بحب الشباب مقارنة بالأصحاء وكذلك فقد بينت النتائج هناك زيادة في مستوى التوستوستيرون عند المصابين بحب الشباب في كلا الجنسين مقارنة بالأصحاء. تم التوصل إلى أن هناك علاقة ترابط ايجابية بين مستوى الكوليسترول الكلي ومستوى التوستوستيرون عند المصابين بحب الشباب ولكلا الجنسين.

نستنتج من هذه الدراسة بأن هناك خللاً واضحاً في المحتوى الدهني وفي مستوى هورمون التوستوستيرون عند المصابين بحب الشباب لذلك يجب مراعاة هذه الاضطرابات المصاحبة لهذه الإصابات عند المعالجة الطبية.

الكلمات المفتاحية: حب الشباب، المحتوى الدهني، هورمون التيستوستيرون.