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Assessment of serum testosterone in females with acne vulgaris in Erbil city

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Abstract

Background and objective: Acne vulgaris is a chronic inflammatory disease of the pilosebaceous units, characterized by comedones, papules, pustules and nodules. Acne affects primarily the face, neck, upper trunk. Acne typically begins at puberty and it is often the first sign of increased sex hormone production. In all women with acne the possibility of hyperandrogenic state should be considered. The aim of this study was to determine the relationship between abnormal testosterone level and other virilising signs in young females with acne vulgaris.

Methods: This case-control study was carried out from April 2013 to January 2014 in the consultation Department of Dermatology and Venereology at Rizgary Teaching Hospital in Erbil city. Sixty females were considered group A (case group with acne) and 60 females were considered as group B (control group) without acne.

Results: The mean±SD serum testosterone level was significantly higher among patients with acne compared to the control group (0.51 ng/ml ± 0.27 compared to 0.31 ng/ml ± 0.12, *P* <0.05). Irregular cycle was found in 28 cases (46.6%).

Conclusion: The study showed presence of a significant association between serum testosterone level and acne vulgaris in female patients.

Keywords: Acne vulgaris, Serum testosterone, Erbil city.

Introduction

Acne vulgaris is a chronic inflammatory disease of the pilo-sebaceous unit resulting from androgen-induced increased sebum production, altered keratinization, inflammation, and bacterial colonization of hair follicles on the face, neck, chest and back. Facial scarring due to acne affects up to 20% of teenagers. Acne can persist into adulthood, with detrimental effects on self-esteem.[1] Acne is a common disease that affects the majority of the adolescent population and a large number of young adult population. Both clinical observations and experimental evidence confirm the importance of androgens in the pathophysiology of acne.[2] Acne is a common feature in the course of endocrine diseases characterized by raised levels of androgens. On the other hand raised androgen levels in women with acne have been repeatedly demonstrated in many studies. The skin is a typical target tissue for androgen and testosterone, a major androgen in human blood that stimulate many metabolic processes in the endothelium of sebaceous gland.[3] Androgens cause enlargement and overstimulation of the sebaceous glands in people with acne and this leads to overproduction of sebum coupled with sluggish exfoliation process leads to blocked pores and development of acne.[4] Sebaceous glands contain most of the steroidogenic enzymes necessary for final production of testosterone and di-hydro-testosterone. Some acne patients showed various degrees of hyper-androgenemia although there was no positive correlation between the severity of acne and markers of androgenecity.[5] Certain diseases that cause an increase in androgen production

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are associated with acne including polycystic ovary syndrome and congenital adrenal hyperplasia.[6] Whether androgens are elevated in adult females with acne or not is a matter of debate and controversy. Some studies reported hyper-androgenemia in these cases while others showed no evidence of the same and the disease is mediated by end-organ hyper-response to normal circulating androgens.[7] The aim of this study was to assess serum levels of testosterone in female patients with acne vulgaris in Erbil city.

Methods

This case-control study was carried out from February 2013 until January 2014 in the consultation Department of Dermatology and Venereology at Rizgary Teaching Hospital in Erbil city. Female patients having acne vulgaris where selected as study case group. A healthy age and sex matched control group was enrolled from the community. Thus, 60 patients were considered group A case (acne female patients) and 60 patients were considered as group B control (healthy female without any chronic medical disease or skin disease). Convenience sampling method was used for selection of study participants. Within the period of data collection patients were assigned purposively considering exclusion and inclusion criteria of patient selection. Inclusion criteria for cases included female patients older than 14 years and having acne clinically diagnosed as acne vulgaris and patients willing to participate in this study. Pregnant females and lactating mothers, patients treated with oral contraceptive pills, and anti androgen and patients on medication known to affect androgen action or metabolism were excluded from the study. Inclusion criteria for controls included age matched eumenorrhoeic healthy females with no acne and willing to participate in the study. Facial examination was done according to The American Academy of dermatology classification scheme for acne.[8] General clinical examination was done for all study groups. A questionnaire form was designed and the data were collected from patients by direct interview including name, age, occupation, residence ,duration of acne, family history of acne, location of acne and other virilizing signs such as hirsutism, scalp hair loss, obesity and infertility. Sample collection and preservation; The verbal consent was obtained from all patients and control before being enrolled into the study (for those below 18 years the consent of the guardian was taken). All patients and control females were subjected to the same experimental protocol. Serum sample was drawn during the luteal phase (from10th day to the 25th day of menstrual cycle) with all aseptic precautions. 3ml of blood was collected from the median antecubital vein with disposable plastic syringe. Method of estimation: Testosterone enzyme immunoassay test kit was used to determine serum total testosterone in a biochemical laboratory. The device is manufactured by BIOMERIEUX and made in France. The assay principle combines an enzyme immunoassay competition method with final fluorescent detection (ELFA). At the end of the assay, results were automatically calculated by the instrument in relation to the calibration curve stored in memory and then printed out. Statistical analysis Data were analyzed using the statistical package for the social sciences (version 19). Chi square test of association was used to compare between proportions of the two study groups. When the expected count of more than 20% of the cells of the table was less than 5, Fisher's exact test was used. Student's t test was used to compare between means of the two study groups. A *P* value of ≤0.05 was considered statistically significant.

Results

This study included two groups, the control and the study groups. Each group consisted of 60 individuals. The mean age

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was 20.82 years for study group and 20.75 years for control group. There was no significant difference between the age of the groups (*P* = 0.941). The mean serum testosterone level was 0.3120 for control group and 0.5183 for study group, this finding was statistically significant (*P* = 0.001) as shown in Table 1. Regarding clinical features of acne 63.3% of patients had face involvement alone while 36.7% had chest, back and arm involvement. 33.3% of patients had mild disease, 53.3% had moderate and 13.3% had severe disease as seen in Table 2. The menstrual cycles were irregular in 38.3% of the cases of acne while among control group only 8.3% had irregular cycles (*P* = 0.001) as shown in Table 3.

Table 1: Comparison between case and control groups: Age and serum testosterone level.

	Group	**No.**	**Mean**	**SD**	***P* value**
Age (years)	Case	60	20.82	5.199	0.941
	Control	60	20.75	4.565	
Testosterone level	Case	60	0.5183	0.27695	<0.001
	Control	60	0.3120	0.12264	

Table 2: Locations and severity of acne among case group.

Variable	**No. (%)**
Location of acne	
Face	(38) 63.3%
Back, arm, chest	(22) 36.7%
Severity of acne	
Mild	(20) 33.3%
Moderate	(32) 53.3%
Severe	(8) 13.3%
Total	**(60) 100%**

Table 3: The frequency of irregular cycles among case and control group.

Menstrual cycle	**Control**	**Case**	**Total**	***P* value**
Irregular	5 (8.3%)	23(38.3%)	28(23.3%)	0.001
Regular	55(91.7%)	37(61.7%)	92(76.7%)	
Total	60(100%)	60(100%)	120(100%)	

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Discussion

This study included 60 female patients with acne vulgaris and 60 controls with age matching. The serum level of testosterone among patients group was significantly higher than that of control group. This is a controlled study and any conditions interfere with serum testosterone level have been excluded in both control and the study groups. A from Hilla city that included 73 male and female patients at the ages around 20 years measured several hormones and concluded that the serum testosterone level was significantly higher in patient group compared with control group,[4] which is similar to our findings in females with acne vulgaris. A study from Dhaka Bangladesh on 70 female patients and 70 female control individuals that estimated serum total testosterone had findings similar to this study that was significantly higher level of serum testosterone in female patients with acne vulgaris.[3] In a study done in Brazil 54.56% of patients with acne vulgaris had hyper androgenism but the most frequently elevated hormone was dehydroepiandrosterone, however only testosterone is measured in this study and it is a case controlled while the Brazilian study was retrospective and included 835 women.[8] The severity of acne has also been linked with hyperandrogenism in a study conducted by Alan et al in Antalya that included 145 patients and 73 healthy subjects and they concluded higher prevalence of hyperandrogenism and obesity among patients with acne vulgaris.[9] Not only high serum levels of testosterone has been documented in patients with acne vulgaris, but low estrogen level is also found according to a an article by Arora MK et al from New Delhi, who screened more than 1000 studies and concluded that various endogenous hormones play important role in the pathogenesis of acne vulgarism.[10] Low levels of serum estradiol have been correlated with severity of acne vulgaris in another study done in Egypt by Bakry et al, that also concluded higher levels of serum free testosterone and cholesterol in such patients.[7] It is clear that hyper androgenism is associated with some cases of acne vulgaris and has certain role in the pathogenesis of acne vulgaris.[11] In such cases anti-androgen treatment is one of the options especially in resistant cases.[3] The exact role of testosterone and other androgens in the pathogenesis of acne is not clear. New studies are essential to determine the role of anti-androgen treatment of severe acne and further studies are also needed regarding the role of androgens in various chronic skin disorders. It might be better to involve larger number of patients and control individuals while in this study only 60 individuals included in each group and this is one of the weak points in this study. Another point is that we estimated total serum testosterone rather than free testosterone, but since there is control group and same hormone assessment method applied for both groups it can be dependable.

Conclusion

The study showed presence of a significant association between serum testosterone level and acne vulgaris in female patients.

Conflicts of interest

The authors report no conflicts of interest.

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