

Prevalence of elevated testosterone levels among female patients of acne vulgaris

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Abstract

Background Acne vulgaris is a frequently encountered skin disorder among patients of all ages. It is a source of significant psychosocial trauma and reduced self-esteem especially among females. Androgens, mainly testosterone, have a significant role in its pathogenesis. They mainly increase the sebum production that plays an important role in the formation of typical lesions of acne.

Objective To assess the frequency of increased levels of testosterone among female patients of acne.

Methods This cross-sectional survey was carried out at Department of Dermatology Services Hospital/ Services Institute of Medical Sciences, Lahore from 1st June, 2018 till 30th November, 2018. 3 ml of blood sample was drawn from each patient on 2nd day of menstrual cycle. Serum testosterone analysis was done using chemiluminescence technology. The level of serum testosterone >120 ng/dl was taken as high.

Results A total of 220 female patients of acne were enrolled. Mean age of the patients was 22.7 ± 5.4 years. Mean duration of disease was 11.8 ± 8.7 months, while mean BMI was 24.38 ± 3.80 kg/m². High serum testosterone level was observed in 22 patients (10%). Statistically significant effect of age, BMI, marital status and severity of acne was noted on elevated testosterone levels.

Conclusion It was observed that high serum testosterone was significantly associated with acne. Therefore, assessment of testosterone levels and androgen based treatments may help in better management of women presenting with acne.

Key words

Serum testosterone, acne, chemiluminescence technology.

Introduction

Acne vulgaris is one of the most frequently encountered skin diseases with a prevalence of more than 90%. It is a multifactorial disorder characterized by inflammation of pilosebaceous unit in genetically predisposed individuals under the influence of hormones. The pathogenic process involves increased sebum production, aberrant differentiation of follicular epithelium, microbial colonization and inflammation. These

lead to formation of characteristic lesions of acne which include open and closed comedones, papules, pustules, nodules, cysts, scars and post inflammatory hyperpigmentation. Aggravating factors include stress, topical applications, seasonal variations, sunlight, etc.^{1,2} Acne and its sequelae including scars and hyperpigmentation are accompanied by significant untoward effect on psychosocial life, reduced self-esteem and reduced quality of life of patients.³

Skin especially the sebaceous glands are a frequent target to many hormones especially androgens.⁴ Knowledge of androgens, their receptors, enzymatic activities and their role in

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biology of pilosebaceous unit has led to advancement in development of therapeutic options for acne.⁵ Androgens particularly testosterone and its metabolite dihydrotestosterone are formed in skin and by binding to nuclear receptors they increase sebum production by sebaceous glands. Hyperandrogenism associated with various endocrine disorders, like polycystic ovarian syndrome, leads to increased incidence of acne in these diseases.⁶

This study was conducted to assess the level of testosterone in females presenting with acne in our population in order to understand disease pathogenesis and better management of patients. We also intended to compare these details from studies across the world, to better understand the strength of association.

Methods

This cross-sectional study was conducted at the Department of Dermatology, Services Hospital/ Services Institute of Medical Sciences, Lahore. After obtaining approval from hospital's Ethical Review Board, female patients of acne were enrolled after written informed consent from 1st June, 2018 till 30th November, 2018. Using non-probability purposive sampling, female patients of ages 15 to 45 years, with clinically diagnosed acne (having comedones, papules, pustules, nodules and scarring) were included. Male patients, pregnant or lactating females, patients taking oral contraceptive pills, steroids or antiandrogen drugs within last 3 months were excluded. Patients having polycystic ovary disease, ovarian tumors or concomitant systemic illness like diabetes mellitus, hypertension and ischemic heart disease, diagnosed on the basis of history and clinical examination, were also excluded.

Demographic data and clinical details of patients

were recorded. Severity of acne (mild, moderate, severe) was graded according to Acne grading scale of American Academy of Dermatology.⁷ 3ml of blood sample was drawn from each patient on 2nd day of menstrual cycle. Serum testosterone analysis was done using Chemiluminescence technology. The level of serum testosterone >120 ng/dl was taken as high.

The data collected were entered and analysed using SPSS 22. Mean and standard deviation was calculated for quantitative variables like age, BMI and duration of disease. Qualitative variables like severity of acne, marital status and serum testosterone level were presented as frequencies and percentages. Data were stratified for age, BMI, marital status, acne severity (mild, moderate, severe) and duration of disease to deal with effect modifiers. Post-stratification Chi-square test was applied taking p-value ≤ 0.05 as significant.

Results

A total of 220 females fulfilling inclusion criteria were enrolled in this study during the period of six months. Mean age of the patients was calculated as 22.7 ± 5.4 years. Age distribution of the patients showed that 42% (93) patients were between 15-20 years old, 31% (68) were between 21-25 years old, 20% (43) were between 26-30 years old, 5% (12) were between 31-35 years old, 1% (02) were between 36-40 years old while 1% (02) patients were between 41-45 years of age.

The distribution of the patients by duration of the disease showed that 75% (166) had disease duration of 1-12 months, 20% (44) had 13-24 months, 4% (08) had 25-36 months and 1% (02) had 37-48 months of disease. Mean duration of disease was calculated as 11.8 ± 8.7 months. The distribution of patients by BMI showed that

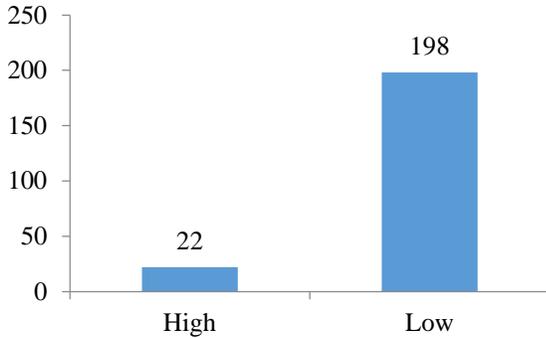


Figure 1 Serum testosterone level in acne.

55.5% (122) patients had BMI <25 kg/m², while 44.5% (98) had BMI of >25 kg/m². Mean BMI was found to be 24.38±3.80 kg/m².

The distribution of patients by severity of acne showed that 32.7% (72) had mild, 46.4% (102) had moderate and 20.9% (46) patients had severe acne.

Out of 220 women, 30.5% (67) were married and 69.5% (153) were unmarried. In total, 10% (22) patients had high testosterone levels, while

90% (198) patients were found to have normal serum testosterone level (**Figure 1**).

Stratification of raised testosterone level with regard to age, BMI, marital status and acne severity showed significant effect of these effect modifiers (p-value ≤ 0.05). However, duration of disease had no significant effect on serum testosterone level (p-value > 0.05).

Discussion

Acne vulgaris is a frequently encountered dermatosis especially among adolescents and may point towards an underlying endocrine or metabolic disorder according to Uysal *et al.*⁸ They concluded from their study on Turkish women suffering from acne that 64% of them had hyperandrogenemia. This was quite contrary to our observation, since we found only 10% patients suffered from elevated serum testosterone level. This may be attributed to different ethnicity and social and cultural habits of the two study populations.

Table 1 Stratification regarding various effect modifiers.

		High serum Testosterone (n)	Normal serum Testosterone (n)	Total	p-value
Age groups (years)	15-20	16	77	93	0.050
	21-25	4	64	68	
	26-30	2	41	43	
	31-35	0	12	12	
	36-40	0	02	02	
	41-45	0	02	02	
Severity of Acne	Mild	2	70	72	0.040
	Moderate	13	89	102	
	Severe	7	39	46	
Duration of disease (months)	1-12	18	148	166	0.517
	13-24	4	40	44	
	25-36	0	8	8	
	37-48	0	2	2	
BMI (Kg/m ²)	<25	17	105	122	0.030
	≥25	5	93	98	
Marital status	Married	1	66	67	0.005
	Unmarried	21	132	153	

Mehta-Ambalal S.⁹ and Rahman *et al.*¹⁰ found 13.8% and 10% Indian females with acne had high serum testosterone level respectively, which was quite close to our observation probably due to similar ethnic, cultural and climatic conditions shared by the two populations.

We observed that 42% patients were between 15-20 years old, 31% were between 21-25 years old, 20% were between 26-30 years old, 5% were between 31-35 years old. So most patients were adolescents as reported by other researchers especially Kaur *et al.*,¹¹ who found raised testosterone among acne patients which later was found to be reduced after treatment of acne. In our study, serum testosterone levels were significantly affected by severity of acne. However, Nguyen *et al.*¹² found no effect of severity of acne on serum testosterone levels. Ahmed and Fatin also reported significant association of elevated serum testosterone with acne and its association with age of patients like our study results.¹³ We concluded significant association of marital status and obesity with hyperandrogenism. This was also observed in Antalya by Alan *et al.*¹⁴ among acne patients.

Unfortunately, not much work has been done on hyperandrogenism and its role in acne in our part of the world.^{6,15} This study may prove to be an initiative for further research on this important disease affecting majority of population. The major limitation of this study was the lack of control group due to lack of resources. Additional and more advanced studies are required to add to our knowledge of the topic in order to improve the available management strategies of acne.

Conclusion

It is concluded that raised serum testosterone may be responsible for acne in at least a

proportion of patients, which may benefit from androgen reducing treatment strategies. Secondly, endocrine or metabolic disorders causing hyperandrogenemia may be investigated in patients with severe or resistant acne. Multidisciplinary approach involving endocrinologists may aid in better management and improvement of quality of life of patients with acne.

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