

ORIGINAL ARTICLE

ASSOCIATION OF SERUM TESTOSTERONE AND SEX HORMONE BINDING GLOBULIN LEVELS IN FEMALES WITH ACNE BASED ON ITS SEVERITY

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Background: Androgens are involved in the development of acne. The aim of this study was to find out if there was an association of serum testosterone and sex hormone binding globulin (SHBG) in females with acne based on its severity. **Methods:** It was a cross sectional study, conducted in Dermatology unit of Fauji Foundation Hospital (FFH), Rawalpindi. Duration of study was eight months. Adult females with acne were enrolled in the study. Patients were categorized into minor, mild, moderate groups. Blood samples were taken for serum testosterone and SHBG. **Results:** Five hundred and thirty-one adult female were enrolled into the study. The mean age was 21.49 ± 4.73 years. Acne was graded as minor in 78 (14.7%) cases, mild in 248 (46.7%) and moderate in 205 (38.6%). There was no statistically significant relationship between the levels of serum testosterone ($p=0.776$) and SHBG ($p=0.711$) with acne severity. **Conclusion:** There was no association of serum testosterone and sex hormone binding globulin levels in females with acne based on its severity.

Keywords: Acne, Sex hormone binding globulin, Testosterone

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INTRODUCTION

Acne is a chronic inflammatory disease of the pilosebaceous units. It is a multifactorial disorder. Important pathogenic factors include androgenic stimulation of the sebaceous glands, hyperkeratinization and obstruction of the sebaceous follicles as a result of abnormal keratinization of the infundibular epithelium and microbial colonization of the pilosebaceous unit by *Propionibacterium acnes* and subsequent perifollicular inflammation.¹ Androgens may facilitate acne formation through follicular hyperkeratosis and increased sebum production.^{1,2} The effects of androgens on the skin are the result of circulating androgens and enzymes activity in local tissues and on androgen receptors.^{2,3}

Acne can be categorized according to its severity into minor, mild, moderate and severe using the Global Acne assessment (GEA) scale.⁴ Acne and hirsutism are common manifestations of hyperandrogenemia.^{1,2,5}

A disturbance in the production of androgens in ovaries or adrenal glands, impaired plasma androgens in acne, association of acne with hirsutism; have been investigated previously. The available literature regarding the relationship between androgenicity and acne severity is not consistent in its conclusions.^{1,2,6} It is still not clear how the hormonal stimulation is related to the clinical expression and the course of the disease.⁵ Serum testosterone and sex hormone binding globulin (SHBG) are common androgens associated with acne.^{1,2,5}

Increased level of serum testosterone and decreased level of SHBG have been shown in patients with acne.^{5,7} The evaluation of serum SHBG levels in women with acne is strongly recommended in order to select patient who can have a better response to appropriate hormonal regimes.^{5,7}

However, many reports indicates no significant association between acne severity and androgen levels.^{2,6,8} The role of anti-androgen therapy in acne is still not clear.⁶ The mechanism of anti-androgen hormonal therapy may work by acting on androgen receptors and blocking them (e.g. cyproterone acetate, spironolactone) or by blocking androgen production (e.g. oestrogen).

The objective of this study was to determine if there was an association of serum testosterone and SHBG in females with acne based on its severity.

MATERIAL AND METHODS

The study was conducted in the Dermatology Department of Fauji Foundation Hospital (FFH), Rawalpindi, over a period of eight month. Fauji Foundation Hospital is a tertiary care centre for ex-serviceman and their families. The catchment area was mostly from the villages near Islamabad and Rawalpindi and also includes other parts of the Punjab, Kashmir and also from Pakhtunkhwa. Informed written consent was obtained from all participants after explaining the aim of the study. Adult females with acne were enrolled in the study. Patients with severe acne, history of oral contraceptive pills, antiandrogens, systemic antibiotics, systemic steroids and isotretinoin for the last 3 months were excluded. Menstrual cycle regularity and age was recorded. Physical examination to determine acne severity was performed according to GEA scale.⁴ Patients were divided into three groups.

- a) Minor acne
- b) Mild acne
- c) Moderate acne

Blood sample for hormonal assessment was taken for serum testosterone and SHBG. Tests were carried out at Hospital laboratory and were reported by pathologist. Data was entered in a specially predesigned *pro forma* and was analysed by computer software SPSS (version 10.0). The serum levels of testosterone were determined by chemiluminescence assay using (VITROS-Immunodiagnostic kit, Ortho-clinical diagnostics-Johnson & Johnson Company –USA) and SHBG by (VITROS TOTAL BHCG REAGENT PACK).

RESULTS

The sample totaled 531 adult females patients with age range of 17–47 years and mean age was 21.49 years with a standard deviation of 4.73. (Table-1) Mild acne was the most common clinical pattern 248 (46.7%). Least common clinical type was minor acne 78 (14.7%). (Figure-1) Mean serum levels of testosterone and SHBG in three groups are shown in (Table-2). The testosterone level was lower in the mild group 1.70±3.58 nmol/L as compared to minor group 1.89±1.53 nmol/L, which is not statistically

significant ($p=0.776$). The level of SHBG was lower in the groups with mild 47.51±4.05 nmol/L and moderate acne 45.62±2.76 nmol/L when compared with the group with minor acne 49.01±3.35nmol/L, and was statistically insignificant ($p=0.711$). (Table-2)

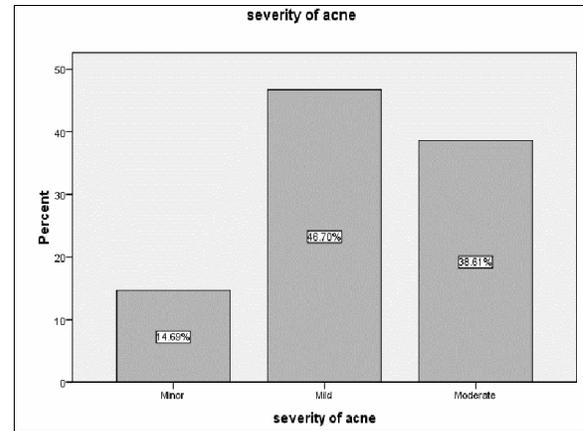


Figure-1: Severity of acne

Table-1: Age of Patients in all three groups

	n	Mean	SD	Std. error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Minor	78	21.91	5.257	0.595	20.72	23.1	17	47
Mild	248	21.54	5.034	0.32	20.91	22.17	15	47
Moderate	205	21.28	4.134	0.289	20.71	21.85	17	41
Total	531	21.49	4.738	0.206	21.09	21.9	15	47

Table-2: Serum testosterone and SHBG relationship with severity of acne

		n	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
Serum Testosterone Levels	Minor	78	1.89655	1.537006	0.174032	1.55001	2.24309	0.3	12.2
	Mild	248	1.70329	3.589424	0.227929	1.25436	2.15222	0.01	56
	Moderate	205	2.03226	6.797292	0.474743	1.09623	2.9683	0.087	98
	Total	531	1.85868	4.914739	0.213282	1.4397	2.27766	0.01	98
Serum SHBG Levels	Minor	78	4.90192	33.57682	3.801827	41.44883	56.58963	5	188
	Mild	248	4.75165	40.57168	2.576304	42.44221	52.59086	1.1	456
	Moderate	205	4.55093	27.66842	1.932446	41.69914	49.3194	2.1	170
	Total	531	4.69623	35.03089	1.520211	43.97596	49.94871	1.1	456

DISCUSSION

Acne vulgaris remains one of the most common disease.^{1,2,6} Identification of the precipitating factor is important because it would help to identify the causative factor and in targeted treatment. Acne and hirsutism are common clinical manifestations of hyperandrogenemia. In various studies,^{1,2,6,8} serum testosterone and SHBG are investigated in females having acne due to hyperandrogenemia.

In present study, mean age of presentation was 21±4.73 years and it varied from 17 to 47 years. Although Borgia *et al.*, in a study on correlation between endocrinological parameters and acne severity in adult women above 17 years of age, and the mean age of presentation was 24 years.⁵ Rehman *et al.*, in a study performed in Bangladesh on association of serum testosterone with acne vulgaris in women, had mean age of the whole group was 22.43 years.⁷ However, its

comparable to a report from Iran with a mean age of presentation was 22.1 years.² Majority of our patients were young and unmarried as Fauji Foundation Hospital, Rawalpindi is a beneficiary hospital where majority of patients are daughters of ex-serviceman and they are entitled for treatment till they get married. Most common presentation of acne was in mild group 46.7%; not consistent with other reports in adult female groups.^{5,8} While in a study, Borgia *et al.*, showed minor acne as major group.⁵ A study performed in Bangladesh showed moderate acne as major group.⁷

Variations in frequent clinical presentation may be due to the fact that in Pakistan and subcontinent, minor forms of acne are ignored or home remedies are used. Patients with severe acne were excluded from our study because of their low number, which is insufficient to perform study.^{5,7} Variable results are available regarding

association of androgen levels with acne and its severity. Our study showed statistically insignificant correlation of serum SHBG levels with severity of acne ($p=0.711$). Serum testosterone was not significantly different among all three groups. It showed increased levels in moderate group as compared to minor but is not statistically significant ($p=0.776$). Similarly, Skrgatic *et al.*, in their study, showed no positive correlation in Croatian women of reproductive age. Serum testosterone instead of increasing with acne severity showed decreased levels in severe forms and SHBG levels instead of decreasing showed raised levels.⁸ Statistically insignificant results are shown in studies from Iran and India.^{2,6} However, Borgia *et al.*, showed a positive association of SHBG levels with acne severity.⁵ Moreover; the degree of acne severity was also correlated positively, although not statistically significant with testosterone level. Rehman *et al.* found a significant association between serum testosterone and acne vulgaris.⁷ In both the above mentioned studies the study population was very less. Boriga *et al* had 129 patients and Rehman *et al* had only 70. Due to the low number of patients the conclusions deduced from their study cannot be applied. Macedo *et al.* also showed positive association.⁹ He recommended that the serum SHBG levels in women with acne should be evaluated so as to select patients who can have better response to appropriate anti androgen therapy.^{5,7,9} A possible explanation to their results are that they excluded patients with mild acne with no signs of hyperandrogenism and included patients with severe comedogenic acne, severe papulopustular acne, mild papulopustular acne associated with other signs of hyperandrogenism (hypertrichosis and or hirsutism, hard to control seborrheic dermatitis). Using statistical methods we did not demonstrate any positive correlation between acne severity and laboratory markers of androgenicity consistent with Seirafi¹, Skrgatic⁸, Adityan⁶ and Zandi².

CONCLUSION

There is no association of serum testosterone and SHBG levels in females with acne based on its severity.

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AUTHOR'S CONTRIBUTION

AJK conducted the study under the supervision of FUR.

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