


Report

Sex hormones, erectile dysfunction, and psoriasis; a bad friendship!Abd El Aziz I. Eltaweel¹, MD, Amany I. Mustafa¹, MD , Ola S. El-Shimi², MD, and Fatma A. Algaod³, MBBCh

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Introduction

Psoriasis is a common, chronic, inflammatory, T-cell mediated autoimmune disease which affects skin, nails, and joints. It affects 2–3% of all population.¹ The symmetrical distribution of the sharply demarcated, red plaques with adherent silvery white scales over the body is its main characterization.² Hormones, especially sex steroid hormones,³ have a major role in psoriasis pathogenesis due to their effect on keratinocyte proliferation,⁴ along with their variable biological and immunological impact on skin.⁵ The lower levels of total testosterone, free testosterone, and sex hormone-binding globulin were found to be associated with the metabolic syndrome. The latter is considered a sensitive biomarker for insulin resistance and systemic inflammation in psoriatic patients.⁵ Furthermore, estrogen has been addressed to be involved in the immunological shift from Th1 and Th17 to Th2 immunity.⁶ According to the WHO, sexuality is a basic demand for human life, being very important in

Abstract

Background Sex hormones may play a major role in psoriasis pathogenesis due to their biological and immunological effects on skin. Psoriasis also has a significant impact on patients' sexual function and thus their quality of life.

Aim In the present study, we investigated serum sex hormones and erectile function in male psoriasis patients compared with healthy controls and correlated these findings with various disease parameters.

Methods Serum total testosterone and estradiol were measured by an ELISA technique in 50 male patients with psoriasis and 30 healthy controls. The erectile function of all subjects was assessed by the international index of erectile function version-5.

Results Patients with psoriasis showed a significant lower serum level of total testosterone, higher level of estradiol, and impaired erectile function relative to healthy controls.

Conclusion The detected hormonal disturbance in male psoriasis patients may be a cause of the associated erectile dysfunction beside the known effect of chronic systemic disease on patients' erectile function.

maintaining a good mental health. The influence of psoriasis, as well as its severity, on sexual function is significant as it may result in major changes in patients' quality of life.⁷ Data regarding sexual dysfunction in patients receiving antipsoriatic treatments is limited to just a few case reports. Acitretin and methotrexate were reported to induce erectile dysfunction and reduced libido in patients treated for chronic plaque psoriasis. However, sexual function returned to normal within 2–4 weeks after the treatment was changed.^{8,9} The aim of this study is to measure serum total testosterone and estradiol in male psoriasis patients and to evaluate their erectile function.

Materials and methods**Study population**

A total of 80 male subjects were enrolled in this case-control study. They were divided into two groups. Psoriasis group included 50 patients recruited from the outpatient Clinic of

Dermatology and Andrology Department, Benha University Hospitals. All patients had active but clinically stable moderate to severe psoriasis plaques for at least 1 year. Disease severity was evaluated using psoriasis area and severity index (PASI) scoring system; topical and systemic therapy for psoriasis were stopped 2 weeks and 1 month, respectively, prior to the study. Control group included 30 age-matched apparently healthy volunteers. Any subject with prior medical history of cardiovascular disease, venous thromboembolic disease, hypertension, hormone-dependent malignancy, diabetes mellitus, renal dysfunction, liver disease, and current hormonal therapies was excluded to avoid instances of hormonal imbalance and organic causes of erectile dysfunction.

Ethical consideration

This study was approved by the ethical committee on research involving human subjects in Faculty of Medicine, Benha University. All patients provided written informed consent prior to participation. The study was conducted in accordance with the guidelines of the Declaration of Helsinki.

Methodology

Assessment of the erectile function according to the international index of erectile function version-5 (IIEF-5) International index of erectile function version-5; developed in 1997 by Rosen *et al.*¹⁰ and consisted of five domains and a 15-item questionnaire, had an excellent reliability and sensitivity for assessing male erectile dysfunction (ED). A five-item version of the IIEF (IIEF-5) was developed and validated to diagnose the presence and severity of ED.¹¹

Measurement of serum total testosterone and estradiol

Three milliliters of blood was withdrawn by venipuncture without anticoagulant. Serum was separated, divided into aliquots, and stored frozen at -20°C until analysis. Serum total testosterone and estradiol were measured quantitatively by a competitive enzyme-linked immunosorbent assay (ELISA) technique using commercial kits for *in vitro* diagnostic use (Diagnostic Biochem Canada Inc., Cat #: CAN-TE-250 and CAN-E-430, respectively) in clinical pathology department, Benha University Hospitals. The normal reference values of serum total testosterone and estradiol in males are 291–1,100 ng/dl and 20–50 pg/ml, respectively.

Statistical analysis

Data were collected onto an electronic spreadsheet, and Statistical Package (Version 24; SPSS) was used for statistical analyses. Descriptive statistics were reported as percentages or means and standard deviations. A Student's *t* test or Mann-Whitney test was used when appropriate to compare means for parametric or nonparametric data, respectively. A chi-square test or Fisher's exact test was performed for

comparison of categorical variables. Spearman correlation analysis was done between studied parameters. $P < 0.05$ was considered statistically significant. Receiver operating characteristics (ROC) curve was used to define the best cutoff value of IIEF-5, total testosterone, and estradiol in studied individuals to discriminate between patients and controls regarding erectile dysfunction.

Results

The studied parameters of psoriasis patients and control groups are presented in Table 1. Serum total testosterone level was significantly lower, and serum estradiol was significantly higher in the psoriasis patients ($P < 0.001$ each). In addition, erectile function was significantly impaired in psoriasis patients compared to control group ($P < 0.05$). There were significant positive correlations between serum total testosterone and age of patients and between serum estradiol and patients' BMI ($P < 0.05$ each). Erectile function was significantly worsening with increasing patient's age ($P < 0.001$) as shown in Table 2. ROC analysis was carried out to evaluate and compare the diagnostic performance of serum total testosterone, estradiol, and IIEF-5 score in studied patients and control group regarding erectile dysfunction. The best cutoff point and the corresponding sensitivity and specificity, positive predictive value, negative predictive value, and area under the curve were estimated as shown in Table 3 and Figure 1.

Discussion

Psoriasis is a common chronic multifactorial inflammatory skin disease. Hormones along with genetic, immunological, and environmental factors interact in its pathogenesis.⁴ Psoriasis has multiple psychological effects on patients, such as poor self-esteem, depression, suicidal ideation, and sexual dysfunction. The latter can negatively affect patient's quality of life.¹² The co-occurrence of erectile dysfunction and psoriasis can be explained in many ways, such as patient's lifestyle (smoking and obesity), chronic inflammation and premature atherosclerosis, and psychosocial factors as anxiety and depression that associated with psoriasis.¹³ In the present study, we aimed to evaluate sex hormones (total testosterone and estradiol) and erectile function (using IIEF-5 score) in male psoriasis patients and correlate them with different disease parameters.

We found that serum total testosterone was significantly decreased while serum estradiol level was significantly increased in psoriasis patients than in control group ($P < 0.001$ each). These results were in agreement with Cemil *et al.*¹⁴ findings. However, both Schwarz *et al.*¹⁵ and Tehraninia *et al.*⁵ reported the higher levels of serum total testosterone in healthy control subjects than psoriasis patients without reaching a statistical significance. Furthermore, our results showed a

Table 1 Studied parameters of psoriasis patients and control group

	Psoriasis patients (N = 50)	Control (N = 30)	P
Age (years), mean ± SD	47.64 ± 13.39	45.93 ± 16.36	0.613
BMI (kg/m ²), mean ± SD	27.13 ± 3.68	26.87 ± 3.8	0.763
Smoking, n (%)			
Smokers	23 (46)	11 (36.7)	0.414
Nonsmokers	27 (54)	19 (63.3)	
Alcohol consumption, n (%)			
Alcoholics	4 (8)	2 (6.7)	0.826
Nonalcoholics	46 (92)	28 (93.3)	
PASI score, n (%)			
Mild	22 (44)	NA	–
Moderate	15 (30)		
Severe	13 (26)		
Total testosterone (ng/dl), mean ± SD	311.92 ± 114.88	769.23 ± 118.70	<0.001
Estradiol (pg/ml), mean ± SD	43.27 ± 14.65	23.99 ± 6.71	<0.001
IIEF-5 score, n (%)			
No ED (22–25)	10 (20)	15 (50)	0.041
Mild (17–21)	10 (20)	6 (20)	
Mild–moderate (12–16)	15 (30)	5 (16.7)	
Moderate (8–11)	10 (20)	3 (10)	
Severe (5–7)	5 (10)	1 (3.3)	

Bold indicates significant *P* value.
SD, standard deviation; BMI, body mass index; PASI, psoriasis area and severity index; IIEF-5, international index of erectile function version-5; ED, erectile dysfunction; NA, not applicable.

Table 2 Correlations between sex hormone levels and different studied parameters

		Total testosterone	Estradiol	IIEF-5
Age (years)	<i>r</i>	0.347	0.153	–0.703
	<i>P</i>	0.048	0.289	<0.001
Duration (months)	<i>r</i>	–0.042	–0.069	0.090
	<i>P</i>	0.771	0.635	0.484
PASI score	<i>r</i>	–0.087	0.037	–0.067
	<i>P</i>	0.550	0.797	0.591
BMI	<i>r</i>	0.078	0.314	0.160
	<i>P</i>	0.591	0.036	0.233

Bold indicates significant *P* value.
r, Spearman correlation; BMI, body mass index; PASI, psoriasis area and severity index; IIEF-5, international index of erectile function version-5.

significant positive correlation between serum total testosterone with the age (*P* = 0.048) and between serum estradiol with the BMI of studied patients (*P* = 0.036). While no correlations could be detected between both measured sex hormones and other studied disease parameters. This was against Cemil *et al.*¹⁴ results, who found a significant inverse correlation between serum level of estradiol and PASI score in the psoriasis patients.

We detected a significant impaired erectile function in psoriasis patients more than control group when assessed by IIEF-5

Table 3 Receiver operator characteristics curve analysis of serum total testosterone, estradiol, and IIEF-5 score in studied individuals regarding their erectile function

Variable	IIEF-5	Total testosterone	Estradiol
Cutoff	>12.5	<521.2 ng/dl	>37.5 pg/ml
Sensitivity	81.2%	100%	62%
Specificity	48.5%	97%	100%
PPV	66.3%	98%	100%
NPV	52.5%	100%	61%
AUC	50.5%	99.9%	88%

IIEF-5, international index of erectile function version-5; PPV, positive predictive value; NPV, negative predictive value; AUC, area under the curve.

(*P* = 0.046). This was in line with Ji *et al.*¹⁶ and Cabete *et al.*¹³ who found a significant higher prevalence of erectile dysfunction in psoriasis patients than healthy controls. Moreover, we found that psoriasis patients' IIEF-5 score had a significant negative correlation with their age (*P* < 0.001), while no correlations were found with disease duration (months), PASI score, or BMI in studied patients. On the contrary, Türel Ermertcan *et al.*¹² results found that total IIEF-5 scores were not correlated with PASI score in male psoriasis patients. To the best of our knowledge, no published data is available correlating serum total testosterone, estradiol, and IIEF-5 with other studied disease parameters in male psoriasis patients.

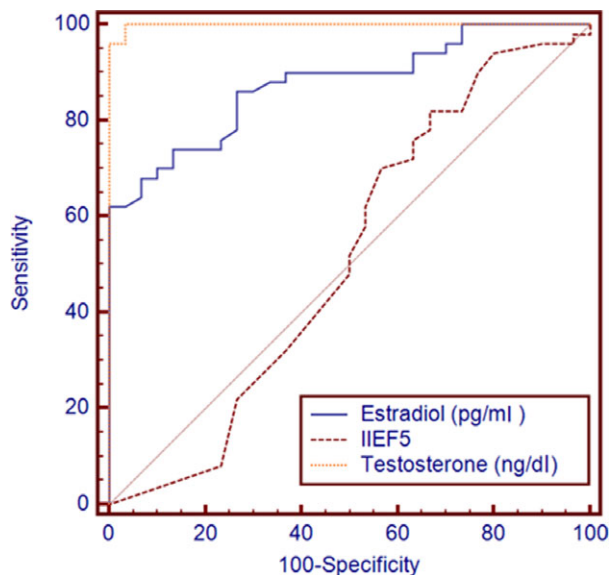


Figure 1 Receiver operating characteristic curves of serum total testosterone, estradiol, and IIEF-5 score in studied individuals regarding their erectile function

Conclusion

This study showed significantly decreased levels of total testosterone and increased levels of estradiol in serum of psoriasis patients. This can explain that not only psoriasis as a chronic systemic disease impairs erectile function but also the associated hormonal disturbance may be a cause of the significantly impaired erectile function among studied group of patients.

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