

Erectile dysfunction in patients with psoriasis: potential impact of the metabolic syndrome

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Abstract. – BACKGROUND: Psoriasis is a chronic inflammatory skin disease that affects up to 5.5% of world population and is associated with erectile dysfunction (ED). Aim of the present study was to investigate impact of metabolic syndrome (MetS) on association between psoriasis and ED as well as to improve our understanding of this association via studying other possible causes of ED such as psychological factors and disease effects.

PATIENTS AND METHODS: The patient group included 37 male psoriasis patients and control group 28 healthy men. Severity of psoriasis was determined using Psoriasis Area and Severity Index (PASI), and ED was evaluated using International Index of Erectile Function (IIEF) Scale. Psychiatric state of the patients were determined using Beck Depression Inventory (BDI). MetS was diagnosed using the National Cholesterol Education Program Adult Treatment Panel III criteria.

RESULTS: MetS, ED prevalence and BDI score were significantly higher in psoriasis patient group ($p = 0.032$, $p = 0.018$ and $p < 0.001$). Average IIEF score of psoriasis patients with and without MetS, on the other hand, was not different ($p = 0.073$). IIEF score had negative correlations with age, BDI and PASI scores. In multiple linear regression analysis, BDI score, old age and smoking (but not MetS) were found to be independent predictors of ED.

CONCLUSIONS: ED, MetS and depression frequencies were significantly higher in psoriasis patient group. In addition, psoriasis severity and ED parameters were closely associated. Depression, old age and smoking were found to be independent risk factors for ED.

Key Words:

Metabolic syndrome, Psoriasis, Erectile dysfunction, Depression.

Introduction

Psoriasis is a chronic inflammatory skin disease that affects 0.5 to 5.5% of world population¹.

In addition to skin symptoms, systemic involvement, mainly arthritis, can also be observed. Recent studies have shown a close correlation between psoriasis and atherosclerotic diseases²⁻⁴. The association of metabolic risk factors for type 2 diabetes and cardiovascular disease such as abdominal obesity, hyperglycemia, dyslipidemia, and hypertension suggests the existence of a metabolic syndrome (MetS)⁵. There are several researches indicating elevated MetS incidence in psoriasis patients⁶.

Penile erection involves a complex interaction between the central nervous system and local factors. The integration of normal psychological, neurological, and normal vascular processes are required for normal penile erection. Erectile dysfunction (ED) is the inability to achieve or maintain sufficient erection for satisfactory sexual performance⁷. Psychological, neurogenic, hormonal and vascular pathologies could lead to ED. Atherosclerosis is also known as one of the significant causes of ED. Risk factors for cardiovascular disease increases the risk of ED occurrence. Similarly, future cardiovascular disease risk is higher in ED patients^{8,9}.

There are limited number of reports dealing with the association of psoriasis with ED. Common finding of these studies is increased ED frequency in psoriasis patients. Among the reasons studied for higher ED frequency were psychological disturbances and severity of skin symptoms¹⁰⁻¹³. Only two of these papers investigated the association between psoriasis and ED, and cardiac risk factors were evaluated^{14,15}.

Aim of the present work was to investigate the effect of MetS on association between psoriasis and ED, which was not addressed in previous studies. In addition, we aimed to improve our understanding of the association between psoriasis and ED through concurrent evaluation of other

possible causes of ED such as psychological factors and disease effects.

Patients and Methods

We have observed 37 male psoriasis patients and 28 healthy men. Subjects were recruited from Department of Internal Medicine and Dermatology Outpatient Clinics at Gaziosmanpasa University Hospital. All subjects gave informed consent, and the study protocol was approved by the local Ethic Committee. All individuals were over 18 years of age and married. The patients with chronic diseases such as pulmonary, hematological, hepatic, neurologic or renal, malignancy, severe involvement of psoriasis such as arthritis, psychosis or similar psychiatric disorders and the patients using antidepressant or other drugs which are known to interfere with sexual functions were excluded.

Detailed physical examinations were performed on all subjects. BMI was calculated as weight in kg/square of height in meters. Waist circumference (WC) was measured by placing the measuring tape snugly around the abdomen at the level of the iliac crest. Blood pressure was taken in sitting posture twice and the average of two measurements was used. Serum samples were taken from subjects to determine chemical parameters such as triglyceride (TG), high density lipoprotein (HDL) and fasting blood glucose (FBG) levels.

Each patient was examined by an experienced dermatologist. Severity of psoriasis was determined using Psoriasis Area and Severity Index (PASI) which considers the erythema, induration

and scaling of the lesions in four body areas (head, trunk, arms and legs)¹⁶. All patients were analyzed using the Beck Depression Inventory (BDI) for their psychiatric state¹⁷. This is a self-administered proof containing 21 questions evaluated in likert scale of 0-3 and measuring the severity of depression. MetS was diagnosed using the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria¹⁸. When three or more of the following were present, the patient was diagnosed as having MetS: abdominal obesity (WC \geq 102 cm for males and \geq 88 cm for females), BP $>$ 130/85 mmHg, FBG \geq 110 mg/dl, TG \geq 150 mg/dl or low HDL cholesterol ($<$ 40 mg/dl for males and $<$ 50 mg/dl for females). ED was evaluated using International Index of Erectile Function Scale (IIEF). The test has 15 questions evaluated by 0-5 grades. The first five and the fifteenth questions of the test are used to evaluate ED. Points of 6-10 based on the answers to the six questions mean severe ED, while 11-16 intermediate ED, 17-21 intermediate-mild, 22-25 mild ED, and 26-30 non-ED according to 6 questions¹⁹.

Statistical Analysis

Statistical analysis were performed using the SPSS software, version 17.0 (SPSS Inc., Chicago, IL, USA). Visual (histograms, probability plots) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk's test) were used to determine normal distribution status of the variables. Parametric tests were applied to variables with normal distribution, and non-parametric tests were applied to variables which did not distribute normally. Continuous variables were expressed as mean \pm standard deviation. Qualitative vari-

Table I. Demographic and clinical characteristics of subjects

	Psoriasis patients (n=37)	Control group (n=28)	p values
Age	45.19 \pm 13.82	40.89 \pm 12.91	0.208
BMI	29.13 \pm 3.20	27.70 \pm 3.57	0.112
Smoking	(n = 13) 35.13%	(n = 10) 35.71%	0.962
Disease duration	11.49 \pm 8.48		
PASI	8.25 \pm 4.42		
IIEF	17.76 \pm 6.61	23.46 \pm 4.71	0.005
ED	(n = 30) 81.08%	(n = 15) 53.57%	0.018
BDI	16.16 \pm 10.38	6.68 \pm 4.14	0.000
MetS	(n = 14) 35.13%	(n = 4) 14.28%	0.032

BMI body mass index; PASI psoriasis area and severity index; IIEF international index of erectile dysfunction; ED erectile dysfunction; BDI beck depression inventory; MetS metabolic syndrome.

Table II. IIEF-6 scores in groups

IIEF-6 Score	Psoriasis patients (n = 37)	Control group (n = 28)
IIEF-6 Score	17.76 ± 6.61	23.46 ± 4.71
Severe ED (6-10)	3 (8.10%)	–
Intermediate ED (11-16)	14 (37.83%)	3 (10.71%)
Intermediate-Mild ED (17-21)	9 (24.32%)	7 (25%)
Mild ED (22-25)	4 (10.81%)	5 (17.85%)
Non ED (26-30)	7 (18.92%)	13 (46.43%)
ED (6-25)	30 (81.08%)	15 (53.57%)

IIEF: international index of erectile dysfunction; ED: erectile dysfunction.

ables were presented as counts and proportions. Student's t test was used to compare parameters for normally distributed variables. Comparison of variables, which did not have normal distribution, was performed using Kruskal-Wallis test. Chi square test was used to compare differences in categorical values. To evaluate the correlation between IIEF and BDI scores, age and PASI score, Pearson/Spearman correlation was employed. A multiple linear regression model was used to identify independent predictors of IIEF scores. A *p* value < 0.05 was considered statistically significant.

Results

The mean age was 45.19 ± 13.82 years in patient group and 40.89 ± 12.91 years in control group (*p* = 0.208). BMI of patient and control groups were 29.13 ± 3.20 and 27.70 ± 3.57, respectively, and the difference was not statistically significant (*p* = 0.112). In patient group, average duration of the disease was 11.49 ± 8.48 years and average PASI score was 8.25 ± 4.42. There was no statistically difference between study groups for percentage of smoking subjects (*p* = 0.962). MetS was observed in 14 patients (35.15%) and in 4 controls (14.28%). The frequency of MetS was higher in psoriasis patients compared to healthy controls, and the difference was statistically significant (*p* = 0.032). BDI score was 16.16 ± 10.38 in patient group while 6.68 ± 4.14 in control group, and the difference was significant (*p* < 0.001) (Table I).

IIEF-6 score in psoriatic patients (17.76 ± 6.61) was significantly lower than in control

group (23.46 ± 4.71) (*p* = 0.005). ED was observed in 30 subjects (81.08%) in psoriatic patients and in 15 subjects (53.57%) in control group. The difference was significant (*p* = 0.018). Average IIEF value of 14 psoriatic patients with MetS was 15.50 ± 6.46, while that of 23 psoriatic patients without MetS was 19.13 ± 6.45, but the difference was not significant (*p* = 0.073). ED classification of patients based on IIEF values are given in Table II.

IIEF score had significant negative correlations with age and BDI and PASI scores (Table III). In multiple linear regression analysis, BDI score, old age and smoking (but not MetS diagnosis) were found to be independent predictors of IIEF-6 scores (Table IV).

Discussion

Psoriasis is a prototypical Th-1 inflammatory disease. It is characterized by expansion and acti-

Table III. Correlations between IIEF-6 scores and other parameters.

	IIEF-6 scores	
	r value	p value
PASI	-0.422	0.009
BDI	-0.654	0.000
BMI	-0.286	0.061
Age	-0.485	0.002
Disease duration	-0.127	0.452

PASI psoriasis area and severity index; BDI beck depression inventory; BMI body mass index

Table IV. Multiple linear regression analysis of independent predictors of IIEF-6 scores in psoriatic patients.

Predictors	Standardized	
	β	<i>p</i> -value
BDI	-0.631	< 0.001
Age	-0.416	< 0.001
Smoking	0.237	0.029
Model adjusted R2	0.619	< 0.001

BDI beck depression inventory.

vation of Th-1 T cells, antigen presenting cells, and Th-1 cytokines. Chronic Th-1 inflammation is also important in the pathophysiology of metabolic syndrome and atherosclerosis²⁰. Chronic inflammation and pro-inflammatory cytokines in psoriasis were suggested to cause atherogenesis and MetS. Arican et al.²¹ showed that psoriasis develops with chronic inflammation, and found higher levels of plasma TNF- α , IL-6, IL-8, IL-12, IL-18 and IFN- γ in psoriasis patients compared to healthy control group. In more recent studies, higher MetS incidence has been reported in psoriasis patients^{6,22,23}. Similar to previous reports, we detected significantly higher MetS incidence ($p = 0.032$) in psoriasis patients (14 out of 37 patients, 35.13%) compared to healthy controls (4 out of 28, 14.28%).

Erectile dysfunction is an important health problem and it has negative impacts on social lives and mental health of patients, as well as their partners. Psychological, neurogenic, hormonal and vascular pathologies could lead to ED²⁴. Association between MetS and ED has been revealed in some studies^{25,26}. MetS carries some risk factors that could result in endothelial dysfunction, and endothelial dysfunction plays part in pathogenesis of ED and cardiovascular disease. Endothelial dysfunction lowers the nitric oxide secretion and, thus, prevents vasodilatation²⁷.

There are limited number of papers in literature dealing with the relation between psoriasis and ED. In the limited number of available studies, severity and skin features of the disease, associated cardiovascular risk factors and psychological disturbances were evaluated. Psoriasis have been found to be associated with a range of psychological disorders including notably depression²⁸. In all reports dealing with psychological disorders, depression incidence was higher in psoriasis patients^{10,11,29,30}. Ermertcan et al.¹⁰ compared psoriasis patients with or without depres-

sion and healthy controls, and found no relation between psychological problems and sexual dysfunction frequency. In the other three studies, on the other hand, a positive correlation has been reported between sexual dysfunction and depression^{11,29,30}. In parallel to the previous ones, the present work also found significantly higher BDI score, a parameter used for the evaluation of depression, in psoriasis patients compared to healthy control group ($p < 0.001$). In addition, there was a significant negative correlation between BDI score and IIEF-6 score representing ED ($r = -0.654$, $p < 0.001$).

There are conflicting results from studies dealing with the effect of clinical symptoms on ED in psoriasis patients. Some articles^{10,12} report no effect of clinical symptoms on ED, while some^{30,31} refer significant correlations between the severity of clinic symptoms and ED. Severity of psoriasis measured by PASI score was significantly correlated with IIEF-6 score ($r = -0.422$, $p = 0.009$).

Despite the presence of reports showing the close association between late stage psoriasis and atherosclerotic diseases and MetS, number of studies dealing with the effects this association has on ED has been limited. Goulding et al¹⁴ observed ED prevalence in male patients with psoriasis and examined the effects of diabetes mellitus, hypertension, hyperlipidemia and atherosclerotic disease on ED. That study used patients with dermatologic problems other than psoriasis as control rather than using healthy subjects, and found that old age and hypertension were independent risk factors affecting ED. ED prevalence was not different between patient and control groups, which could be explained by the fact that the control group consisted of subjects with dermatological problems¹⁴. In all other papers, ED prevalence was reported to be significantly higher in psoriasis patients. In the present work, average IIEF-6 score was also significantly higher in psoriasis patient group than in control group ($p = 0.005$). Percentage of patients who had ED diagnosis based on IIEF-6 score in psoriasis patient group (81.08%) was significantly higher ($p = 0.018$) than in healthy control group (53.57%). Although the average IIEF-6 score of psoriasis patients with MetS was lower than that of the patients without MetS (15.50 ± 6.46 vs. 19.13 ± 6.45 , respectively), the difference was not significant ($p = 0.073$).

Although various factors such as psychological disturbances, clinical findings and atherosclerotic disease risk factors were investigated in researches conducted so far to address the associa-

tion between psoriasis and ED, there is no study that evaluate all of them together. Unlike the previous ones, our paper has evaluated all these factors together. Evaluating MetS which includes atherosclerotic risk factors along with other factors, we aimed to explain the association between psoriasis and ED. In the present study, a multiple regression analysis was carried out taking all possible contributors of ED into account. BDI score, old age and smoking were found to be independent risk factors affecting IIEF-6 score. Association of ED with old age and smoking are well established^{32,33}. There are reports revealing that depression occurrence is higher in psoriasis and this could affect ED^{11,29,30}. Recently, high levels of pro-inflammatory cytokines and inflammation involved in the pathogenesis of psoriasis were suggested to be associated with depression^{34,35}.

Conclusions

ED, MetS and depression frequencies were significantly higher in psoriasis patient group. In addition, PASI and IIEF-6 scores were closely associated. However, depression, old age and smoking were found to be independent risk factors for psoriasis. The present work is the first evaluating the effect of MetS on the association between psoriasis and ED using other possible factors such as severity of skin symptoms and depression.

Conflict of Interest

The Authors declare that they have no conflict of interests..

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