Prevalence of metabolic syndrome in patients with lichen planus in comparison with control group

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Background: The increased prevalence of metabolic syndrome has been established in chronic inflammatory skin diseases. Patients with metabolic syndrome have a higher mortality rate due to cardiovascular disease and malignancy. In this study, the prevalence of metabolic syndrome was evaluated in lichen planus patients compared with a control group in Kerman, southeast Iran.

Methods: This was a cross-sectional study on 90 patients with lichen planus and 90 healthy participants from the Dermatology Clinic of Afzalipour Hospital, Kerman, Iran. Demographic features of the patients and clinical features of the lesions were recorded. Then, parameters of metabolic syndrome were evaluated in both groups. The independent t-test and chi-squared test were used to compare quantitative and qualitative variables, respectively.

Results: There was no significant difference in demographic features of the participants between the two groups. Metabolic syndrome was significantly more prevalent in the lichen planus group (62.6%) than in the control group (14.4%) (P = 0.001). Metabolic syndrome parameter values (except waist circumference) were significantly higher in the lichen planus group than in the control group. Lichen planus patients with metabolic syndrome had a significantly higher percentage of mucosal involvement (66.1%) than lichen planus patients without metabolic syndrome (44.1%). Lichen planus patients with metabolic syndrome were significantly older than those without metabolic syndrome.

Conclusions: This study observed a higher prevalence of metabolic syndrome in lichen planus patients relative to controls. Furthermore, lichen planus patients with metabolic syndrome had significantly higher age, mucosal involvement, and body mass index than lichen planus patients without metabolic syndrome.

Keywords: metabolic syndrome, lichen planus, hypertension, dyslipidemia

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INTRODUCTION

Lichen planus (LP) is an autoimmune skin disease with mucocutaneous, nail, and hair follicle involvement. The prevalence of the disease is estimated from 0.1% to 4% worldwide. It is mostly seen between the fourth and sixth decades of life. The lesions appear as pruritic violaceous plane papules and plaques and most frequently involve the wrist, lower extremities, and trunk. Infiltration of T-lymphocytes at the dermal-epidermal junction and destruction of basal keratinocytes secondary

to altered antigenic properties contribute to the pathogenesis of L*P* [1-4].

The increased prevalence of metabolic syndrome (MS) has recently been established in patients with chronic inflammatory skin diseases including psoriasis, vitiligo, androgenetic alopecia, hidradenitis suppurativa, chronic urticaria, acne, and rosacea. Several factors such as genetic predisposition, diet, physical activity, hormonal status, oxidative stress, and chronic inflammation have been proposed in the pathogenesis of MS. Patients with MS are more frequently predisposed to cardiovascular disease, stroke, malignancy, and fatty liver disease [5,6]. Approximately 20–25% of people worldwide and nearly 27% of people in Iran are affected by MS [7,8]. The mortality rate in patients with MS is 2-3 times higher than in normal populations. Early diagnosis of MS can lead to the control of risk factors and reduce mortality and morbidity rates [5-8]. In this study, the prevalence of MS in LP patients was evaluated in comparison with a control group in Kerman, southeast Iran.

PARTICIPANTS AND METHODS

This was a cross-sectional study on 90 patients with LP and 90 healthy participants from the Dermatology Clinic of Afzalipour Hospital, conducted from December 2018 to December 2019 in Kerman, Iran. Inclusion criteria were patients with a diagnosis of LP who were older than 18 years of age. Diagnosis of LP was based on clinical features and skin biopsy. The control group included healthy age and sex-matched subjects who were referred to our clinic for cosmetic problems but had no inflammatory skin disease history. Excluded were patients with lichenoid drug eruptions or treatment with systemic retinoids, corticosteroids, methotrexate, cyclosporine, or any other systemic therapies within six months. Written informed consent was obtained from the participants. Demographic features (age, sex, and body mass index [BMI]) of the patients and site and duration of the lesions were recorded. Then, after 12 hours of fasting, laboratory tests including triglyceride (TG), high-density lipid (HDL), and fasting blood glucose (FBS) were tested between 8 to 9 AM. Furthermore, the participants' systolic and diastolic blood pressure (BP) values were obtained after 10 minutes of resting. Waist circumference was measured in the upper part of the hip without any compression. Finally, the prevalence of MS based on Adult Treatment Plan (ATP)-III criteria was estimated in two groups. This proposal was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1394.663).

For statistical analysis, SPSS 16 (IBM, Armonk, NY, USA) was used by an analyzer blinded to the nature of the study groups. For descriptive analysis, frequency, percentage, and mean ± standard deviation (SD) were used. The independent t-test and chi-squared test were used to compare quantitative and qualitative variables, respectively. Binary logistic regression was used to calculate the correlation of LP with MS after controlling for BMI.

RESULTS

One hundred and eighty participants (90 in each group) were enrolled in this study. The mean age of the participants was 42.27 ± 14.67 (range 20-75) years, and most were female (62.8%). Most LP patients were in the third and fourth decades of life. There were no significant differences between the two groups regarding the participants' demographic features, including sex, age, and smoking habits (Table 1). Cutaneous tissues, oral mucosa, hair follicles, and nails were involved in 90%, 57.8%, 11.1%, and 10.1% of the cases, respectively. The mean duration of disease was 8.21 ± 21.58 months (Table 1). The rate of metabolic syndrome was significantly higher in the LP group (62.6%) than in the control group (14.4%) ($P = 0.001$). Moreover, MS parameter values other than waist circumference were significantly higher in the LP group than in the control group (Table 2).

Our study found that LP patients with MS had significantly more mucosal involvement, BMI, and age than LP patients without MS. There was no significant correlation between variables including sex and duration of the disease in LP patients with MS compared with LP patients without MS (Table 3).

Because of significantly higher BMI in the LP group than in the control group, a binary logistic regression model was used to control BMI as a confounding factor. Our analysis revealed an association between LP and MS, even after controlling for BMI (OR = 0.119, 95% CI = 0.269-0.052, $P < 0.001$).

Table 1. Demographic variables and frequency of metabolic syndrome parameters in both lichen planus (LP) and control groups

Variables	Lichen planus Group N (%)	Control group N (%)	*P*-value
Sex			
Male	32 (35.6)	35 (38.9)	0.644
Female	58 (64.4)	55 (61.1)	
Age (years)			
20-30	36 (40)	23 (25.6)	0.086
30-40	25 (27.8)	29 (32.2)	
40-50	7 (7.8)	18 (20)	
50-60	15 (16.7)	11 (12.2)	
60-70	5 (5.6)	8 (8.9)	
70-80	2 (2.2)	1 (1.1)	
Smoking	7 (7.8)	7 (7.8)	1
BMI > 25 kg/m^2	60 (66.7)	36 (40)	0.001
BP ≥ 130/85 mmHg	54 (60)	10 (11.1)	0.001
FBS ≥ 110 mg/dl	38 (42.2)	1 (1.1)	0.001
TG ≥ 150 mg/dl	67 (74.4)	20 (22.2)	0.001
HDL (< 40 mg/dl in males; < 50 mg/dl in females)	57 (63.3)	26 (28.9)	0.001
Waist circumference (≥ 102 cm in males; ≥ 88 cm in females)	63 (70)	34 (37.8)	0.001
Metabolic syndrome	56 (62.6)	13 (14.4)	0.001

Abbreviations: BP, blood pressure; FBS, fasting blood sugar; triglyceride, TG; high-density lipid, HDL; BMI, body mass index

Table 2. Mean ± SD of metabolic syndrome parameters and body mass index (BMI) in the lichen planus (LP) and control groups

Variable	Lichen planus group	Control group	*P*-value
Systolic BP (mmHg)	128.03 ± 23.17	111.55 ± 15.92	0.001
Diastolic BP (mmHg)	79.88 ± 10.57	72.58 ± 7.68	0.001
FBS (mg/dl)	99.23 ± 20.38	87.21 ± 11.94	0.001
TG (mg/dl)	181.66 ± 46.60	153.46 ± 37.09	0.001
HDL (mg/dl)	41.55 ± 8.97	48.33 ± 8.52	0.001
Waist circumference (cm)	102.43 ± 14.79	99.84 ± 10.85	0.182
BMI (kg/m^2)	26.48 ± 4.25	23.99 ± 3.96	0.001

Abbreviations: BP, blood pressure; FBS, fasting blood sugar; triglyceride, TG; high-density lipid, HDL; BMI, body mass index

Table 3. Comparison of demographic and clinical features of lichen planus (LP) patients with or without metabolic syndrome

Variables	LP patients with metabolic syndrome N (%)	LP patients without metabolic syndrome N (%)	*P*-value
BMI> 25 kg/m^2 N (%)	48 (85.7)	12 (35.3)	0.001
Duration of lichen planus (Months, Mean ± SD)	23 ± 7.14	12.41 ± 1.95	0.085
Sex N (%)			
Male	19 (33.9)	13 (38.2)	0.679
Female	37 (66.1)	21 (61.8)	
Age (years, Mean ± SD)	45.51 ± 15.08	40.25 ± 14.11	0.02
Site N (%)			
Cutaneous	52 (75.4)	29 (26.1)	0.246
Mucosal	37 (66.1)	15 (44.1)	0.041
Hair follicles	6 (10.7)	4 (11.8)	0.878
Nails	3 (5.5)	6 (17.6)	0.064

DISCUSSION

In this study, metabolic syndrome (MS) was significantly more common in the case group (62.6%) than in the control group (14.4%). Moreover, the frequency of abnormal MS parameters (BP, FBS, TG, HDL, and waist circumference) was significantly higher in the LP group than in the control group.

Several previous studies, similar to the present study, demonstrated a higher prevalence of MS in LP patients in comparison with controls. Nasiri *et al.* in Iran demonstrated a significantly higher prevalence of MS in LP patients compared with the controls (51.2% vs. 25.6%, respectively) [9]. Furthermore, Signla *et al.* in India showed a significantly greater prevalence of MS in LP patients (43%) than in healthy participants (26%) [10]. Eshkevari *et al.* also demonstrated a significantly higher prevalence of MS in LP patients (58.6%) than in controls (17.1%). Furthermore, like our study, all abnormal MS components were significantly more common in LP patients than in the controls [11].

Kurian *et al.* in India, in contrast to the present study, found no significant association between LP and MS. In that study, abnormal TG, HDL and BP levels were observed significantly more frequently in LP patients than in healthy controls (25% vs.10%, 65% vs.45%, 47% vs. 27.5%, respectively). In the present study, similar to the Kurian *et al.* study, abnormal levels of TG, HDL, and BP were significantly more common in the LP group than in the control group (74.4% vs. 22.2%, 63.3% vs. 28.9%, 60% vs. 11.1%, respectively). However, in the Kurian *et al.* study, in contrast to this study, there was no significant difference between the two groups in terms of abnormal levels of FBS and abdominal obesity [12].

In the present study, an abnormal FBS was significantly more common in the LP group than in the control group (42.2% vs. 1.1%, respectively). Singla *et al.*, in India, similar to the present study, demonstrated more prevalence of abnormal FBS in the LP group (42%) than the control group (10%) [10]. In the current study, a higher percentage of abnormal waist circumference was observed in the LP patients (70%) than in controls (37.8%), which was significant and in concordance with other studies [9-12].

In the current study, the BMI was significantly higher in LP patients (26.48 ± 4.25 kg/m^2) than in the control group (23.99 ± 3.96 kg/m^2), which was similar to the Eshkevari study (27.5 ± 4.3 and 24.1 ± 4.1 kg/m^2 in the LP group and control group, respectively). Moreover, a higher percentage of abnormal BMI was observed in the LP patients with MS syndrome (85.7%) than in LP patients without MS syndrome (35.3%), which was statistically significant (P = 0.001) and compatible with the Eshkevari *et al.* study [11].

In the present study, a higher prevalence of MS was observed in the LP patients with mucosal involvement (66.1%) than in LP patients without mucosal involvement (44.1%), which was statistically significant (P = 0.041). In the Eshkevari *et al.* study, mucosal involvement was more frequent in LP patients with MS (46.4%) than LP patients without MS (27.5%), but the results was not significant (P = 0.13) [11]. Baykal *et al.* also demonstrated a significantly higher prevalence of MS in LP patients with mucosal involvement (34.5) than LP patients without mucosal involvement (8.3%) (P = 0.032) [13].

In the current study, although most of the LP patients with MS were female (66.1%), there was no significant correlation between sex and MS in LP patients (P = 0.679), which is compatible with other studies [11-13].

In this study, LP patients with MS had a significantly higher mean age (45.51 ± 15.08) than LP patients without MS (40.25 ± 14.11) (P = 0.02). Furthermore, although LP patients with MS had a longer duration of disease than LP patients without MS, the result was not significant. Baykal *et al.*, similar to the present study, demonstrated that LP patients with MS had a significantly higher mean age (56.90 ± 9.05) than LP patients without MS (43.57 ± 14.44). Moreover, in the latter study, the duration of LP was significantly higher in LP patients with MS (54.29 ± 68.80) than LP patients without LP (23.17 ± 35.8).

Lichen planus is a chronic inflammatory dermatologic disease that is associated with increased levels of pro-inflammatory cytokines including interleukin (IL)-2, IL-4, IL-6, IL-10, and transforming growth factor (TGF)-α, as well as up regulation in the attachment of CXCL-9, CXCL-10, and CXCL-11 to CXCR3 by interferon (IFN)-α. Furthermore, increased levels of leptin, adiponectin, reactive oxidative species (ROS), nitric oxide, and monocyte chemotactic protein-1 (MCP-1) have been reported in LP. Infiltration of natural killer cell lymphocytes leads to increased levels of pro-inflammatory cytokines such as interferon gamma, TNF-α, IL-17, IL-22, and IL-40. On the other hand, increased levels of acute inflammatory reactants including homocysteine, fibrinogen, and C-reactive protein (CRP) have been documented in LP patients who have atherosclerotic plaques

and cardiovascular risk factors. Higher levels of pro-inflammatory cytokines associated with T helper-1 can impair lipid metabolism and insulin signaling and result in adipogenesis, dyslipidemia, and insulin resistance [14-18].

CONCLUSION

In this study, a higher prevalence of metabolic syndrome (MS) was observed in lichen planus (LP) patients than in the control group. LP patients had a significantly higher percentage of abnormal levels of MS parameters (HDL, FBS, BP, waist circumference) and BMI than controls. Furthermore, LP patients with MS had significantly higher age, mucosal involvement, and BMI than LP patients without MS. However, there was no significant association between sex and duration of disease in LP patients with MS than in LP patients without MS.

Conflict of interest: None declared.

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