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Research Article

Prevalence of Metabolic Syndrome in Vitiligo Patients in Comparison With the Control Group

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Abstract

Background: Vitiligo is an autoimmune pigmentary skin disease. Recently, the association of chronic inflammatory conditions with metabolic syndrome (MS) and oxidative stress has been demonstrated in skin diseases such as lichen planus and psoriasis. In this study, the prevalence of MS in patients with vitiligo was compared to the control group.

Methods: This case-control study included 65 patients with vitiligo and 65 healthy participants in the control group who have referred to the dermatologic clinic in the Afzalipour Hospital of Kerman University of Medical Sciences, Iran. Demographic features and laboratory data of participants were collected and analyzed by SPSS 16 using chi-square and independent *t* tests.

Results: There was no significant difference between the two groups in terms of age, gender, and body mass index (BMI). The mean values of MS parameters were not significant between the two groups. Systolic hypertension (HTN) was significantly higher in the vitiligo group than in the control group ($P=0.03$). Increasing the length of the disease by one year increased the chance of MS occurrence by 7%.

Conclusion: In the current study, systolic HTN was significantly higher in vitiligo patients compared to the control group. MS was also more common in vitiligo patients than in the control group, but the result was not statistically significant.

Keywords: Metabolic Syndrome, Hypertension, Vitiligo

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Background

Vitiligo is an autoimmune pigmentary skin disease with a prevalence rate of 0.5-1%. The clinical features of the disease are characterized by well-circumscribed white-colored macules and patches. Although the pathogenesis of the disease is not well understood, factors such as genetic predisposition, destruction of melanocytes by reactive oxygen species (ROS), inflammatory mechanisms, autoimmune, and neuronal theories have been proposed in this regard. Vitiligo can be associated with other autoimmune disorders such as thyroid dysfunction, Addison disease, hypoparathyroidism, pernicious anemia, alopecia areata, and diabetes mellitus (1, 2). In vitiligo, selective loss of melanocytes occurs in the epidermis, hair follicle, retina, uveal tract, inner ear, leptomeninges, and adipose tissues (3). Melanocytes and melanin pigments in adipose tissues have a role in the reduction of ROS, chronic inflammation, adipocytokines, dyslipidemia, and insulin resistance. Chronic inflammation and an increase in adipocytokines, including leptin, tumor necrosis factor-α (TNF-α), and interleukin-6 (IL-6), are features of metabolic syndrome (MS). Today, it has been proven that these cytokines play a role in the dysfunction of endothelial cells and the development of atheroma. Furthermore, drugs such as methotrexate and TNF-α blockers exert an important role in the control of chronic inflammation and decreased risk of cardiovascular mortality and MS in psoriasis patients (4-7).

Recently, MS has been demonstrated in skin diseases such as lichen planus, psoriasis, systemic lupus erythematosus, androgenetic alopecia, acanthosis nigricans, acne inversa, and skin cancers (8). This study is the first one to evaluate the prevalence of MS in vitiligo patients in comparison with the control group.

Methods

This is a case-control study performed on 130 participants who were referred to the Afzalipour Hospital in Kerman, Iran. Sixty-five patients with vitiligo (case group) and 65 healthy participants (control group), who were matched in terms of demographic features such as age, gender, and body mass index (BMI), were enrolled in the study. The diagnosis of vitiligo was according to clinical features, and in suspicious cases, with wood's lamp and skin biopsy.

The exclusion criteria were being less than 18 years old, having psoriasis or other systemic or skin diseases that can be related to MS, and having a history of treatment with systemic corticosteroids during the previous 6 months or a history of taking drugs for controlling blood pressure (BP), serum glucose, or lipid level. The demographic

features of participants (age, gender, waistline, and BMI) and duration of the lesions were collected after obtaining a written consent form. Then, systolic (SBP) and diastolic blood pressure (DBP) were measured 2 times with an interval of 10 minutes after 5 minutes of rest, and mean numbers were recorded as well. Finally, laboratory markers, including fasting blood glucose (FBS), high-density lipoprotein (HDL), and triglyceride (TG) were measured, and the prevalence of MS was estimated based on Adult Treatment Plan (ATP)-III.

The collected data were analyzed by SPSS, version 16 (software IBM, Armonk, NY, USA). Prevalence, relative prevalence, and mean ± standard deviation (SD) were used for descriptive analyses. Comparisons between the two groups for qualitative and quantitative data were applied by Chi-square and independent *t* tests, respectively. The effect of the duration of vitiligo on the occurrence of MS was evaluated by the logistic regression analysis.

Results

One hundred and thirty participants (65 patients with vitiligo and 65 participants in the control group) were enrolled in the study. There was no significant difference in the demographic features of participants (age and gender) and BMI between the two groups (Table 1). The lower extremity (27.51%) was the most common site of involvement in vitiligo patients. Trunk and upper extremity (each 25.92%), as well as head and neck (20.63%), were involved with lower frequencies. The mean duration of vitiligo was 6.39 ± 5.57 years (in the range of 1-25 years).

MS was observed in 54.29% and 60% of vitiligo patients and the control group, respectively, but the difference was not significant ($P = 0.5$). Although the mean ± SD of MS syndrome parameters was not significant between the two groups, systolic hypertension (HTN) was significantly higher in vitiligo patients compared to the control group (Tables 2 and 3). The effect of the duration of vitiligo on the occurrence of MS was investigated by the logistic regression analysis. An increase in the length of the disease by one year could increase the chance of MS occurrence by 7% [$P = 0.04$, OR (95% CI) = 1.07 (1.00-1.15)].

Discussion

MS is characterized by dyslipidemia, diabetes mellitus, HTN, and abdominal obesity. This syndrome is associated with cardiovascular cerebrovascular diseases and diabetes mellitus. A higher mortality rate related to MS has been reported in previous studies. Although the pathogenesis of MS is not well-known, factors such as chronic inflammatory process, oxidative stress, and hyperhomocysteinemia have been proposed in the pathogenesis of this syndrome (5-7). Previous studies demonstrated an association between chronic inflammatory skin diseases such as psoriasis and lichen planus with MS. It was reported that increased pro-

Table 1. Demographic Features of Participants in Both Groups

Variables	Vitiligo Group	Control Group	*P* Value
Age (Mean ± SD, years)	32.42 ± 13.89	34.90 ± 32.58	0.22
BMI (Mean ± SD, kg/cm^2)	23.31 ± 4.41	23.55 ± 3.15	0.72
Gender, No. (%)			
Male	35 (53.85)	35 (53.85)	0.421
Female	30 (46.15)	30 (46.15)	1.00

Note. BMI: Body mass index; SD: Standard deviation.

Table 2. Metabolic Syndrome Parameters and BMI in Case and Control Groups

Variables			Mean ± SD	Maximum	Minimum	*P* Value
SBP (mmHg)	Vitiligo group		110.07 ± 23.71	115.72	104.41	0.7
	Control group		111.18 ± 15.27	114.97	107.39	
DBP (mmHg)	Vitiligo group		70.77 ± 16.01	74.58	66.95	0.9
	Control group		70.86 ± 13.37	74.17	67.54	
TG (mg/dL)	Vitiligo group		102.86 ± 20.94	160	68	0.93
	Control group		102.51 ± 30.96	237	65	
FBS (mg/dL)	Vitiligo group		91.04 ± 12.6	135	72	0.86
	Control group		90.57 ± 18.68	181	70	
HDL (mg/dL)	Vitiligo group	Female	59.68 ± 12.91	110	34	0.20
		Male	55.83 ± 12.05	100	40	
	Control group	Female	58.45 ± 11.61	96	40	
		Male	54.69 ± 12.1	99	42	
Waist circumference (cm)	Vitiligo group		46.38 ± 20.78	51.34	41.42	0.21
	Control group		42.84 ± 9.93	45.30	40.38	
BMI (kg/cm^2)	Vitiligo group		23.31 ± 4.41	37.55	15.05	0.72
	Control group		23.55 ± 3.15	31	16.78	

Note. SD: Standard deviation; BMI: Body mass index; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; TG: Triglyceride; FBG: Fasting blood glucose; HDL: High density of lipid.

Table 3. Frequency of Metabolic Syndrome Parameters in Case and Control Groups

Variables	Vitiligo Group No. (%)	Control Group No. (%)	*P* Value
Systolic hypertension	13 (18.57)	4 (6.15)	0.03
Diastolic hypertension	9 (12.86)	4 (6.15)	0.18
Hypertriglyceridemia	1 (1.43)	2 (3.08)	0.421
Hyperglycemia	16 (22.86)	9 (13.85)	0.178
Low HDL	9 (12.86)	6 (9.23)	0.50
Abdominal obesity	4 (5.71)	1 (1.54)	0.19
Obesity	21 (30)	19 (29.23)	0.92

Note. HDL: High density of lipid.

inflammatory cytokines and decreased anti-inflammatory cytokines are contributing factors in the development of MS in these diseases (9-11).

To date, a few studies have reported increased insulin resistance, diabetes mellitus, and dyslipidemia in vitiligo patients (12, 13). In this study, for the first time in Iran, the prevalence of MS in vitiligo patients was compared with the control group. In the present study, MS has been reported to be most prevalent in the vitiligo group (45.7%) than in the control group (40%), but the difference was not significant ($P=0.5$). Moreover, systolic HTN was significantly higher in vitiligo patients compared to the control group. Although the other risk factors of MS (i.e., waist circumference, BMI, and FBS) were higher in vitiligo patients than in the control group, they were not statistically significant.

In a similar study in Turkey, Karadag et al reported no significant difference between vitiligo patients and the control group regarding TG, FBS, BMI, and waist circumference. In their study, systolic HTN was significantly higher in the vitiligo group than in the control group (12), which is in line with the result of the current study.

Atas et al demonstrated a significantly higher prevalence of MS in vitiligo patients (38.1%) than in the control group (21.5%). Additionally, the latter study reported a higher prevalence of MS in patients with a longer duration of the disease. In the current study, similar to the above-mentioned study, MS was more common in the vitiligo group (45.7%) than in the control group (40%), but the result was not significant. In the study by Atas et al, the level of FBS was higher in vitiligo patients compared to the control group, but the difference was not statistically significant (13), which corroborates with the finding of our study. In the present study, an increase in the length of the disease by one year led to a 7% increase in the chance of the MS occurrence

In one study in India, Sharma et al revealed a significantly higher prevalence of MS (24% vs. 12%), hyperglycemia (25% vs. 16%), low HDL (58% vs. 53%), and hypertriglyceridemia (41% vs. 24%) in vitiligo patients in comparison with control groups, respectively. In the present study, the frequencies of hyperglycemia (22.8% vs. 13.8%), low HDL (80% vs. 77.14%), and hypertriglyceridemia (3.08% vs. 1.43%) were higher in vitiligo patients than in the control group, but the result was not statistically significant. In the aforementioned study, there was no significant difference in waist circumference and BMI between the two groups 14, which matches the result of our study.

In the present study, systolic HTN was significantly higher in vitiligo patients (18.57%) compared to the control group (6.15%). In previous studies, an association was found between chronic inflammatory diseases such as psoriasis and seborrheic dermatitis and HTN (15, 16). In the study by Linder, a significantly higher prevalence of HTN was reported in seborrheic dermatitis patients (27.1%) than in the control group (24.7%) (15). In another study by Cohen, the prevalence of HTN was significantly higher in psoriasis patients in comparison to the control groups (38.8% vs. 29.1%) (16). Several factors such as the increased level of homocysteine, C- reactive protein, ROS, and pro-inflammatory cytokines, especially TNF-α have been involved in the higher rate of HTN in these diseases. Likewise, the endocannabinoid system and its role in the regulation of adipogenesis, BP, and vascular function have been confirmed in the pathogenesis of HTN. Thus, previously mentioned factors can also be the contributing causes of HTN in vitiligo patients (15, 16).

The increased levels of pro-inflammatory cytokines related to TH1 (IL-1, IL-6, and TNF-α) and decreased levels of anti-inflammatory cytokines such as IL-10 have been reported in the pathogenesis of vitiligo similar to inflammatory diseases such as psoriasis. Oxidative stress and increased level of ROS are other factors that have been involved in the dysfunction of lipids and pathogenesis of vitiligo (17, 18).

Conclusion

The findings of this study indicated a significantly higher prevalence of systolic HTN in vitiligo patients compared to the control group. In addition, a higher frequency of MS was observed in vitiligo patients relative to the control group, but the difference was not significant. Thus, with regard to the possibility of the higher occurrence of MS in vitiligo patients, it is recommended that the screening laboratory test be conducted for early recognition and treatment of cardiovascular risk factors.

Authors' Contribution

Conceptualization: SM,MKh; Methodology:SM, MKh, MA; Validation:SM, MKh, MA; Formal Analysis:SM, MKh, MA; Investigation:SM, MKh, MA; Resources:SM, MKh, MA,MS; Data Curation:MS, MA; Writing—Original Draft Preparation: MA, MKh,MS,SM; Writing—Review and Editing:MKh,SM; Visualization:MS, MA; Supervision:MKh, MA; Project Administration: SM, M.Kh; Funding Acquisition: No funding

Conflict of Interests

The authors declare that they have no conflict of interest.

Ethical Approval

This proposal was approved in the ethical committee of Kerman university of medical sciences with the ethical code of IR.KMU.REC.1394.620.

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