ORIGINAL ARTICLE ASIAN JOURNAL OF MEDICAL SCIENCES

Study of metabolic syndrome in patients of Vitiligo: A single-center observational study

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Submission: 01-05-2022 Revision: 22-07-2022 Publication: 01-09-2022

ABSTRACT

Background: Metabolic syndrome (MetS) has been observed in patients with vitiligo. Literature suggests that there is some link between vitiligo and MetS. Autoimmunity, oxidative stress, and decreased number of melanocytes are involved in its pathogenesis. **Aims and Objectives:** This study aimed to assess MetS in patients of vitiligo, its association with different types of vitiligo, age of patients, and duration of vitiligo. **Materials and Methods:** We enrolled 62 vitiligo patients who met inclusion criteria in this cross-sectional study from August 1, 2020 to July 31, 2021. Detailed history, physical examination, and blood investigations were done in all patients and NCEP ATP III criteria were used for diagnosis of MetS. **Results:** Mean age of participants was 35.98 ± 15.48 years; M: F: was 1:2.3. MetS was observed in 12.9% vitiligo patients. Advancing age and non-segmental vitiligo were significantly associated with MetS ($P < 0.05$). **Conclusion:** Vitiligo is a condition which may affect individual at any age and carries risk of developing MetS in the future. In our study, MetS is observed in 12.9% patients with vitiligo. Early identification of MetS and appropriate management of such patients may help in reducing cardiovascular morbidity and mortality. Further prospective studies required to establish relation between vitiligo and MetS.

Key words: Advancing age; Central India; Metabolic syndrome; NCEP ATP III criteria; Vitiligo

Access this article online

Website: http://nepjol.info/index.php/AJMS

DOI: 10.3126/ajms.v13i9.44775

E-ISSN: 2091-0576

P-ISSN: 2467-9100

INTRODUCTION

Vitiligo is an acquired autoimmune skin disorder in which loss of pigmentary cells in the epidermis, resulting in well-defined macules (with scalloping borders) to near-total depigmentation of skin.[1,2] Vitiligo affects approximately 1–2% of population worldwide irrespective of ethnicity and race. Higher incidence of vitiligo is observed in Indian subcontinent, Mexico and Japan.[3] Depending on the morphology of clinical involvement, vitiligo may be segmental or non-segmental whereas based on activity of disease, it can be progressing or stable disease. Further based on the extent of involvement, vitiligo can be categorized as localized or generalized or extensive.[4] Vitiligo lesions are well demarcated, pearly white/depigmented, multiple shaped, and with convex borders.[5] Although the disorder is progressive, vitiligo does not results in restriction of work capacity but causing cosmetic disfigurement and thus has been associated with psychological upset.[6]

Metabolic syndrome (MetS) is characterized by multiple metabolic abnormalities which include obesity, hypertension, insulin resistance, and atherogenic dyslipidemia. The syndrome is associated with higher risk of developing cardiovascular disease.[7] MetS has adverse impact not only on health of an affected individual but also on the health-care system. Early diagnosis and management are important modality of management in case of MetS as lifestyle and risk factor modification, and specific therapy has shown to have benefit in the management of MetS.[8] The literature suggest that there is a link between vitiligo and MetS. Oxidative stress is involved in the pathogenesis of both the conditions vitiligo and MetS.[9] Another factor which links vitiligo and MetS is that normally melanocytes present in adipose tissue have anti-inflammatory effects

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resulting in reduce formation of reactive oxygen species.[10] Patients of vitiligo having reduced number of melanocytes in the adipose tissue, so that melanogenesis is affected. These decreased number of melanocytes have reduced anti-inflammatory effects causing metabolic abnormalities such as insulin resistance as well as dyslipidemia in these patients.[11]

The present study was planned to assess association of MetS in patients of vitiligo.

Aims and objectives

This study aimed to assess MetS in patients of vitiligo, its association with different types of vitiligo, age of patients and duration of vitiligo.

MATERIALS AND METHODS

A cross-sectional study was conducted at Department of Medicine, Gandhi Medical College and associated Hamidia Hospital, Bhopal during the study period of 1 year, that is, from August 1, 2020 to July 31, 2021. After taking permission from the Institutional Ethics Committee, Gandhi Medical College, Bhopal, 62 patients were enrolled. Patients with vitiligo of age range of 18–60 years and willing to sign written consent were included whereas vitiligo patients already on lipid lowering agent, antidiabetic drugs were excluded from the study.

Sample size

Sample size was calculated using formula

$$n = \frac{4pq}{d^2}$$

where,
p=Prevalence=4% according to Mahajan et al.[12]
q=1-prevalence
d=Allowable error which is 5%

$$n = \frac{4 \times 0.04 \times 0.96}{(0.05)^2}$$

n=61.4=62

Sociodemographic data were obtained from all enrolled patients with. Further all the patients were undergone detailed general as well as systemic examination. BMI was calculated (using the formula weight in kg/height in m^2).

Waist circumference was measured by measuring tape which was located on the top of the right iliac crest and placed horizontally around the abdomen without compression to the skin. Blood pressure was taken in sitting position once the patient is comfortable and mean average of three readings will be taken as actual reading.

Investigations such as FBS and lipid profile were sent.

Vitiligo patients were classified in segmental and non-segmental type according to the Vitiligo Global Issues Consensus Conference[4] in 2011–2012.

The participants were screened for presence or absence of MetS using the current (2005) National Cholesterol Education Program Adult Treatment Panel III (ATP III) guidelines. The following criteria were used:

- Waist circumference ≥102 cm for males and ≥88 cm for females,
- Triglycerides ≥150 mg/dL or on treatment,
- HDL <40 mg/dL for males and <50 mg/dL for females or on treatment,
- Blood pressure ≥130/85 mmHg or on treatment, and
- FBS ≥100 mg/dL or on treatment.

The presence of any three of the five traits in the patient was considered MetS.

Statistical analysis

Data were collected compiled using MS Excel and analyzed using IBM SPSS software version 20. Categorical data were expressed as frequency and percentage and numerical data were expressed as mean and standard deviation. Association of MetS with the vitiligo was assessed using Chi-square test.

P<0.05 was considered statistically significant.

RESULTS

The present study was conducted on a total of 62 cases of vitiligo with mean age of 35.98±15.48 years.

About 69.4% patients with vitiligo were females and only 30.6% patients were males. Female predominance was observed for vitiligo with male: female ratio of 1:2.3. Majority of cases had non-segmental vitiligo (54.8%), of them 27.4% cases each had acrofacial and generalized vitiligo, respectively.

Mean duration since diagnosis of vitiligo in patients with vitiligo was 7.43±8.09 years and duration since diagnosis in majority of cases was 1–5 years (38.7%). BMI was raised in more than half of the cases, of them about 35.5% cases were obese and 17.7% cases were overweight. About 8.1% cases with vitiligo were underweight. Mean BMI of patients with vitiligo was 23.49±3.27 kg/m^2.

Table 1: Distribution according to baseline variables

Baseline variables		Frequency (n=62)	Percentage
Age			
≤20		18	29
21–30		9	14.5
31–40		12	19.4
41–50		6	9.7
51–60		17	27.4
Sex			
Male		19	30.6
Female		43	69.4
Type of vitiligo			
Segmental		28	45.2
Non-segmental			
Total		34	54.8
Acrofacial		17	27.4
Generalized		17	27.4
Duration			
≤1		12	19.4
1–5		24	38.7
5–10		15	24.2
≥10		11	17.7
BMI (kg/m^2)			
≤18.5	Underweight	5	8.1
18.5–22.9	Normal	24	38.7
23–24.9	Overweight	11	17.7
≥25	Obese	22	35.5
Age at onset (years)			
≤20		24	38.7
21–30		12	19.4
31–40		16	25.8
41–50		5	8.1
51–60		5	8.1
Taking treatment			
Yes		45	72.6
No		17	27.4

Mean age at onset of vitiligo was 28.5±12.31 years. Age at onset was <20 years in majority (38.7%) of cases followed by 31–40 years of age (25.8%) and 21–30 years (19.4%). About 72.6% cases were receiving treatment for vitiligo in some form whereas about 27.4% cases were not on medications (Table 1).

In present study, MetS observed in 8 (12.9%) cases of vitiligo (Figure 1).

Table 2 reveals gender-wise distribution according to various criteria of MetS. We observed significant difference in fasting blood glucose (FBG), waist circumference, HDL, and blood pressure between males and females (P<0.05) (Table 2).

In the present study, MetS was significantly associated with advancing age, non-segmental vitiligo (particularly generalized), and prolonged duration of vitiligo (P<0.05) (Table 3).

DISCUSSION

The present study aimed to assess MetS in patients with vitiligo and to find its association with various factors. A total of 62 patients of vitiligo were enrolled with mean age of 35.98±15.48 years. MetS is a constellation of several disorders such as insulin resistance[IR], obesity, and altered lipid profile especially triglycerides and HDL and raised blood pressure and FBG levels. All these features significantly increase the risk of atherosclerosis,

Table 2: Gender-wise distribution according to components of metabolic syndrome

Metabolic syndrome	Total	Male	Female	χ^2	P value
FBS (mg/dl)					
≤100	49 (79)	12 (63.2)	37 (86)	4.2	0.04
≥100	13 (21)	7 (36.8)	6 (14)		
Mean	91.0±17.4	96.5±24.3	88.6±12.9		
WC (cm)					
Normal	48 (77.4)	19 (100)	29 (67.4)	7.9	0.005
Raised	14 (22.6)	0 (0)	14 (32.6)		
Mean	86.2±6.8	89.2±6.4	84.9±6.7		
Triglycerides (mg/dl)					
≤150	44 (71)	11 (57.9)	33 (76.7)	2.27	0.13
≥150	18 (29)	8 (42.1)	10 (23.3)		
Mean	124.7±33.8	127.2±44.2	123.5±28.6		
HDL (mg/dl)					
Normal	44 (71)	17 (89.5)	27 (62.8)	4.55	0.03
Low	18 (29)	2 (10.5)	16 (37.2)		
Mean	49.1±5.9	45.2±5.1	50.8±5.5		
Blood pressure (mmHg)					
Raised	19 (30.6)	10 (52.6)	9 (20.9)	6.23	0.013
Normal	43 (69.4)	9 (47.4)	34 (79.1)		
SBP	116.4±18.4	124.3±20.7	112.8±16.3		
DBP	76.2±9.5	80±10.1	74.5±8.8		

Table 3: Association of metabolic syndrome with various factors

	Metabolic syndrome		P value
	Yes (n=8)	No (n=54)	
Age (years)			
≤20	0 (0)	18 (100)	0.001
21–30	0 (0)	9 (100)	
31–40	0 (0)	12 (100)	
41–50	0 (0)	6 (100)	
51–60	8 (47.1)	9 (52.9)	
Mean	55.83±3.31	33.86±14.74	
Sex			
Male	3 (15.8)	16 (84.2)	0.65
Female	5 (11.6)	38 (88.4)	
Type of vitiligo			
Segmental	1 (3.6)	27 (96.4)	0.045
Non-segmental			
Total	7 (20.6)	27 (79.4)	
Acrofacial	3 (17.6)	14 (82.4)	
Generalized	4 (23.5)	13 (76.5)	
Duration of vitiligo (years)			
≤1	0 (0)	12 (100)	0.001
1–5	1 (4.2)	23 (95.8)	
5–10	2 (13.3)	13 (86.7)	
≥10	5 (45.5)	6 (54.5)	
Mean	17.83±11.32	6.32±6.92	
Taking treatment			
Yes	8 (17.8)	37 (82.2)	0.06
No	0 (0)	17 (100)	
Age at onset of vitiligo			
≤20	0 (0)	24 (100)	0.10
21–30	2 (16.7)	10 (83.3)	
31–40	3 (18.8)	13 (81.2)	
41–50	2 (40)	3 (60)	
51–60	1 (20)	4 (80)	
Mean	38±11.89	27.54±12.01	

diabetes, cardiovascular, and neurological complications including cerebrovascular accident.[8] In our study, NCEP ATP III was used for diagnosis of MetS.[9] Overall, in our study, MetS was found in 12.9% cases of vitiligo. The findings of our present study were concordant to the findings of Salman and Abdulkareem in which the observed prevalence of MetS in vitiligo patients was documented as 23.6%.[13] Atas and Gönül, however, noted MetS in higher proportions of cases with vitiligo (38.1%) as compared to our present study.[14] The difference observed in proportions of MetS found between present study and reference study can be attributed to difference in prevalence of MetS or the risk factors of MetS between the geographic region of the present and reference study as the proportion of MetS in control group was also high in the reference study. However Namazi et al.,[15] observed higher prevalence of MetS (34.3%) as compared to our study, which could be attributed to difference in diagnostic criteria of MetS, our study used NCEP ATP III criteria whereas reference study used NHLBI and AHA guidelines.

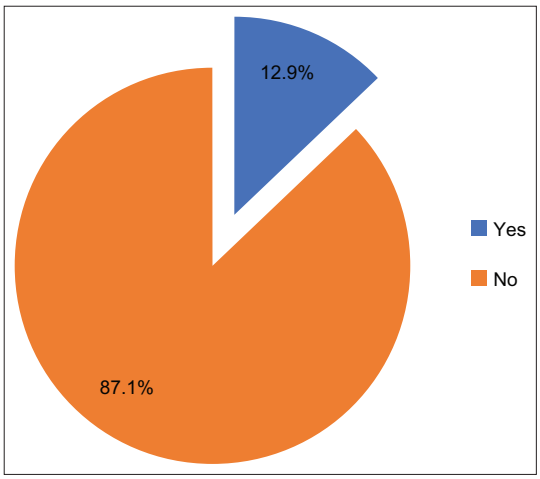

Figure 1: Distribution according to metabolic syndrome

In our present study, mean age of patients of vitiligo with MetS was higher (55.83±3.31 years), that is, all the cases with MetS belonged to 51–60 years of age (p<0.05). Furthermore, we observed that the risk of MetS increased in patients with advancing age (P<0.05). These findings were supported by the study of Namazi et al, where the authors noted advancing age as an isolated predictor of MetS on both univariate as well as multivariate analysis (P<0.05).[15] Salman and Abdulkareem also observed majority of cases with MetS in 5th decade (37.5%) and this association was observed statistically significant (P<0.05).[13]

Vitiligo observed in almost equal proportions of male and female gender.[5] However, in our study, female preponderance for vitiligo was noted, about 69.4% cases were females and only 30.6% were males possibly because female patients often seek dermatology consultation due to social stigma and cosmetic reasons. We observed no statistically significant association of MetS with gender (P>0.05). Atas and Gönül also found vitiligo in higher proportion of females and no significant risk of MetS with gender was observed in patients with vitiligo.[14] Namazi et al., observed vitiligo in higher proportions of males as compared to females, yet, they found no significant difference of MetS in males as compared to females, supporting the findings of our study.[15]

Vitiligo can be categorized as segmental or NSV (non-segmental) depending on the clinical involvement.[4] Segmental type of vitiligo mostly presents in younger age group. In the present study, MetS was significantly associated with non-segmental vitiligo, particularly acrofacial as well as generalized vitiligo was associated with high risk of developing MetS whereas generalized vitiligo was associated with MetS (P<0.05). Our study findings were concordant to the findings of Tanacan and Atakan in

which MetS was observed in higher proportions of cases of non-segmental vitiligo.[16] Salman and Abdulkareem also observed MetS in significantly increased proportions of cases with generalized type (92.3%), followed by acrofacial and least in segmental form (P<0.05).[13] In contrast to the present study, Atas and Gönül observed disease activity and segmental vitiligo as an important predictor of MetS.[14]

As duration of vitiligo is an important factor which is associated with progression of disease and its severity. In our study, MetS was found significantly associated with duration of vitiligo, that is, prolonged duration of vitiligo was associated with MetS. Atas and Gönül also observed duration of vitiligo significantly associated with MetS (OR: 1.4; 95% CI: 1.1–2.0; P<0.05).[14] The findings of present study were also supported by findings of Sharma et al.,[17] and Sallam et al.,[18] in which MetS had been correlated significantly with duration of vitiligo.

In our study, 72.6% cases were on medication for management of vitiligo, which itself be the confounding factor associated with MetS; however, we observed no significant association of MetS with treatment of vitiligo (P>0.05). Ünlü and Türsen documented treatment with immunosuppressive agents may be associated with MetS.[19]

Limitations of the study

The study was conducted as an observational cross sectional study with no comparative group due to ongoing pandemic of covid 19.

CONCLUSION

Vitiligo is a condition which may affect individual at any age and carries risk of developing MetS in the future. In our study, metabolic syndrome is observed in 12.9% patients with vitiligo. Early identification of MetS and appropriate management of such patients may help in reducing cardiovascular morbidity and mortality. Further prospective studies required to establish relation between vitiligo and MetS.

ACKNOWLEDGMENT

We would like to show our gratitude to the professor and head Department of Dermatology Dr. Anna Alex for sharing pearls of wisdom with us during the course of this research, we also thank reviewers of AJMS for their insight.

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Author's Contributions:
VG- Interpreted the results, reviewed the literature, and manuscript preparations; **AA-** Concept and design of the study and prepared first draft of manuscript; **AD-** Statistical analysis interpretation, preparation of manuscript, and revision of the manuscript; and **SD-** Coordination, interpretation of manuscript, and revision of the manuscript.

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Source of Funding: None, **Conflicts of Interest:** None.