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

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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
resulting in reduced formation of reactive oxygen species.\textsuperscript{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.\textsuperscript{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,
\[ p = \text{Prevalence}=4\% \text{ according to Mahajan et al.}^{12} \]
\[ q = 1-\text{prevalence} \]
\[ d = \text{Allowable error which is 5\%} \]

\[
 n = \frac{4 \times 0.04 \times 0.96}{0.05^2}
\]

\[ n=61.4=62 \]

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\textsuperscript{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\(^2\).
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,
diabetes, cardiovascular, and neurological complications including cerebrovascular accident. In our study, NCEP ATP III was used for diagnosis of MetS. 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%. Atas and Gönül, however, noted MetS in higher proportions of cases with vitiligo (38.1%) as compared to our present study. The difference observed in proportions of MetS found between present study and reference study 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.

Table 3: Association of metabolic syndrome with various factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Yes (n=8)</th>
<th>No (n=54)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤20</td>
<td>0 (0)</td>
<td>18 (100)</td>
<td>0.001</td>
</tr>
<tr>
<td>21–30</td>
<td>0 (0)</td>
<td>9 (100)</td>
<td></td>
</tr>
<tr>
<td>31–40</td>
<td>0 (0)</td>
<td>12 (100)</td>
<td></td>
</tr>
<tr>
<td>41–50</td>
<td>0 (0)</td>
<td>6 (100)</td>
<td></td>
</tr>
<tr>
<td>51–60</td>
<td>8 (47.1)</td>
<td>9 (52.9)</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>55.83±3.31</td>
<td>33.86±14.74</td>
<td></td>
</tr>
<tr>
<td>Type of vitiligo</td>
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<td>0.045</td>
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<td>Segmental</td>
<td>1 (3.6)</td>
<td>27 (96.4)</td>
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</tr>
<tr>
<td>Non-segmental</td>
<td>7 (20.6)</td>
<td>27 (79.4)</td>
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<tr>
<td>Acrofacial</td>
<td>3 (17.6)</td>
<td>14 (82.4)</td>
<td></td>
</tr>
<tr>
<td>Generalized</td>
<td>4 (23.5)</td>
<td>13 (76.5)</td>
<td></td>
</tr>
<tr>
<td>Duration of vitiligo (years)</td>
<td></td>
<td></td>
<td>0.001</td>
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<tr>
<td>≤1</td>
<td>0 (0)</td>
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<td>1–5</td>
<td>1 (4.2)</td>
<td>23 (95.8)</td>
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<tr>
<td>5–10</td>
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<td>13 (86.7)</td>
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<tr>
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<td>6 (54.5)</td>
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<tr>
<td>Mean</td>
<td>17.83±11.32</td>
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<td></td>
</tr>
<tr>
<td>Taking treatment</td>
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<tr>
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<td>37 (82.2)</td>
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</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>17 (100)</td>
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</tr>
<tr>
<td>Age at onset of vitiligo</td>
<td></td>
<td></td>
<td>0.10</td>
</tr>
<tr>
<td>≤20</td>
<td>0 (0)</td>
<td>24 (100)</td>
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<tr>
<td>21–30</td>
<td>2 (16.7)</td>
<td>10 (83.3)</td>
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<tr>
<td>31–40</td>
<td>3 (18.8)</td>
<td>13 (81.2)</td>
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<tr>
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<td>3 (60)</td>
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<tr>
<td>51–60</td>
<td>1 (20)</td>
<td>4 (80)</td>
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<tr>
<td>Mean</td>
<td>38±11.89</td>
<td>27.54±12.01</td>
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</table>

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.). 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.).

Vitiligo observed in almost equal proportions of male and female gender. 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. 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.

Vitiligo can be categorized as segmental or NSV (non-segmental) depending on the clinical involvement. 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 Gönil 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 Gönil 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.

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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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