

A CASE CONTROL STUDY OF METABOLIC SYNDROME IN VITILIGO PATIENTS AT A TERTIARY CARE CENTRE

Dermatology

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ABSTRACT

Vitiligo is a prevalent depigmenting disorder affecting 0.5%–2% of the global population, characterized by the selective loss of melanocytes, leading to chalky-white, non-scaly macules. It is associated with conditions such as thyroid diseases, rheumatoid arthritis, diabetes mellitus, and metabolic syndrome. This hospital-based case-control study aimed to evaluate the relationship between vitiligo and metabolic syndrome by analyzing 60 clinically diagnosed vitiligo patients and 60 age- and sex-matched controls without vitiligo. Metabolic syndrome was diagnosed using the National Cholesterol Education Program Adult Treatment Panel (NCEP ATP III) criteria, and statistical analysis was performed using mean, standard deviation, percentage, and Student's t-test. The study identified metabolic syndrome in 48.3% of vitiligo patients compared to 26.7% of controls ($p = 0.014$). A longer duration of vitiligo and a higher percentage of affected body surface area were independent predictors of metabolic syndrome. The Vitiligo Area Severity Index (VASI) scores were significantly associated with an increased incidence of metabolic syndrome, affecting 69% of cases ($p = 0.0001$). While a weak positive correlation was observed between VASI scores and disease duration, it was not statistically significant (correlation coefficient = 0.250, $p = 0.054$). These findings suggest a strong link between vitiligo severity and metabolic syndrome, emphasizing the need for early metabolic screening in vitiligo patients.

KEYWORDS

vitiligo, metabolic syndrome, VASI, autoimmune diseases.

INTRODUCTION

Metabolic syndrome (MS), also known as syndrome X or insulin resistance syndrome, comprises a cluster of abnormalities that increase the risk of cardiovascular diseases. It includes obesity, type 2 diabetes mellitus, hyperglycemia, dyslipidemia, and hypertension¹. The World Health Organization (WHO) defines MS based on glucose intolerance, insulin resistance, or diabetes mellitus, along with any two of obesity, high serum triglycerides, low high-density lipoprotein (HDL) cholesterol, or hypertension². The International Diabetes Federation (IDF) prioritizes obesity as a primary criterion, considering population-specific cut-offs³. MS affects nearly one-fourth of the global adult population, with South Asians, particularly Asian Indians, at higher risk⁴. In India, its prevalence ranges from 11% to 41%⁵.

MS increases the risk of coronary heart disease, stroke, fatty liver disease, and various cancers^{6,7}. Studies highlight associations between MS and elevated serum triglycerides, plasma glucose, and insulin resistance^{8,9}. Vitiligo, an acquired melanocytopenia, is characterized by depigmented macules due to melanocyte loss¹⁰. Though its exact cause is unknown, proposed mechanisms include autoimmune, genetic, neurogenic, and oxidative stress theories¹¹. It manifests in different forms, including segmental, acrofacial, generalized, universal, focal, mixed, and mucosal variants¹².

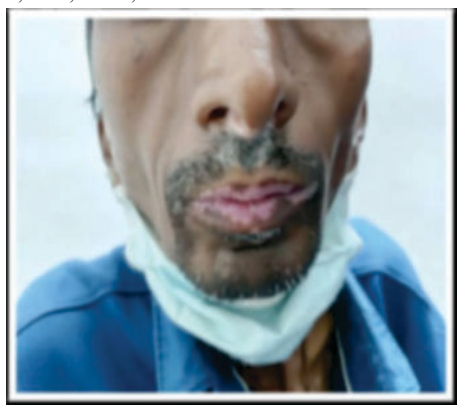


Figure 1: Lip – Tip Vitiligo



Figure 2 : Vitiligo Vulgaris

Oxidative stress and autoimmune responses in vitiligo may contribute to systemic complications, linking it to MS^{5,13}. Research suggests associations between vitiligo and metabolic disorders like diabetes, hypertension, and dyslipidemia¹⁴. While studies have examined MS in autoimmune diseases, fewer have investigated its connection to dermatologic conditions such as vitiligo and psoriasis¹⁵. Vitiligo accounts for 1.87% of dermatology outpatient cases in our region. Given its prevalence, this study aims to explore its correlation with MS.

Objectives

1. To determine the frequency of metabolic syndrome in vitiligo patients and compare it with age and sex matched controls.
2. To find out correlation between severity of vitiligo and disease duration with metabolic syndrome.

MATERIALS AND METHODS

A case – control study was conducted on clinically diagnosed cases of vitiligo at the Dermatology, Venereology and Leprosy outpatient department of Navodaya Medical College Hospital and Research Centre in Raichur. The study spanned 18 months, from July-2023 to December-2024.

Ethical Clearance was Obtained.

Informed and written consent was secured from all participants before

the study begun. The study included a total of 60 clinically diagnosed vitiligo patients and 60 age and sex matched controls without vitiligo, selected based on specific inclusion and exclusion criteria.

Inclusion Criteria

- All clinically diagnosed cases of vitiligo with BSA involvement of more than 10%
- Age more than 18 years
- Age and sex matched controls willing to participate in the study.

Exclusion Criteria:

- Those who have concomitant inflammatory, infectious dermatoses.
- Patients who have used medications like systemic steroids or phototherapy during last 6 months.
- Smoking habit or alcohol consumption

For Controls

- Pregnant or lactating women
- Smoking habit or alcohol consumption.

Procedure

A comprehensive history was recorded detailing symptoms, age of onset, duration, lesion evolution, and progression. Information on personal family history of vitiligo, diabetes mellitus, hypertension, and cardiovascular disorders was also collected. A thorough cutaneous examination was done to know the site of involvement, morphology, and percentage of body surface area involved using VASI score and duration of disease is noted using VIDA score.

The VASI Score Were Categorised as Follows:

Mild: less than 5

Moderate: 5 to 15

Severe: more than 15

Patients weight in kilograms and height in meters were recorded to calculate their Body Mass Index (BMI) using the formula $BMI = \text{weight (kg)} / \text{height (m)}^2$. Blood pressure (BP) was measured with a mercury sphygmomanometer, and the average of two readings taken five minutes apart was recorded as the patient's BP. The collected data was entered into a specially designed case record form and subjected to statistical analysis, such as Chi – square test and independent T – test, as needed. Patients were referred to the laboratory for necessary blood investigations after overnight fasting. The results from the two groups were then compared.

Lab Investigations:

- 1) Lipid profile
- 2) FBS
- 3) Complete hemogram

RESULTS

In the current study, association between cases & controls with that of the gender. However, the distribution of males and females was identical across cases and controls, with no significant difference.

			Group		Total	P-Value
			Cases	Control		
Metabolic syndrome	Positive	Count	29	16	45	0.014
		%	48.3%	26.7%	37.5%	
	Negative	Count	31	44	75	
		%	51.7%	73.3%	62.5%	
Total		count	60	60	120	
		%	100.0%	100.0%	100.0%	

Table1 compares the presence of metabolic syndrome between the cases and controls. It indicates a higher proportion of metabolic syndrome in cases (48.3%) compared to controls (26.7%), with a statistically significant difference with a p-value = 0.014.

			Metabolic syndrome		Total	P – value
			Positive	Negative		
VASI Score	Moderate	Count	9	27	36	0.0001
		%	31.0%	87.1%	60.0%	
	Severe	Count	20	4	24	
		%	69.0%	12.9%	40.0%	

Total	Count	29	31	60	
	%	100.0%	100.0%	100.0%	

Table 2 represents the association between VASI scores (vitiligo severity) and metabolic syndrome. It indicates that severe VASI scores are significantly associated with a higher incidence of metabolic syndrome 20 (69%) with a p-value of 0.0001.

Group		N	Mean	Std Deviation	Median	Range	P Value
Age (years)	Case	60	41.13	13.89	40.00	50.00	0.772
	Control	60	41.85	13.09	41.50	47.00	
WC	Case	60	89.48	7.78	90.00	35.00	0.001
	Control	60	84.23	3.50	82.00	17.00	
TC	Case	60	189.98	52.77	179.00	302.00	0.897
	Control	60	188.80	46.80	188.00	233.00	
LDL	Case	60	112.45	31.97	104.00	130.00	0.745
	Control	60	110.38	37.39	111.00	206.00	
VLDL	Case	60	41.68	15.90	40.00	108.00	0.932
	Control	60	41.23	37.77	30.00	165.00	
SBP	Case	60	122.17	10.66	120.00	36.00	0.327
	Control	60	120.18	11.39	120.00	42.00	
DBP	Case	60	79.80	8.63	80.00	30.00	0.635
	Control	60	79.07	8.27	80.00	30.00	

Table 3 compares different demographic & laboratory investigations among cases & controls. Unpaired T-test/ Independent sample test has been used to compare the means between the two groups. Patients with vitiligo (cases) have a significantly higher waist circumference than the controls, suggesting that increased waist circumference, a risk factor for metabolic syndrome, is more prevalent in cases with vitiligo. Other parameters, including age, total cholesterol, LDL, VLDL, systolic blood pressure, and diastolic blood pressure, did not show significant differences, indicating that these factors are similarly distributed between cases and controls.

DISCUSSION

This study evaluated the association between vitiligo and metabolic syndrome (MS) in 60 patients and 60 matched controls. The mean age of participants was 41.1 ± 13 years, with a slight female predominance (55%). Disease duration ranged from 2 to 40 years, with a mean of 10.4 years.

A significant correlation was found between severe vitiligo (higher VASI score) and increased MS prevalence (69%, $p=0.0001$). Our findings align with studies by Hatice Atas et al.¹⁶, Namazi N et al.¹⁷, and Efsun Tanacan et al.¹⁸, which suggest chronic inflammation in vitiligo may contribute to MS.

Our study reported higher FBS values in cases (113.02 ± 37.19) than controls (129.25 ± 41.32), consistent with Mustafa AI et al.¹⁹, and Atas H et al.¹⁶ HDL levels were lower in vitiligo patients, supporting findings by Aryanian Z et al.²⁰ and Atas H et al.¹⁶. TC levels were similar between groups but varied across studies. DBP was comparable between cases and controls, aligning with Sharma et al.²¹, but differing from Atas H et al.¹⁶.

MS prevalence was significantly higher in vitiligo patients (48.3%) than controls (26.7%), consistent with studies by Aryanian Z et al.²⁰, Atas H et al.¹⁶, and Mustafa AI et al.¹⁹. However, some studies, such as Karadag et al.²², and Rodriguez-Martin et al.²³, found no significant metabolic differences.

Overall, our study reinforces the link between vitiligo and MS, emphasizing the need for metabolic screening in vitiligo patients.

CONCLUSION

Our study found a higher prevalence of metabolic syndrome (48.3%) in vitiligo patients compared to controls (26.7%, $p = 0.014$). Longer disease duration and greater body surface involvement were independent predictors. These findings highlight the need for further research and suggest routine screening of vitiligo patients for lipid profiles and blood pressure to mitigate cardiovascular risks.

REFERENCES

1. Khosravi A, Sadeghi M, Barghikar M. Which components of Metabolic Syndrome have a Greater Effect on Mortality CVA and Myocardial Infarction, Hyperglycaemia, High Blood Pressure or Both? Advanced Biomedical Research.2017; 6:121.

2. Cowey S, Hardy RW. The Metabolic Syndrome: A High – Risk state for Cancer? The American Journal of Pathology.2006; 5:1505-1522.
3. Huang PL. A comprehensive definition for metabolic syndrome. Disease Models & Mechanisms. 2009; 2:231-237.
4. Singh V, Singh M, Joshi A, Joshi C. prevalence of different components of the metabolic syndrome in type 2 diabetes attending tertiary care hospital in Himalayan region. Int Res Med Sci 2017; 5:5232–6.
5. Eckel RH. The metabolic syndrome. In kasper, Fauch, Hauser, Longo, Jameson, Loscalzo et al. Eds Harrison's principles of Internal Medicine. New York, McGraw Hill Education 2015; 19:2449–422.
6. Hanley AJ, Karter AJ, Williams K, Festa A, D'Agostino RB, Wagenknecht LE et al. Prediction of type 2 diabetes mellitus with alternative definitions of the metabolic syndrome: The Insulin ResistanceAtherosclerosis Study. 2005; 112: 3718–21.
7. Giovannucci E. Metabolic syndrome, hyperinsulinemia, and colon cancer: a review. Am J Clin Nutr. 2007; 86:836–42.
8. Jehn M, Clark JM, Guallar E. Serum ferritin and risk of the metabolic syndrome in U.S. adults. Diabetes care. 2004; 27:2422–8.
9. Fernandez – Real JM, Ricart – Engel W, Arroyo E, Balanca R, Casamitjana Abella R, Cabrero D, et al. Serum ferritin as a component of the insulin resistance syndrome. Diabetes Care. 1998; 21:62-8.
10. Dhār S, Dutta P, Malakar R. Pigmentary disorders. In Sacchidanand S, Oberoi C, Inamadar AC, editors. IADVL textbook of dermatology, 4th ed. Mumbai: Bhalani publishing house; 2015:p1295–326.
11. Geel NV, Speeckaert R. Acquired Pigmentary Disorders. In Griffiths C, Barker J, Bleiker T, Chalmers R, Creamer D, editors. Rook's textbook of dermatology, 9th ed. Oxford: Blackwell; 2016:p88.1-55.
12. Halder RM, Taliaferro SJ, Vitlgo. In: Wolff K, Goldsmith L A, Katz S I, Gilchrist BA, Paller A S, Leffel DJ, editors. Fitzpatrick's Dermatology in General Medicine, 7th ed. New York: McGraw Hill Co; 2008:p16-22.
13. Sabir AA, Bilbis LS, Saidu Y, Jimoh A, Iwvuala SO, Isezuo SA, et al., Oxidative stress among subjects with metabolic syndrome in Sokoto, North – Western Nigerio Nilger J Clin pract. 2016; 19.
14. Versini M, Jeandel P.Y., Rosenthal E., Shoenfeld Y., Obesity in autoimmune diseases: not a passive by stander. Autoimmun Rev. 2014
15. Pietrzak A, Bartosinska J, Hercogova J, Lotti TM, Chowdowska G. Metabolic syndrome in vitiligo. Dermatol Ther. 2012; 25(Suppl 1): 41-3.
16. Ataş H, Gönül M. Increased Risk of Metabolic Syndrome in Patients with Vitiligo. Balkan Med J. 2017 May 5; 34(3):219-225. Doi: 10.4274/balkanmedj.2016.1005. Epub 2017 Apr 6.
17. Namazi N, Amani M, Haghighatkah HR, Noori E, Abdollahimajd F. Increased risk of subclinical atherosclerosis and metabolic syndrome in patients with vitiligo: a real association or a coincidence? Dermatol Ther. 2021 Mar; 34(2):e14803.
18. Tanacan E, Atakan N. Higher incidence of metabolic syndrome components in vitiligo patients: a prospective cross-sectional study. A Bras Dermatol. 2020 Mar-Apr; 95(2):165-172.
19. Mustafa AI, Hamed AM, Kadah AS, Fawzy EM, El Shimi O S. A notorious trio! Inflammation, metabolic syndrome and vitiligo. Indian Dermatol Online J 2023; 14:493–9.
20. Aryanian Z, Shirzadian A, Farzaneh S, Goodarzi A, Azizpour A, Hatami P. Metabolic derangement in patients with vitiligo: a cross-sectional study. J Investig Med. 2022 Apr; 70(4):963-966.
21. Sharma YK, Bansal P, Menon S, Prakash N. Metabolic syndrome in vitiligo patients among a semi-urban Maharashtrian population: A case control study. Diabetes Metab Syndr. 2017 Nov; 11 Suppl 1:S77-S80.
22. Karadag AS, Tatal E, Ertugrul DT, Akin KO, Bilgili SG. Serum holotranscobalamin, vitamin B12, folic acid and homocysteine levels in patients with vitiligo. Clin Exp Dermatol 2012; 37: 62–64.
23. Rodriguez - Martin M, de Paz NM, Mehtani P et al. Patients with vitiligo present fewer cardiovascular risk factors: results from case - control study. J Eur Acad Dermatol Venereol 2011; Dec 17.