

# Spectrum of Dermatological Disorders in Patients of Metabolic Syndrome

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## ABSTRACT

**Introduction:** Over the years, a paradigm shift is evident worldwide including India with chronic diseases like cardiovascular diseases(CVD), diabetes, hypertension making a huge impact sending alarm bells across the world. Changing lifestyle with predominance of sedentary habits along with new dietary habits are responsible for this. As a result of this, metabolic syndrome has become a global epidemic and so the link between skin diseases and metabolic syndrome is also being increasingly established. This study was undertaken to assess the spectrum of dermatological disorders prevalent among the patients with metabolic syndrome.

**Material and methods:** This was a prospective study carried out at a tertiary care centre of north India for a period of six months. Proper ethical clearance from the ethical committee of the institution was taken up and a written informed consent was taken from all patients for the study. All patients presenting to the out patient department having metabolic syndrome, which was diagnosed according to the National Cholesterol Education Program's Adult Treatment Panel III were thoroughly analysed. Various dermatological disorders, either one or more than one prevalent among patients was noted down.

**Results:** A total of 180 patients were taken up for the study and females outnumbered the males. There were 111(61.6%) females and 69(38.3%) males. Maximum patients (95, 52.7%) were in the 40-50 years age. In 120 patients more than one disorder was present. The most common dermatological disorder seen was acanthosis nigricans in 111(61.6%) patients, skin tags in 110(61.1%), acne in 95(52.7%), hirsutism in 92(51.1%)patients.

**Conclusion:** In this study, we have tried to study the various dermatological disorders seen among patients of metabolic syndrome. With rising incidence of metabolic syndrome and increasing link being found between various skin disorders and metabolic syndrome, it becomes the responsibility of the clinicians to diagnose early and advise accordingly to prevent the adverse events like cardiovascular accidents among such patients.

**Keywords:** Dermatology Disorders, Metabolic Syndrome, Obesity, Insulin Resistance

## INTRODUCTION

Metabolic syndrome also synonymously known as syndrome X has become a global epidemic worldwide consequent upon to the altered lifestyle primarily composed of sedentary behavior. Over the years, mankind has been able to conquer the infectious diseases and a paradigm shift is evident worldwide including India with chronic diseases like cardiovascular diseases(CVD), diabetes, hypertension making a huge

impact sending alarm bells.<sup>1</sup> Ever since the first description of Syndrome X by G M Reaven<sup>2</sup> in 1988, multiple definitions have thereafter propped up, given by various groups like National Cholesterol Education Program's Adult Treatment Panel III, World Health Organization, and the European Group on Insulin Resistance. The definitions proposed by all these are more or less similar with minute differences. Even in India, the threat of metabolic syndrome is on the rise with a study reporting a prevalence of 18.3%.<sup>3</sup> Metabolic syndrome is not a disease per se but an interconnected network of risk factors like hypertension, obesity, glucose intolerance, dyslipidemias, pro-inflammatory and pro-thrombotic states, all of which predispose to CVD.<sup>4</sup> The underlying pathophysiology of metabolic syndrome encompassing insulin resistance, oxidative stress and a pro inflammatory pathway, has also been implicated in various dermatological diseases thus establishing a relation between these diseases and metabolic syndrome.<sup>5,6</sup> Multiple recent evidences further corroborate the association of various dermatological disorders with metabolic syndrome like lichen planus, psoriasis, androgenetic alopecia, acanthosis nigricans, acne etc. However there is a dearth of studies to assess the various dermatological disorders associated with metabolic syndrome. This study was undertaken to assess the spectrum of dermatological disorders prevalent among the patients with metabolic syndrome.

## MATERIAL AND METHODS

This was a prospective study carried out at a tertiary care centre of north India for a period of six months. Proper ethical clearance from the ethical committee of the institution was taken up and a written informed consent was taken from all patients for the study. All patients presenting to the out patient department having metabolic syndrome, which was diagnosed according to the National Cholesterol Education Program's Adult Treatment Panel III were thoroughly analysed. This panel defines a patient suffering from

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metabolic syndrome if three out of the following five criteria are present: abdominal obesity defined by increased waist circumference (>90 cm in men and > 80 cm in women), high triglycerides (>150 mg/dl or on specific medication) and low HDL levels (< 40 mg/dl for men and <50 mg/dl for women), elevated blood pressure (>130 mm of Hg and >85 Hg diastolic or on specific medication) and glucose intolerance (fasting blood glucose >100 mg/dl or on specific medication or previously diagnosed diabetes mellitus type 2).<sup>7,8</sup> A total of 180 patients falling within the definition of metabolic syndrome as outlined above and suffering from one or more of cutaneous disorders were taken up for the study. Inclusion criteria were: consenting patients  $\geq$  to 18 years, suffering from one or more than one cutaneous disorders. Exclusion criteria included non-consenting patients, patients failing the other criteria of metabolic syndrome, suffering from abnormal lipid profile, hypertension or glucose intolerance due to other factors like drugs, congenital causes, other medical conditions. Also pregnant and lactating women were excluded. A detailed clinical history regarding age of onset of cutaneous disorder, duration, severity, temporal and severity relation of the cutaneous disorder with respect to various attributes of metabolic syndrome were noted. A detailed cutaneous examination including site, morphology, distribution was done to reach to a cutaneous diagnosis. Also weight, height, blood pressure, body mass index (BMI), waist circumference was noted. Relevant investigations were done like fasting blood glucose levels, lipid profile was also done. The data was statistically analysed and inferences were drawn.

## RESULTS

A total of 180 patients were taken up for the study and females outnumbered the males. There were 111(61.6%) females and 69(38.3%) males. Maximum patients (95, 52.7%) were in the 40-50 years age group followed by 51 (28.3%) in 50-60 years age group, 28(15.5%) were in the 30-40 years age group followed by 6(3.3%) were in the 20-30 years age group. The youngest child was 21 years old and the oldest was 59 years old. A total of 11 different dermatological disorders were found among the patients of metabolic syndrome. The gender wise distribution has been shown in table 1. In 120 patients more than one disorder was present. The most common dermatological disorder seen was *acanthosis nigricans* in 111(61.6%) patients, skin tags in 110(61.1%), acne in 95(52.7%), hirsutism in 92 (51.1%) patients.

In all patients of *acanthosis nigricans*, axillae was the most common site of involvement involved in all 111(100%) patients, neck in 90(81%) patients, knuckles in 85(76.5%) and face in 60(54%) patients. The most common parameter deranged was increased waist circumference in 111(100%) patients and glucose intolerance in 87(78.3%) patients. In 110(99%) patients, *acanthosis* was associated with skin tags also. Acne was seen in 95(52.7%) patients, with 77(81%) females and 18(19%) males. In 50(52.6%) patients, the acne was of grade 3 followed by grade 2 in 34(35.7%)

S No.	Dermatological disorders	Males n, (%)	Females n, (%)
1	<i>Acanthosis nigricans</i>	46(41.4%)	65(58.5%)
2	Skin tags	52(47.2%)	58(52.7%)
3	Acne	18(19%)	77(81%)
4	Hirsutism	0	92(100%)
5	Psoriasis	32(64%)	18(36%)
6	Androgenetic alopecia	21(72.4%)	8(27.5%)
7	Hidradenitis suppurativa	4(20%)	16(80%)
8	Lichen planus	9(45%)	11(55%)
9	Xanthomas	3(37.5%)	5(62.5%)
10	Xanthelasma	1(20%)	4(80%)
11	Granuloma annulare	1(33.3%)	2(66.6%)

**Table-1:** Showing gender distribution of various patients of metabolic syndrome with dermatological disorders.

patients and grade 1 in 11(11.5%) patients. The lesions were localized over the lower jawline, chin and neck. The most common deranged parameters were increased waist circumference in 95(100%) patients followed by glucose intolerance in 82(86.3%) patients. Hirsutism was present in 92(51.1%) females and on applying the Modified Ferriman-Gallwey (mFG) score, in 74(80.4%) patients it was > 8 and in 18 (19.5%) patients it was <8. In 81(88%) patients, it was associated with PCOS. Additional finding of acne was seen in 60 (17.3%) patients and *acanthosis nigricans* was present in 89(96.7%) of females with hirsutism. Psoriasis was seen in 50(27.7%) no. of patients with males 32 (64%) and females 18(36%). Plaque psoriasis was present in 39(78%) and pustular psoriasis was present in 11(22%). Average PASI score was 13.4 and most common parameter altered were increased waist circumference, hypertension and decreased HDL, increased triglycerides. Androgenetic alopecia (AGA) was seen in 29(16.1%) patients, and out of these 24(82.7%) showed an early age of onset below 25 years. Most common parameters altered were, increased waist circumference, hypertension and altered lipid profile. In 20(69%) no. of patients AGA was of normal to mild type (Hamilton-Norwood type I- III) and 9(31%) no. had moderate to severe (Hamilton-Norwood iv – vii). Hidradenitis suppurativa was present in 20(11.1%) patients. The most common parameters altered were increased waist circumference, hypertension and decreased high density lipoproteins. Maximum patients 15(75%) were in stage 3 of hidradenitis suppurativa. Lichen planus was seen in 14(7.7%) no. of patients with oral lichen planus in 10(71.4%) and cutaneous in 4(28.5%) and most common parameters deranged were increased triglycerides, decreased HDL and hypertension. Eruptive xanthomas and xanthelasma were seen in 8(4.4%) and 5 (2.7%) no. of patients respectively. Most common parameters deranged were hypertension, increased waist circumference and increased triglycerides. Granuloma annulare was seen in 3(1.6%) patients and most common parameters altered were increased fasting blood sugar levels, increased triglycerides and hypertension.

## DISCUSSION

In our study, among 180 patients of metabolic syndrome,

there was a female preponderance and maximum patients were in the 40-60 years age group. Similar findings have been reported in various other studies where metabolic syndrome was commonly encountered among female population in the 40-60 years age group.<sup>9,10,11</sup> Various studies world wide have documented the prevalence of multiple cutaneous findings in patients of metabolic syndrome.<sup>12</sup> In our study also we found 13 different types of cutaneous disorders among patients of metabolic syndrome and each with its set of altered parameters of metabolic syndrome well in accordance to the above studies. In our study, acanthosis nigricans and skin tags were the major findings and were more commonly associated with increased waist circumference (obesity) and increased glucose intolerance. Various other studies have also reported the association of acanthosis nigricans and skin tags with insulin resistance was more and, obesity.<sup>13</sup> A study also found a prevalence of metabolic syndrome in patients of acanthosis nigricans of about 70% and similar findings as above.<sup>14</sup> Acne formed 52.7% of the patients and was more severe and inflammatory along the jaw line, mandible and neck. Various studies have also shown similar findings in acne in adult age attributing it to obesity with insulin resistance and hormonal disorders.<sup>15,16</sup> Also similar to other studies, hirsutism with Mfg score >8 was seen in 80.4% of the patients of metabolic syndrome and with obesity, PCOS and increased fasting glucose widely present. Various studies have found higher >8 mFG with metabolic syndrome.<sup>17,18</sup> Also various studies world wide have documented the evidence of association of hidradenitis suppurativa with metabolic syndrome involving obesity, hypertension and decrease in HDL cholesterol.<sup>19,20</sup> In our study however severe form of hidradenitis suppurativa was present in maximum patients in contrast to another study where metabolic syndrome was associated with milder forms.<sup>21</sup> In our study, patients of androgenetic alopecia with metabolic syndrome had an early age of onset with severe forms, this was well in concordance with other studies.<sup>22</sup> Various studies have established the association of metabolic syndrome with psoriasis thus supporting our finding of psoriasis in patients of metabolic syndrome. However in our study, metabolic syndrome was independent of the severity of psoriasis or PASI values which was well in accordance with other studies.<sup>23,24</sup> Also similarly oral lichen planus, xanthomas and xanthelasma, granuloma annulare were found to be associated with metabolic syndrome similar to various other studies substantiating their association with metabolic syndrome.<sup>25,26</sup> Various studies were well in accordance to our study showing increased prevalence of oral lichen planus with metabolic syndrome as compared to cutaneous.<sup>27,28</sup> Thus the link between metabolic syndrome and skin diseases is increasingly important with new associations being discovered which was seen in our study as well with a multitude of skin diseases prevalent among patients with metabolic syndrome.

## CONCLUSION

In our study, the prevalence of various dermatological disorders prevalent among patients with metabolic syndrome

was studied and their relationship with the various parameters of metabolic syndrome was assessed. This carries immense significance as knowledge and early detection can prevent catastrophic cardiovascular events.

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