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Original Research Article

The prevalence of metabolic syndrome in male patients of early onset androgenic alopecia compared to age matched controls

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ABSTRACT

Background: Androgenic alopecia is most common type of non-scarring alopecia in men. It is associated with high risk of cardiovascular events. Aim was to study the prevalence of metabolic syndrome in male patients of early onset androgenic alopecia.
Methods: A case-control study was conducted at the dermatology out-patient department over a period of 6 months which included 100 patients of androgenic alopecia and 100 age matched controls. All subjects were aged 20 to 35 years and underwent detailed history, clinical examination including trichoscopic examination and measurement of waist circumference and blood pressure. Fasting blood sugar, triglyceride and high-density lipoproteins were tested following overnight fasting. Diagnosis of metabolic syndrome was based on criteria of national cholesterol education program (NCEP) adult treatment panel III. Chi square test was used as a test of significance. P value <0.05 was considered statistically significant.
Results: Prevalence of metabolic syndrome was more in androgenic alopecia patients than in controls (48% versus 18%, p value <0.001). Androgenic alopecia patients had higher prevalence of increased waist circumference (76% versus 28%, p value <0.0001), increased diastolic blood pressure (32% versus 12%, p value=0.007), increased serum triglycerides (46% versus 24%, p value=0.0011) and decreased serum high-density lipoproteins (36% versus 18%, p value=0.0042) compared to controls.
Conclusions: Early screening for metabolic syndrome and its components is beneficial in patients with androgenic alopecia to reduce cardiovascular mortality.

Keywords: Androgenetic alopecia, Metabolic syndrome, Diastolic blood pressure, Trichoscopy

INTRODUCTION

Androgenetic alopecia is characterized by transformation of thick terminal hair follicles into thin vellus-like hair follicles.[1] Male pattern hair loss primarily affects the vertex and frontal region of the scalp. In male-pattern hair loss, the hair loss often presents itself as either a receding hairline, loss of hair on the vertex of the scalp or a combination of both and is classified into various grades by Hamilton and Norwood.[2] It is considered that androgenic alopecia occurring before 35 years of age is early onset androgenic alopecia.[3]

Hypertension, central obesity, glucose intolerance, insulin resistance, and atherogenic dyslipidaemia come under metabolic syndrome which increases the chances of diabetes, atherosclerotic and non-atherosclerotic cardiovascular disease.[4] The incidence of people suffering from metabolic syndrome is so on a rise that it is now considered as an epidemic.[5] Central obesity and the resulting insulin resistance are the major determinant in the

development of metabolic syndrome.[3-6] We undertook this study to check the prevalence of metabolic syndrome in early onset androgenic alopecia in male patients.

Aim

Aim of the research was to study the prevalence of metabolic syndrome in male patients of early onset androgenetic alopecia.

METHODS

A case-control study was conducted which included 100 cases of androgenetic alopecia and 100 age matched controls. The data was collected over a period of 6 months (December 2020 to May 2021).

The study was conducted in the dermatology out-patient department of Smt. Kashibai Navale Medical College and General Hospital, Pune. Institutional ethics committee approval was obtained prior to the study. Written informed consent of the patients was taken before enrolling them in this study.

Sample size was calculated using the formula.

$$n = Z^2[P(1-P)]/d^2$$

Where n is the sample size, Z is the statistic corresponding to level of confidence, P is expected prevalence, and d is precision.[7] From the previous available hospital data, we calculated minimum sample size to be 100 per group.

Inclusion criteria

Inclusion criteria for patients with androgenic alopecia were: male patients of androgenic alopecia of age group 20 to 35 years; and Hamilton-Norwood classification of at least grade III androgenic alopecia.

Exclusion criteria

Patients with history of diabetes mellitus or hypertension, and patients with history of a drug use which may cause hypertension, hypertriglyceridemia and hyperglycemia were excluded.

Detailed history and complete clinical examination was done for all participants in the study. Trichoscopy was performed to diagnose the cases of androgenic alopecia. Positive trichoscopic findings seen in androgenic alopecia are hair shaft thickness heterogeneity (HSTH), brown peripilar sign (BPPS), yellow dots, white peripilar sign, focal atrichia and scalp pigmentation. Parameters of metabolic syndrome were assessed and compared between cases and age matched controls. The control group was included with various other dermatological complaints (expect alopecia).

The abdominal circumference was measured using a non-stretchable measuring tape positioned at the level between iliac crest and lower costal border. The blood pressure was measured in supine position from the right arm of subject after at least 20 min of rest. The blood fasting sugar level was taken after an overnight fasting of at least 8 hours. Fasting sugar levels were measured using glucose oxidation method. Serum triglycerides and cholesterol levels were measures using enzymatic procedures.

Diagnosis of metabolic syndrome is based on national cholesterol education program (NCEP) adult treatment panel III. The National institutes of health guidelines define metabolic syndrome as having three or more of the following traits, including traits you're taking medication to control.[2]

Increased waist circumference - measures at least 89 cm for women and 102 cm for men; increased blood pressure - 130/85 mm Hg or higher; high triglyceride level >150 mg/dl; reduced high-density lipoprotein (HDL) cholesterol - less than 40 mg/dl in men or less than 50 mg/dl in women of HDL cholesterol; and elevated fasting blood sugar -110 mg/dl or higher.

Statistical analysis of the data was done using Epi Info™ software. Categorical variables were compared between cases and controls using chi square test. P value <0.05 was considered statistically significant.

RESULTS

In our study, 100 cases of androgenic alopecia and 100 controls were studied. Out of 100 androgenic alopecia cases 48 patients (48%) had metabolic syndrome. Whereas, out of 100 controls only 18 patients had metabolic syndrome (OR=4.2), p value was less than 0.0001 which was statistically significant. In our study, the waist circumference was raised in 76 cases and 28 control (OR=8.14, p<0.0001).

We also observed 18 cases and 12 control with raised systolic blood pressure (OR=1.6, p=0.2359). A raised diastolic blood pressure was seen in 32 cases and 12 control (OR=3.45, p=0.0007). High level of serum triglycerides was seen in 46 cases and 24 controls (OR=2.69, p=0.0011). A low level of high density lipoprotein was seen in 36 cases and 18 controls (OR=2.56, p=0.0042) and fasting blood sugar level were raised in 36 cases and 26 controls (OR=1.60, p=0.1272) (Table 1).

In our study, out of 100 cases 28 patients had grade III androgenic alopecia, 42 patients had grade IV androgenic alopecia, 24 patients had grade V androgenic alopecia, and only 6 patients had grade VI androgenic alopecia. Metabolic syndrome was present in 39.3% cases of grade III, 47.6% cases of grade IV, 54.1% cases of grade V and 66.7% cases of grade VI androgenic alopecia (Table 2).

Table 1: Comparisons of various parameters of metabolic syndrome between cases and control.

Parameter	Cases		Control		P value	Odd's ratio
	Present	Absent	Present	Absent		
Waist circumference (>102 cm)	76	24	28	72	<0.0001	8.14
Systolic blood pressure (>130 mm Hg)	18	82	12	88	0.2359	1.6
Diastolic blood pressure (>85 mm Hg)	32	68	12	88	0.0007	3.45
Serum triglycerides (>150 mg/dl)	46	54	24	76	0.0011	2.69
High density lipoprotein (<40 mg/dl)	36	64	18	82	0.0042	2.56
Blood sugar level (fasting) (>110 mg/dl)	36	64	26	74	0.1272	1.60

Table 2: Comparison of androgenic alopecia grades in patients with presence of metabolic syndrome.

Grade of androgenic alopecia	Number of androgenic alopecia patients	Number of androgenic alopecia patients with metabolic syndrome	Percentage of androgenic alopecia patients with metabolic syndrome
Grade III	28	11	39.3
Grade IV	42	20	47.6
Grade V	24	13	54.1
Grade VI	6	4	66.7
Total	100	48	

DISCUSSION

In our study, 100 cases diagnosed with androgenic alopecia and 100 controls without androgenic alopecia were assessed for parameters of metabolic syndrome. These parameters include waist circumference, systolic and diastolic blood pressure, serum triglyceride levels, serum high density lipoprotein levels, and fasting blood sugar levels. We graded patients of androgenic alopecia according to the Hamilton-Norwood classification.[2] Metabolic syndrome has been associated with higher cardiovascular and coronary heart disease mortality even after adjusting for other cardiovascular disease risk factors. The risk increases with number of metabolic syndrome components present.[8]

Trichoscopic findings seen in patients of androgenetic alopecia includes hair shaft thickness heterogeneity, brown peripilar sign, white peripilar sign, yellow dots, focal atrichia and scalp pigmentation.[9] These findings were seen in our patients (Figure 1 and 2).

In our study 48 (48%) out of 100 cases had metabolic syndrome. Similarly, in a study done by Vora et al they observed in 46 (60%) out of 77 cases of early onset androgenic alopecia had metabolic syndrome. Both of these results were statistically significant. The only difference was that they took age group of 25 to 40 for their study opposed to ours of 20 to 35 years.[10] A slightly higher prevalence may be due to the difference in age group. In a study by Swaroop et al an attempt was made to find the strength of association between early onset androgenic alopecia with metabolic syndrome and insulin resistance. They found a positive association between androgenic alopecia and metabolic syndrome which was in concordance to our study. Their relatively smaller sample size was the only limitation which we have tried to resolve.[5]

To find association between parameters of metabolic syndrome and androgenic alopecia a study was done by Nabaie et al in which they did not found any association between the two.[11] Contrary to their results, we found that serum high density lipoprotein (p value=0.0042), serum triglycerides (p value=0.0011) were statistically significant when compared to the control group. In our study fasting blood sugar levels (p value=0.1272) were not statistically significant which was in concordance to study done by Nabaie et al.[11]

In our study increased waist circumference was statistically significant with early onset androgenic alopecia (p<0.0001). Similar findings were seen in a study by Gopinath et al in which they found statistical significance (p=0.04) between waist circumference and androgenic alopecia. It their study there was no age related criterion. [1] Similarly, in a study done by Vora et al statistical significance (p=0.028) was found between waist circumference and androgenic alopecia which was in concordance to our study (Table 3).[10]

Table 3: Comparison of results of our study with other related studies.

Parameters	In our study cases % (p value)	Gopinath et al[1] cases % (p value)	Vora et al[10] cases % (p value)
Waist circumference (>102 cm)	76 (<0.0001)	37.6 (0.006)	60 (0.028)
Raised blood pressure	-	49.4 (0.029)	64 (0.016)
Systolic blood pressure (>130 mm Hg)	18 (0.2359)	-	-
Diastolic blood pressure (>85 mm Hg)	32 (0.0007)	-	-
Serum triglycerides (>150 mg/dl)	46 (0.0011)	29.4 (0.619)	70 (0.147)
High density lipoprotein (<40 mg/dl)	36 (0.0042)	25.9 (0.005)	64 (0.009)
Blood sugar level (fasting) (>110 mg/dl)	36 (0.1272)	47.1 (0.644)	58 (0.000)
Metabolic syndrome (three out of five criterion)	48 (>0.001)	22.4 (0.021)	10 (0.092)

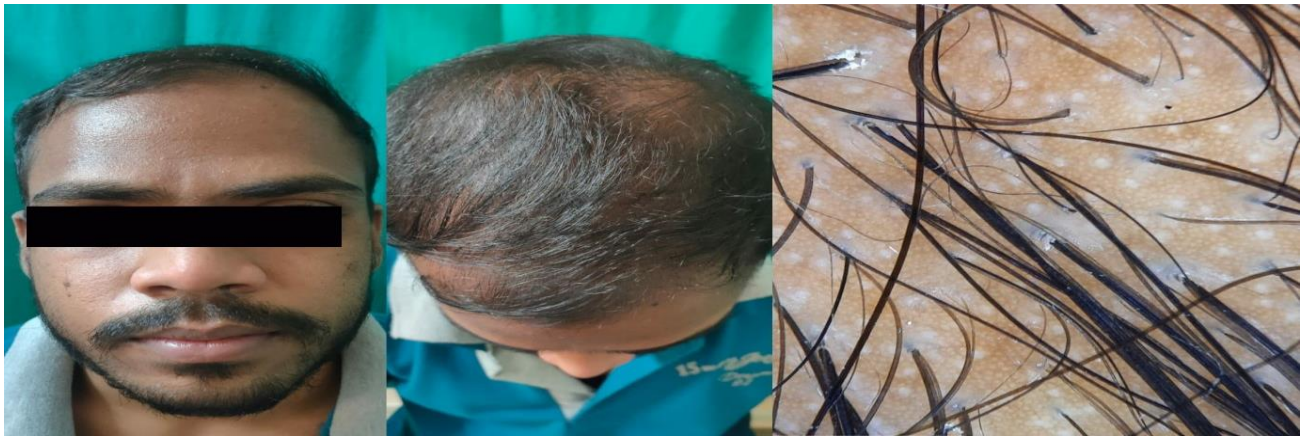

Figure 1: Patient 1- clinically thinning of hair with a bald patch over vertex is present. Trichoscopy (Dermlite DL3N, 10X) shows hair diameter diversity more than 20% with yellow and white dots.

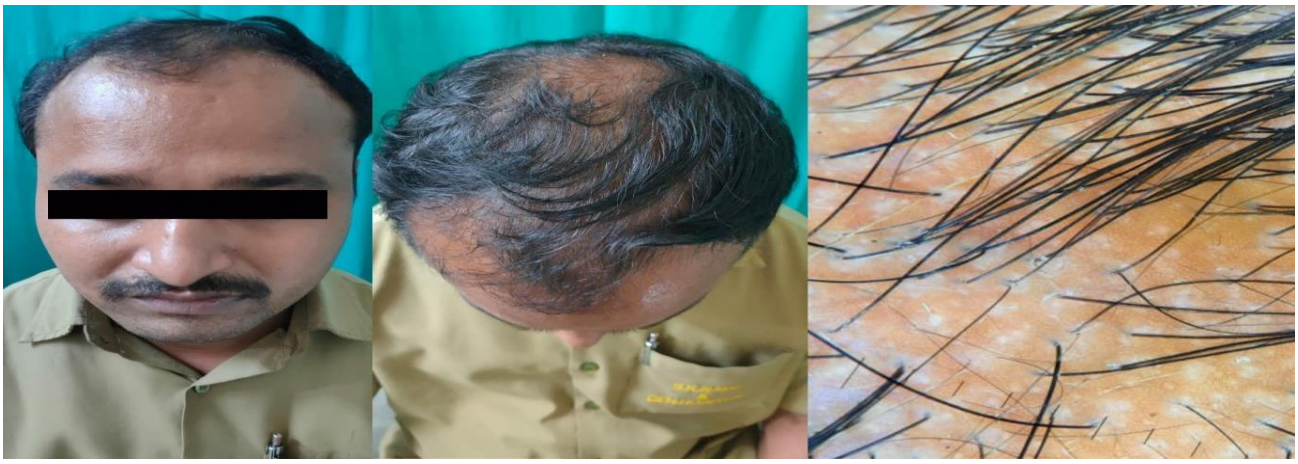

Figure 2: Patient 2- clinically receding hairline showing characteristic "M" shape. Thinning of hair is seen with vertex showing a bald patch. Trichoscopy (Dermlite DL3N, 10X) shows few yellow dots and white dots and an overall hair diameter diversity of more than 20% is seen.

In a study done by Kumar et al they found that the mean systolic blood pressure was statistically significant when compared with healthy controls.[12] In a study done by Gopinath et al raised blood pressure was statistically significant (0.029) with androgenic alopecia.[1] In a study done by Vora et al raised blood pressure was statistically significant (0.016) with androgenic alopecia.[10] We on the contrary kept systolic and diastolic blood pressure as two different parameters and found that the diastolic blood pressure (p=0.0007) was statistically significant but not with the systolic blood pressure (p=0.2359) (Table 3).

In our study there was a statistical significance of raised serum triglyceride levels in cases of androgenic alopecia

(p=0.0011), while in similar studies by Gopinath et al (p=0.619) and Vora et al (p=0.147) there was no statistical significance between raised serum triglyceride and androgenic alopecia.[1,10] In our study there was statistical significance of reduced high density lipoproteins with androgenic alopecia, similar results were seen in studies by Gopinath et al (p =0.005) and Vora et al (p=0.009) (Table 3).[1,10]

In our study 39.3% (11 out of 28) cases with grade III androgenic, 47.6% (20 out of 42) cases of grade IV androgenic alopecia, 54.1% (13 out of 24) cases of grade V androgenic alopecia and, 66.7% (4 out of 6) cases of grade VI androgenic alopecia had metabolic syndrome.

In our study the prevalence of metabolic syndrome in cases of androgenic alopecia were found to be significant (p>0.0001) and out of all the parameters increased waist circumference (p>0.0001), raised diastolic blood pressure (p=0.0007), raised serum triglyceride levels (p=0.0011) and reduced high density lipoprotein (p=0.0042) were found to be statistically significant, whereas raised systolic blood pressure (p=0.2359) and raised fasting blood sugar levels (p=0.1272) were statistically insignificant.

Limitations

In our study only prevalence was documented, but to study causality a prospective study with large sample size is needed. Also there could be chance for selection bias because controls which we enrolled in our study were hospital-based controls.

CONCLUSION

Higher prevalence of metabolic syndrome was noted in patients with early onset androgenic alopecia. We observed that with increase in grade of androgenic alopecia, there is a corresponding rise in the prevalence of metabolic syndrome. There should be a close follow up of the patients of early onset androgenic alopecia to look for long term complications and to reduce cardiovascular mortality. Early screening for metabolic syndrome is beneficial in patients with androgenic alopecia to prevent future unforeseen complications by early lifestyle modifications.

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Ethical approval: The study was approved by the institutional ethics committee

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