Association of Components of Metabolic Syndrome with Female Pattern Alopecia: A Case Control Study from Kashmir

Parvaiz A Rather[1,*], Nisar Naikoo[2], Syed Masood[3], Sameena Akhtar[4]

[1]Dermatologist, Department of Dermatology, [3]Block Medical Officer, [4]Medical Officer, Sub District Hospital, Sopore, Baramulla, Jammu & Kashmir, [2]Lecturer, Department of Biochemistry, Govt. Medical College, Srinagar, Jammu & Kashmir

***Corresponding Author:**
Email: parvaizanwar@gmail.com

ABSTRACT

Background: *Various studies about the relationship between androgenetic alopecia (AGA) and various components of the metabolic syndrome have been conducted in the past especially in males, and there is paucity of data in females.*

Aims and Objectives: *To study the association between female AGA and various components of metabolic syndrome in Kashmiri population.*

Material and Methods: *In this hospital based study, female patients of androgenetic alopecia were included in the study after excluding other causes of hair loss, from history, clinical examination, and relevant investigations. Various components of the metabolic syndrome were measured by the same dermatologist and investigations obtained from the same hospital laboratory.*

Results: *35.71% of cases and 32.35% of controls were overweight, and 21.43% patients compared to 25% control group had moderate obesity. 50% patients and 28.67% in the control group had increased waist circumference and 50% of cases showed hypertriglyceridemia compared to 29.41% in control group. Cholesterol levels were elevated in 14.28% cases, compared to 18.38% in control group. LDL levels were raised in 28.57% cases, compared to 15.44% in control group. HDL levels were lower in 7.14% cases compared to 22.79% in control group. Raised blood pressure was found in 14.28% cases, compared to 18.38% controls. Elevated glucose levels were found in 14.28% patients, compared to 34.59% in control group. Polycystic ovarian pathology was detected in 21.43% cases, compared to 10.29% in control group.*

Conclusion: *Differences between cases and control regarding various components of the metabolic syndrome were noted, with statistically significant results with respect to raised waist circumference, hypertriglyceridemia, low HDL, and raised blood glucose levels. Diagnostic criteria of metabolic syndrome was not however applicable to any of the cases in study or control group.*

Key Words: *Female pattern alopecia; Kashmiri; metabolic syndrome.*

What`s Known: *Studies about the association of metabolic syndrome with androgenetic alopecia has been well studied in males than females.*

INTRODUCTION

Androgenetic alopecia (AGA) is one of the commonest causes of non-cicatricial alopecia in both males and females. The relationship between various components related to metabolic syndrome and AGA has been studied by some authors in the past.[1, 2] This is especially so in males,[3,4,5] and there is paucity of data regarding females.[6]

However, the results of these studies have been inconsistent and many controversies surround this subject.[2] This encouraged us to undertake this study from our hospital, the first of its kind from this part of Northern India.

MATERIALS AND METHODS

This hospital based case control study was conducted on female patients with androgenetic alopecia (AGA) after obtaining proper consent. Study included female patients of female pattern alopecia aged ≥ 19 years to ≤ 40 years. Those with hair loss suspected to be due to other causes, and in age group ≤18 years and ≥ 41 years were excluded from the study. It can start any time after menarche and most common in age group 20-40.[7]So this age group was selected. The patients were labeled as having AGA after excluding other causes of hair loss in females such as diffuse alopecia areata, telogen effluvium and that related to systemic disorders like thyroid function abnormalities etc. Diffuse alopecia areata was defined as hair loss which started from patchy loss, or which occurred rapidly over a short period of months than the insidious loss seen in female pattern alopecia. Telogen effluvium and other causes of hair loss were excluded by detailed history taking and clinical examination including dermatological examination. History excluded any preceding significant event such as illnesses, stress, co-morbid conditions, and family history of hair loss. Dermatological examination excluded cicatricial alopecia, and some tests including hair pull test and examination under microscope were done to exclude other major causes of non cicatricial hair loss, including telogen effluvium. Other details in the history, clinical examination, systemic examination, laboratory investigations such as complete hemogram, thyroid function tests, ultrasound abdomen and pelvis, in all the patients, and hormonal profile in few, excluded various other causes of hair loss.

Details regarding age, duration of hair loss, smoking habits (if any), frequency of hair wash, and any significant preceding event, were obtained. An associated scalp change on cutaneous examination was noted. Grading of female pattern alopecia was done on

the basis of Ludwig`s classification for female pattern alopecia. Various parameters of metabolic syndrome were recorded, including blood pressure, body mass index (BMI), and waist circumference. This was done by the same dermatologist.

The body mass index (BMI) was determined by weight and height calculations using the equation: BMI = weight in kg/square of height in meters. BMI value of 23 to 24.9 was taken as overweight, greater than or equal to 25 as moderate obesity, and greater than or equal to 30 as severe obesity, as per Indian guidelines. The waist circumference was measured at the level of the iliac crest. A waist circumference of more than 90 cm and 80 cm for men and women, respectively, was considered as abdominal obesity.[8] The blood pressure was taken in the sitting posture and the average of two measurements was recorded.

All patients underwent fasting serum glucose level estimation and lipid profile from the same hospital laboratory. Lipid profile included total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) and triglyceride levels, assessed by enzymatic methods.

Metabolic syndrome (MS) was diagnosed using the South Asian Modified National Cholesterol Education Program Adult Treatment Panel III criteria (SAM-NCEP criteria).[9] If three or more of the following are present, the patient is diagnosed as having MS: abdominal obesity (waist circumference ≥90 cm for males and ≥80 cm for females using Asia Pacific WHO guidelines), blood pressure >130/85 mmHg, fasting blood glucose ≥100 mg/dl, hypertriglyceridemia >150 mg/dl, or low HDL cholesterol (<40 mg/dl for males and <50 mg/dl for females).

All the parameters in the female pattern alopecia patients were compared with those in age and sex matched controls. The controls comprised of a sample taken from the general population in the form of apparently healthy female attendants of the patients visiting the out-patient department, without any dermatological or other health complaint. Control females were also in the age range of 19-40 years and so it was an age and sex matched control group.

The data was compiled and subjected to statistical analysis, using computer software statistical product and service solutions (SPSS) version 16, using chi square (ϒ) test, and taking $p < 0.05$ as significant.

RESULTS

The study involved 42 female cases of female pattern alopecia, with Ludwig`s grade I alopecia found in 27 (64.29%), grade II in 9 (21.43%) and grade III in 6 (14.28%) patients. The average age of patients was 25.5 years (SD 4.098), with maximum age of 34 years and minimum of 19 years. 30 patients were in the age group 21-30 years, 9 in the 31-40 years age group and 3 in the age group of ≤ 20 years. The duration of profound and noticeable hair loss ranged from 6 months to 10 years, with an average duration of 3.32 years. All the patients had moderate physical activity and no smoking habits. There were 136 controls, with an average age of 25.73 (±SD 4.0979) years, with maximum of 36 years and minimum of 19 years age. 97 patients were in the age group 21-30 years, 29 in the age group 31-40 years and 10 in the age group ≤ 20 years. The ages were normally distributed and there was no statistically significant difference between cases and controls regarding age distribution.

15 cases (35.71%) were overweight (BMI 23-24.9), 12 with grade I and 3 with grade II alopecia, compared to 44 controls (32.35%), which was not statistically significant.9 patients (21.43%) had moderate obesity (BMI ≥25), 6 with grade I and 3 with grade II alopecia, compared to 34 (25%) in control group, results being statistically not significant. No patient had severe obesity (BMI ≥30), and all patients with grade III alopecia were normal weight, similar to that in control group.

21 patients (50%) showed increased waist circumference (≥80 cm), 15 with grade I and 6 with grade II alopecia. No patient with Ludwig`s grade III alopecia had raised waist circumference. In the control group, 39 (28.67%) had increased waist circumference, and the results were statistically significant.

21 patients (50%) showed hypertriglyceridemia, 9 with grade I, 6 with grade II and all the 6 grade III patients, compared to 40 (29.41%) in control group. This difference was statistically significant. Cholesterol levels were elevated in 6 patients (14.28%), 3 each with grade II and III alopecia, compared to 25 (18.38%) in control group. The difference was however statistically not significant. LDL levels were raised in 12 patients (28.57%), 3 with grade I, 6 with grade II and 3 with grade III alopecia, compared to 21 (15.44%) in control group, the results being statistically not significant. HDL levels were lower in 3 patients (7.14%), all with grade III alopecia, compared to 31 (22.79%) in control group, the difference being statistically significant.

Blood pressure above 130/85 was found in 6 patients (14.28%), 3 each with Ludwig`s grade I and III alopecia, compared to 25 (18.38%) control cases and this was not statistically significant.

Glucose levels >100 were found in 6 patients (14.28%), all with Ludwig`s grade I alopecia, compared to 47 (34.59%) in control group. This difference was statistically significant.

USG documented polycystic ovarian pathology was detected in 9 patients (21.43%), 3 each with grade I, II and III alopecia, compared to 14 (10.29%) in control group, results, however, being statistically not significant.

These results are summarized in Table 1.

Table 1: Various components of metabolic syndrome and other parameters between cases and controls

Parameter	Cases (n=42)				Controls (n=136)	p value
	Ludwig`s grade			Total		
	I	II	III			
Overweight (BMI 23-24.9)	12	3	0	15	44	0.828
Moderate obesity (≥25)	6	3	0	9	34	0.790
Severe obesity (≥30)	0	0	0	0	0	
Increased waist circumference (≥80 cm)	15	6	0	21	39	**0.018 (S)**
Hypertriglyceridemia (>150 mg/dl)	9	6	6	21	40	**0.023 (S)**
High total cholesterol (≥200 mg/dl)	0	3	3	6	25	0.705
High LDL (≥120mg/dl)	3	6	3	12	21	0.092
Low HDL cholesterol (<50 mg/dl)	0	0	3	3	31	**0.042 (S)**
Raised blood pressure (>130/85 mmHg)	3	0	3	6	25	0.705
Raised fasting blood glucose (≥100 mg/dl)	6	0	0	6	47	**0.020 (S)**
Metabolic syndrome	0	0	0	0	0	
USG (for cystic ovaries)	3	3	3	9	14	0.106

DISCUSSION

Prevalence values for female pattern alopecia are comparable to male pattern alopecia and varies from 16%-86% depending on age factor.[10]

The prevalence of metabolic syndrome is increasing exponentially in India, both in the urban and rural areas. It has escalated in different parts of India to figures now ranging from 11% to 41%. This difference in the prevalence between studies from may be attributed to different criteria employed, different age groups included, and different rates of prevalence of individual components of the metabolic syndrome.[11]

The overall prevalence of metabolic syndrome in AGA from various studies varies from 16.6% to 28%,[2,4] and this association has been most commonly found among people beyond the fifth decade of life.[4,12]

The relative risk of getting metabolic syndrome in AGA has consistently shown a definite male preponderance,[13] except in few, where females outnumbered the males.[2]

35.71% of the cases in our study were overweight, with a BMI 23-24.9, compared to 32.35% of controls, and the results were not statistically significant. 21.43% patients had moderate obesity with BMI ≥25, compared to 25% in control group, results being statistically not significant. No patient in the study group or those in control group in our study had severe obesity (BMI ≥30), and all patients with grade III alopecia were normal weight. This may be because patients and the control groups in our study were relatively young and so, less likely to be severely obese. Gonzalez-Gonzalez et al. found a positive correlation between obesity and AGA.[14]

50% patients in this study showed increased waist circumference (≥80 cm), but none had Ludwig`s grade III alopecia. 28.67% in the control group had increased waist circumference, the results being statistically significant. Increased waist circumference and a tendency for obesity is found more with androgenetic alopecia, as noted by previous studies, similar to the present study.[14]

50% of cases showed hypertriglyceridemia compared to 29.41% in control group, the difference was statistically significant. Cholesterol levels were elevated in 14.28% cases, compared to 18.38% in control group. The difference was however statistically not significant. LDL levels were raised in 28.57% cases, compared to 15.44% in control group, the results being statistically not significant. HDL levels were lower in 7.14% cases, all with grade III alopecia, compared to 22.79% in control group, the difference being statistically significant.

Abnormalities in the lipid profile, including hypertriglyceridemia, elevated cholesterol, elevated LDL levels and lower levels of cardiac protective lipoprotein HDL, is an important finding in androgenetic alopecia, and important risk factor for cardiovascular diseases, and this should be kept in mind while evaluating a case of androgenetic alopecia.

In a previous community based study, a significant association was found between female pattern alopecia and the presence of metabolic syndrome and its components, and HDL-cholesterol was found to be the most important factor associated with female pattern alopecia.[4] Trevisan et al also noted higher serum cholesterol and blood pressure in androgenetic alopecia cases as compared to normal controls.[15]

Blood pressure above 130/85 was found in 14.28% cases, compared to 18.38% control cases and this was not statistically significant. Normal blood pressure may be because of the young age group involved in the cases and controls, and absence of risk factors in many. Many previous studies have shown that patients with AGA showed significantly higher blood pressure values versus controls,[1] and it has been proposed that both phenomena may be explained by the presence of hyperaldosteronism.[16]

In this study, glucose levels >100 were found in 14.28% patients, all with Ludwig`s grade I alopecia, compared to 34.59% in control group. This difference was statistically significant. This shows higher risk of insulin resistance and hyperglycemic potential in

patients with androgenetic alopecia, and further evaluation regarding detection of diabetes is recommended in patients of androgenetic alopecia.

In a previous case control study, patients with AGA had significantly higher hyperglycaemia ratio compared to controls in both gender group.[17] Other studies also suggested that early androgeneticalopecia (AGA) acts as a marker of insulin resistance, and women with female pattern alopecia have impaired glucose tolerance, higher fasting glucose, c-peptide and insulin levels, and homeostatic model assessment-insulin resistance (HOMA-IR) suggestive of insulin resistance.[6,18,19]

USG documented polycystic ovarian pathology was detected in 21.43% cases, compared to 10.29% in control group, results, however, being statistically not significant. Polycystic ovarian syndrome is one of the important causes of female pattern alopecia, which should be looked for.

In our study, the criterion for metabolic syndrome was not fulfilled by any case from the study or control group. However there was appreciable difference in various components of metabolic syndrome between cases and controls. Statistically significant difference, however, existed with respect to raised waist circumference, hypertriglyceridemia, low HDL, and raised blood glucose levels. Abnormality in components was also found in previous studies,[4] and statistically not significant difference in components of metabolic syndrome was also noted in previous studies.[2,20]

CONCLUSION

Differences between cases and control group regarding various components of the metabolic syndrome were noted in this study, although not statistically significant regarding many components. Difference was, however, statistically significant with respect to raised waist circumference, hypertriglyceridemia, low HDL, and raised blood glucose levels. The difference with respect to raised waist circumference and hypertriglyceridemia was statistically significant in favor of cases than controls. With respect to low HDL and raised blood glucose levels, it was statistically significant in favor of controls than cases. This upholds the association existing between androgenetic alopecia, and metabolic syndrome components, which are important risk factors for cardiovascular diseases. Patients with androgenetic alopecia, especially those with early onset, should be screened and followed up for metabolic syndromes and cardiovascular disease risk.

WHAT IS NEW

Metabolic syndrome or its various components are associated with female pattern alopecia, and these should be looked for in patients of female pattern hair loss.

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