

Prevalance of Metabolic Syndrome in men with androgenetic alopecia: A cross-sectional study

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Abstract

Introduction In the last twenty years, evidence has revealed a connection between androgenetic alopecia and metabolic syndrome, along with its related conditions such as cardiovascular diseases, hypertension, and insulin resistance. Metabolic syndrome is characterized by the presence of hypertension, abdominal obesity, dyslipidemia, impaired fasting glycemia, and insulin resistance, and it has been linked to an elevated risk of developing cardiovascular diseases. The aim of this study was to assess the prevalence of metabolic syndrome in men with androgenetic alopecia.

Methods This cross-sectional study was done at the Department of Dermatology, Bahawal Victoria Hospital in Bahawalpur from August 2, 2018 to February 1, 2019. The study involved 95 male participants aged between 20 and 50 with androgenetic alopecia. Exclusions were made for individuals with alopecia areata or psoriasis, those with chronic renal failure (CRF) or chronic liver disease (CLD), and those undergoing radiotherapy or chemotherapy. Informed written consent was obtained, and the researchers assessed five components of metabolic syndrome.

Results The study included participants between the ages of 20 and 50, with an average age of 34.07 ± 6.36 years. Most participants, 61 individuals (64.21%), were between 20 to 35 years of age. The average duration of androgenetic alopecia was 6.31 ± 2.46 months, while the mean height, weight, and BMI were 166.19 ± 11.24 cm, 76.33 ± 7.57 kg, and 26.19 ± 4.57 kg/m², respectively. The study found that 16 individuals (16.84%) with androgenetic alopecia had metabolic syndrome.

Conclusion This study concluded that there is a substantial prevalence of metabolic syndrome among men with androgenetic alopecia.

Key words

Androgenetic alopecia; Metabolic syndrome.

Introduction

Androgenetic alopecia (AGA) is a hereditary condition characterized by progressive hair thinning on the scalp, primarily influenced by androgens. This common dermatological issue impacts both men and, on occasion, women, significantly affecting their social and psychological well-being. It is a prevalent

concern frequently observed in dermatology outpatient departments worldwide. AGA typically begins around age 20 and affects nearly half of men by age 50.^{1,2} Its underlying cause is largely linked to androgens, particularly dihydrotestosterone (a testosterone metabolite), as well as genetic factors.³

This disorder follows a genetic pattern, causing terminal hairs to transform into indeterminate and eventually vellus hairs, resulting in a reduction in the terminal-to-vellus hair ratio, typically around 4:1. As follicles miniaturize, fibrous tracts remain, leading to a characteristic

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pattern of hair loss.³ In androgenetic alopecia, there is often a presence of lymphocytic microfolliculitis directed at the bulge epithelium, accompanied by deposits of immunoreactants in the epithelial basement membrane zone. Patients with a positive immunoreactant profile tend to show improved responses to combined-modality therapy compared to those with a negative profile.

Over the past two decades, research has linked AGA to metabolic syndrome and related conditions, including cardiovascular disease, hypertension, and insulin resistance.⁴ Metabolic syndrome comprises central obesity, hypertension, glucose intolerance, insulin resistance, and dyslipidemia, representing a cluster of metabolic abnormalities.⁵

Research suggests that in AGA, hair follicles may renew themselves through keratinocyte stem cells located in the follicle's bulge area. Androgenetic alopecia is marked by the gradual miniaturization of hair follicles in genetically predisposed individuals, devoid of any scarring phenomenon.⁶

There is limited clinical evidence of association of metabolic syndrome in men with androgenetic alopecia in Pakistani database. The aim of this study was to establish procedure for screening and therapy of individuals who had metabolic syndrome in association with androgenetic alopecia, so that it may help in decreasing their morbidity.

Methods

Ninety-five patients seeking care at the Dermatology outpatient department of Bahawal Victoria Hospital in Bahawalpur, who met the specified inclusion criteria, were included in this cross sectional study. Institutional ethical review committee granted approval and each participant provided informed written consent. The evaluation of metabolic syndrome encompassed

five key components. Blood pressure was measured twice using a standard mercury sphygmomanometer with different cuff sizes. Waist circumference was determined by marking a horizontal line above the right ilium's uppermost lateral border, and then extending it to the body's mid-axillary line. The measuring tape was positioned horizontally at the designated trunk level. Measurements were taken at the end of a normal expiration, recorded to the nearest millimeter, and an average of two measurements was recorded.

Blood samples were collected upon admission and sent to the laboratory for analysis, specifically for fasting blood sugar, triglycerides, and HDL cholesterol levels. Metabolic syndrome was identified based on a predefined operational definition, and all patient data, including demographic information, were documented on a pre-designed proforma.

Data entry and analysis were performed using the computer software SPSS version 20.0. Patient characteristics, including age, disease duration, height, weight, and BMI, were presented as mean values with standard deviations. Variables such as the place of residence (rural/ urban), occupation (field work/office work/ domestic), smoking habits (yes/ no), family history of androgenetic alopecia (yes/ no), and the presence of metabolic syndrome (present/ absent) were expressed in terms of frequencies and percentages. Stratification was used to control for effect modifiers such as BMI (non-obese/ obese), presence of diabetes mellitus (yes/ no), hypertension (yes/ no). Subsequently, the chi-square test was applied post-stratification, with a significance level set at $p\text{-value} \leq 0.05$.

Results

The age range of participants in this study was 20 to 50 years, with an average age of

34.07±6.36 years. Notably, the majority of patients, specifically 61 individuals (64.21%), fell within the age range of 20 to 35 years. The mean duration of androgenetic alopecia for participants in the study was 6.31±2.46 months. Additionally, the mean height recorded was 166.19±11.24 cm, with a mean weight of 76.33±7.57 kg, and an average BMI of 26.19±4.57 kg/m². Out of 95 patients, 50 (52.63%) were from rural areas and 45 (47.37%) were from urban areas. According to occupation, 42 (44.21%) were field workers, 38(40.0%) were office workers and 15 (15.79%) were related to domestic work. 44 (46.32%) were smokers and 40 (42.11%) had family history of androgenetic alopecia.

It is noteworthy that metabolic syndrome was detected in 16 individuals, corresponding to 16.84% of the male participants with androgenetic alopecia, as visually represented in **Figure 1**.

Table 1 indicates distribution of patients in relation to all components of metabolic syndrome.

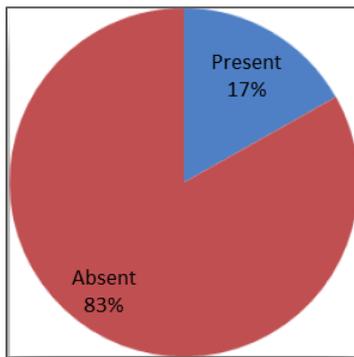


Figure 1 Frequency of metabolic syndrome in androgenic alopecia in men (n=95).

Table 1 Distribution of Metabolic Syndrome components in patients with androgenetic alopecia.

Components of metabolic Syndrome	Frequency n (%)
Fasting Glucose(≥100mg/dl)	27 (28.42%)
Blood pressure(≥130/85mm Hg)	29 (30.52%)
Triglycerides (≥150mg/dl)	30 (31.57%)
HDL (≤40mg)	15 (15.78%)
Waist circumference(≥102cm)	44 (46.31%)

Table 2 Stratification of metabolic syndrome with respect to obesity.

Obesity	Metabolic syndrome		p-value
	Present	Absent	
Yes	10	34	0.155
No	06	45	

Table 3 Stratification of metabolic syndrome with respect to DM.

DM	Metabolic syndrome		p-value
	Present	Absent	
Yes	05	22	0.783
No	11	57	

Tables 2-4 indicates stratification of metabolic syndrome with respect to obesity, diabetes mellitus and hypertension respectively.

Discussion

Androgenetic alopecia (AGA) stands as the leading cause of progressive hair loss,^{7,8} affecting a large portion of the global population (widely recognized as pattern hair loss).⁹ Prior research endeavors have aimed to examine the link between androgenetic alopecia (AGA) and systemic diseases, particularly focusing on metabolic syndrome.¹⁰

A population-based study in India, encompassing 1005 participants, revealed a 58% occurrence of AGA in males aged 30 to 50 years.⁷ Male pattern baldness has been linked to various health factors, including coronary artery disease,¹² hypertension,¹³ insulin resistance,¹⁴ abnormal lipid profiles,¹⁵ obesity,¹⁶ malignancy of prostate,¹⁷ benign hyperplasia of prostate¹⁸ scalp discomfort, and smoking. Elevated androgen levels are thought to contribute to atherosclerosis and thrombosis, leading to conditions like hypercholesterolemia and hypertension.

Table 4 Stratification of metabolic syndrome with respect to HTN.

HTN	Metabolic syndrome		p-value
	Present	Absent	
Yes	02	27	0.086
No	14	52	

Metabolic syndrome (MetS) is a cluster of interconnected risk factors that heighten the chances of atherosclerotic cardiovascular disease, with the risk increasing as more components of Metabolic syndrome are present.¹⁹

This study was conducted to ascertain the prevalence of metabolic syndrome in men with androgenetic alopecia, focusing on individuals aged 20 to 50, with an average age of 34.07 ± 6.36 years. The majority of participants, accounting for 64.21%, fell within the 20 to 35 age range. The study identified metabolic syndrome in 16.84% of male androgenetic alopecia patients, aligning with similar studies where prevalence ranged from 14.0%²⁰ to 50.0%.²¹ Notably, this research indicates a higher prevalence of metabolic syndrome in patients with early-onset androgenetic alopecia.

In our study, 27 (28.42%) patients had high reading for fasting blood glucose level, 29 (30.52%) were suffering from hypertension, 30 (31.57%) had an increased triglycerides level, 15 (15.78%) had low HDL level and 44 (46.31%) were obese. The results for all components of metabolic syndrome are consistent with another study done by Gopinath H *et al.* revealing prevalence of metabolic syndrome 22.4%.²²

In another research, the prevalence of metabolic syndrome in men with androgenetic alopecia is 14.9%.²³ Multiple investigations have explored the connection between metabolic syndrome and androgenic alopecia. Our own study indicates a heightened occurrence (16.84%) of metabolic syndrome in individuals with early-onset androgenic alopecia.

Arias-Santiago *et al.*; in a case-control study, demonstrated metabolic syndrome in 60% of men with early-onset androgenetic alopecia,²⁴ shedding light on a potential link between a pro-

inflammatory state, the pathogenesis of androgenetic alopecia, and metabolic syndrome. Multiple studies from various populations suggest a positive association between AGA and Metabolic syndrome, emphasizing the importance of screening for Metabolic syndrome and cardiovascular risk factors in AGA patients.

In Chakrabarty *et al.*'s study,²⁵ metabolic syndrome was identified in 44% of individuals with androgenetic alopecia, whereas only 2% of the control group displayed this condition. This observed disparity was statistically significant, mirroring the findings of our own study. In the study conducted by Pengsalae *et al.*;²⁶ it was observed that there were no noteworthy distinctions between individuals with androgenetic alopecia and the control group in relation to meeting the criteria for metabolic syndrome components. The variation in outcomes compared to this study could potentially be attributed to their study having a smaller sample size and the inclusion of patients with varying degrees of severity in their analysis.

The relationship between AGA and metabolic syndrome remains complex, with some studies highlighting the role of insulin resistance and hormonal changes in AGA development. Further research is needed to definitively elucidate the interaction between androgenetic alopecia and metabolic syndrome. Several meta-analyses have explored the link between AGA and metabolic syndrome, Caro-Chang's study indicated that individuals with AGA faced a higher risk of developing metabolic syndrome.²⁷

Conclusion

This study highlights a significant occurrence of metabolic syndrome among men with androgenetic alopecia. Metabolic syndrome, a well-established risk factor, increases the

likelihood of developing cardiovascular diseases, doubling the risk over the following 5 to 10 years compared to those without this syndrome. Consequently, identifying, preventing, and addressing the underlying factors of metabolic syndrome should become a paramount strategy in curbing cardiovascular diseases across the general population. Therefore, we advocate for the implementation of national and regional public screening and awareness programs aimed at mitigating these risk factors, ultimately leading to a reduction in the mortality and morbidity associated with heart diseases in our community.

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