Original Article

Association of Androgenic Alopecia with Metabolic Syndrome

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Abstract

Background: There are some debates about the association between metabolic syndrome and androgenic alopecia. Regarding the controversies, this study was conducted to determine the association between metabolic syndrome and androgenic alopecia. **Materials and methods:** In this case-control study, the case group included those subjects with androgenic alopecia attending to dermatology clinic of two training hospitals (n=57) and the control group was selected subjects attending to these hospitals without androgenic alopecia (n=54). The blood sample was obtained and assessed for FBS, TG, LDL, TC, and HDL levels. The weight and height (for body mass index), waist circumference, and blood pressure were assessed in both groups and were recorded in checklist. Finally the frequency rate of metabolic syndrome was compared between two groups. The ethics committee approval code for present study is IR.IUMS.REC 1392.8521215625. **Results:** In case and control group, there were 37 (64.9%) and 29 (53.7%) cases with metabolic syndrome, respectively showing statistically significant difference ($P < 0.0001$). The frequency rate of abnormal blood sugar, serum triglyceride, and total and HDL cholesterol was higher in case group ($P < 0.05$). **Conclusion:** According to the obtained results it may be concluded that there is significant association between metabolic syndrome and androgenic alopecia.

Keywords: Metabolic syndrome; Androgenic alopecia; Etiology

Introduction

Alopecia is a chronic skin condition leading to total or partial hair loss or sometimes with whole body involvement.[1] However not life-threatening and without painful effects but may result in psychological consequences such as anxiety and depression.[2] Androgenic alopecia is the most common type of progressive symmetric hair loss including male and female pattern.[3] The male pattern is the most common type of hair loss affecting 46 percent of 20 to 50 year-old men in frontal and temporal regions beginning from adolescence with slow progression. In females the initiation is later and without complete hair loss.[4,5]

The etiology is not yet understood but includes combination of genetic and environmental factors.[2] Different factors such as hormonal etiologies, insulin resistance, cardiovascular diseases, and malignancies are proposed.[6-9] Metabolic syndrome is a systemic disease that may be related to androgenic alopecia including physiological and weight changes[10] such as central obesity (waist circumference more than 102 cm in men and 88 cm in women), body mass index more than 30 kg/m², high triglyceride level (more than 150 mg/dl), high blood pressure (130/85 mmHg), high blood sugar (more than 110 mg/dl), and low high -density lipoprotein (less than 40 mg/dl in men and less than 50 mg/dl in women).[11]

However metabolic syndrome is related to different diseases and their adverse effects including atherosclerosis[10] and diabetes type II. Some studies have shown the association between metabolic syndrome and the alopecia grade in women; the relationship for men is not clear.[7] However the matter may be confounded by some factors.[12] Also another study reported the association between metabolic syndrome and androgenic alopecia with the most impact by HDL component.[13] Regarding the controversies, this study was conducted to determine the association between metabolic syndrome and androgenic alopecia.

Materials and Methods

This study was performed as a case-control assessment. The case group included those subjects with androgenic alopecia attending to dermatology clinic of two training hospitals. The control group was selected subjects attending to these hospitals without androgenic alopecia. Case group included 57 consecutive patients and the control group included 54 consecutive subjects. Inclusion criteria were aging from 30 to 60 years (for both groups), disease onset before 35 years (for case group) and no androgenic alopecia (for control group), and alopecia grade more than 2 in men according to Norwood-Hamilton classification and 1 in women according to Ludwig

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classification (for case group). The exclusion criteria were use of drugs lowering the blood sugar and serum lipid level, hormonal drug, steroid, and testosterone use, psoriasis, and hypothyroidism history.

The informed consent form was signed by all subjects and then the blood sample was obtained and assessed for fasting blood sugar (FBS), triglyceride (TG), low-density lipoprotein (LDL) cholesterol, total cholesterol (TC), and low-density lipoprotein (HDL) levels. The weight and height (for calculation of body mass index), waist circumference, and blood pressure were assessed in both groups and were recorded in the checklist.

Data analysis was performed among 111 understudy subjects by SPSS (version 18.0) software [Statistical Procedures for Social Sciences; Chicago, Illinois, USA]. The only used statistical test was the Chi-Square and the significance level was considered less than 0.05.

Results

The mean age was 48 ± 7 (ranging from 35 to 60) and 49 ± 7 (ranging from 32 to 60) in case and control groups, respectively ($P > 0.05$). In case and control group, there were 29 (50.87%) and 26 (48.14%) men, respectively ($P > 0.05$). In case and control group, there were 37 (64.9%) and 29 (53.7%) cases with metabolic syndrome, respectively showing statistically significant difference ($P < 0.0001$).

As shown in Table 1, the frequency rate of metabolic syndrome was differed in case and control groups according to the age. The gender showed significant difference in case but not in control group [Table 2]. The frequency rate of abnormal blood sugar, serum triglyceride, and total and HDL cholesterol was higher in case group [Table 3].

Table 1: Metabolic syndrome in case and control groups according to the age.

Groups	Age	With Syndrome		Without Syndrome		P-value
		Frequency	Percent	Frequency	Percent	
Patients	30-40	7	12.28	5	8.77	0.0001
	40-50	12	21.05	10	17.54	
	50-60	18	31.57	5	8.77	
Total		37	64.91	20	35.08	
Control	30-40	5	9.25	6	11.11	0.0001
	40-50	6	11.11	10	18.51	
	50-60	18	33.33	9	66.16	
Total		29	53.70	25	46.29	

Table 2: Metabolic syndrome in case and control groups according to the gender.

Groups	Gender	With Syndrome		Without Syndrome		P-value
		Frequency	Percent	Frequency	Percent	
Patient	Male	15	26.31	14	24.56	0.052
	Female	22	38.59	6	10.52	
Control	Male	16	26.62	10	18.51	0.0001
	Female	13	24.07	15	27.77	

Table 3: Frequency rate of serum lipid and glucose in groups.

Variables	Case	Control	P-value
High Fasting blood sugar	20 (35.8%)	24 (42.1%)	0.0001
High Total cholesterol	21 (36.8%)	7 (12.9)	0.0001
High Triglyceride	24 (42.1%)	38 (70.4%)	0.004
Low HDL cholesterol	23 (40.3%)	14 (25.9%)	0.001

Discussion

This case-control group study was performed to determine the association between metabolic syndrome and androgenic alopecia and a significant relationship was found between these two entities. Also some metabolic parameters including blood sugar and lipid indices were differed across the groups and there were significantly more abnormal indices in case group. Also there were more hypertensive subjects in case group. The matter demonstrates that early intervention and controlling programs are essential to reduce the risk and also the morbidity and mortality of cardiovascular diseases and diabetes mellitus in next years of life.

The study by Bakry et al. [14] in Egypt revealed a statistically significant association between androgenic alopecia and metabolic syndrome and between androgenic alopecia and insulin resistance. During some technical problems, we could not assess the insulin resistance in our study. The study by Su and colleagues demonstrated significant association between metabolic syndrome and androgenic alopecia and also between the androgenic alopecia and the fulfilled metabolic syndrome components. [13] In our study similarly both metabolic syndrome and the related components as shown in Table 3 had significant association.

Mumcuoglu et al. [15] reported that diastolic blood pressure measurements and total cholesterol values were significantly higher in men with androgenic alopecia compared with control men as well as our study. The study by Arias-Santiago and colleagues [16] showed that metabolic syndrome was seen in sixty percent of male patients and forty-nine percent of female patients with androgenic alopecia compared with thirty percent of male and eight percent of female control subjects. In our study also the gender showed significant effect in case but not in control group.

In the study by Chakrabarty et al. [17] the metabolic syndrome was present in 44 percent and two percent of patients with androgenic alopecia and control group, respectively with significant difference as well as our study. In their study, as compared to controls with a significant manner, the patients with androgenic alopecia had higher serum triglycerides, diastolic blood pressure, systolic blood pressure, and lower HDL cholesterol levels similar to our study.

In the study by Pengsalae et al. [18] it was seen that there were no significant differences between patients with androgenic alopecia and control group in terms of fulfilled metabolic syndrome components. This difference between the results with our study may be due to lower sample size and also inclusion of patients with different severities in their study. Acibucu and colleagues [6] reported that the occurrence of MS was significantly higher in patients with androgenic alopecia compared with the control group (twenty-five percent versus ten percent) as well as our study.

Wu et al. [19] performed a meta-analysis and concluded that

androgenic alopecia is a risk factor for metabolic syndrome and suggesting the patients with androgenic alopecia as a target group for screening of metabolic syndrome. This matter may be also concluded from our study. However the study by Narad and colleagues [20] demonstrated that androgenic alopecia is not a part of metabolic syndrome. Regarding these controversies further study would demonstrate the definite interaction between androgenic alopecia and metabolic syndrome.

In another study by Chandola et al. A dose-response relation was found between exposure to work stressors over 14 years and risk of the metabolic syndrome, independent of other relevant risk factors. Employees with chronic work stress (three or more exposures) were more than twice as likely to have the syndrome as those without work stress. So work stressors may affect androgenic alopecia through increasing the risk of metabolic diseases but more studies are needed to determine the exact co-relation. [21]

A study about Alopecia Areata (AA) revealed that the attenuation of oxidative stress might be a relevant therapeutic approach and antioxidants can be recommended as additional drugs in AA treatment. The influence of oxidative stress on androgenic alopecia is feasible although Androgenic alopecia is caused by the heightened sensitivity of scalp follicles to dihydrotestosterone whereas alopecia areata is induced by an autoimmune reaction. [22]

Another study on circadian rhythm revealed that the hair follicles undergo recurrent cycling of controlled growth (anagen), regression (catagen), and relative quiescence (telogen) with a defined periodicity. While circadian clock mechanisms have been implicated in a variety of diurnal biological processes, this study indicated that circadian clock genes may be utilized to modulate the progression of non-diurnal cyclic processes. [23]

Conclusion

Totally, according to the obtained results, it may be concluded that there is significant association between metabolic syndrome and androgenic alopecia and also between the androgenic alopecia and the fulfilled metabolic syndrome components. However further studies should be carried out to let us better interpretation of the possible association in the clinical relevance.

Conflict of Interest

All authors disclose that there was no conflict of interest.

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