Association of Early-Onset Androgenetic Alopecia and Metabolic Syndrome in Thai Men: A Case-Control Study

Nopparat Pengsalae MD*, Chuchai Tanglertsampan MD*,
Thanapat Phichawong MD*, Saridpong Lee MD*

** Department of Dermatology, School of Anti-aging and Regenerative Medicine, Mae Fah Luang Hospital (Bangkok), Bangkok, Thailand*

Background: *There are many studies of the association between early-onset androgenetic alopecia (AGA) and metabolic syndrome (MS), which is known to increase the risk of cardiovascular diseases. However, the results are inconsistent. There is no study in a Thai population.*
Objective: *To evaluate the association of early-onset AGA and metabolic syndrome in Thai male patients.*
Material and Method: *Patients were recruited from the check-up clinic. There were 80 male subjects: 40 with a diagnosis of early-onset AGA (before 35 years of age) and 40 control subjects without alopecia. Data from medical records, self-administered forms, and interview were collected and analyzed.*
Results: *Patients with early-onset AGA had the 3.48-fold higher risk of metabolic syndrome than in a control group (p = 0.015, odd ratio = 3.48, 95% confidence interval = 1.25-9.75). There was no relationship between AGA severity and metabolic syndrome (p = 0.629). There were no significant differences between the groups in terms of metabolic syndrome parameter.*
Conclusion: *The present study found the association between early onset AGA and metabolic syndrome in Thai men. Early detection of metabolic syndrome in this population may be useful to prevent cardiovascular diseases.*

Keywords: *Androgenetic alopecia, Male pattern hair loss, Metabolic syndrome, Cardiovascular diseases*

J Med Assoc Thai 2013; 96 (8): 947-51
Full text. e-Journal: *http://jmat.mat.or.th*

Androgenetic alopecia (AGA) is the most common cause of hair loss in men. It is an androgen-induced disorder characterized by hair loss in genetically predisposed men[1,2]. There can be correlation between early-onset AGA and health conditions such as hypertension, dyslipidemia, insulin resistance, prostate gland hyperplasia, and metabolic syndrome (MS)[3-6]. Several studies have investigated the association between early onset AGA and MS which is known to increase the risk of cardiovascular disease. However, the results have been inconsistent[7-9]. There has never been a similar study in Thailand. The purpose of the present study was to evaluate the association between early-onset AGA and metabolic syndrome and the relationship between AGA severity and metabolic syndrome in Thai population.

Correspondence to:
Tanglertsampan C, Mae Fah Luang University Hospital (Bangkok), 38/11-13 Asoke Place Building, Asoke Road (Sukhumvit 21), Kloy Toey Nae, Wattana, Bangkok 10110, Thailand.
Phone: 0-2664-2295, Fax: 0-2664-2296
E-mail: drchuchait@yahoo.com, drchuchait@icloud.com

Material and Method

The present study was approved by the Ethics Committee of Mae Fah Luang University. Adapting sample size was based on the study of Arias-Santiago[3]. The authors enrolled 80 Thai male patients aged between 35 and 55 years from the check-up clinic, 40 with early-onset AGA and 40 controls subjects. Diagnosis of early-onset AGA was based on clinical findings, such as early-onset alopecia (before 35 years of age) with a pattern of alopecia more than type II according to the Hamilton-Norwood Classification. The exclusion criteria were other types of alopecia and patients' refusal to participate. The inclusion criteria for controls were normal hair status and agreement to participate in the present study. The exclusion criteria for the controls were the same as for the cases, as well as the presence of AGA.

The authors collected the following data: age, family history of AGA, current or previous treatment for alopecia, smoking habit, underlying diseases and medications (oral antidiabetic agents, lipid-lowering agents, and antihypertensive drugs). Weight and height were recorded to calculate the body mass index (BMI).

Table 1. Adult treatment panel III criteria for metabolic syndrome in men

1) Abdominal obesity	>90 cm
2) Triglycerides	≥150 mg/dL
3) Blood pressure	≥130/85 mm Hg or treatment
4) HDL cholesterol	<40 mg/dL
5) Blood sugar	≥110 mg/dL

Modified to include the World Health Organization's proposal waist circumference cut-off for Asians[7,10]

Waist circumference was measured at the midpoint between the bottom of the rib cage and the top of iliac crest. The systolic (SBP) and diastolic blood pressures (DBP) of all cases were measured after 15 minutes of rest. After 12 hours of fasting, venous blood was used for fasting blood sugar (FBS) and lipid profile evaluation including triglyceride and high-density lipoprotein (HDL). The presence of metabolic syndrome was investigated in all cases according to the criteria set by the National Adult Treatment Panel-III (waist circumference, triglycerides, high-density lipoprotein cholesterol, systolic and diastolic blood pressure, and blood glucose). Patients with three or more positive criteria were considered to have metabolic syndrome (Table 1)[10].

Statistical analysis

Data were analyzed by SPSS and presented in number, percentage, and mean ± SD as appropriate. Chi-square was used to compare the characteristics between patients with early-onset AGA and metabolic syndrome. Results were presented as p-value and odd ratio (95% CI). A p-value of <0.05 was considered statistically significant. The Student's t-test was used for intergroup comparisons of mean values of all parameters in both groups (triglyceride, HDL-cholesterol, FBS, systolic and diastolic blood pressure, and waist circumference). Chi-square or Fisher's exact test where appropriate was used to evaluate relationship between severity of AGA and metabolic syndrome.

Results

The authors studied 40 men with early-onset AGA (15% with type II, 20% with type III, 47.5% with type IV, 10% with type V, 5% with type VI, and 2.5% with type VII alopecia according to the Norwood Hamilton classification). The control group comprised 40 men with normal hair status. The mean (SD) age was 47.38±6.94 years in the case and 46.20±6.54 years in the control group with no statistical difference between them (p = 0.438). The mean (SD) value of BMI was 25.18±3.05 years in the case and 24.67±4.27 years in the control group with no statistical difference between them (p = 0.61). The mean time since onset of alopecia was 14.25±6.80 years. There was a family history of alopecia in 70% of the cases compared with 12.5% of the controls (p<0.0001). Most of them were first-degree relatives (71.4%). Demographic and clinical characteristics of the patients participating in the study are shown in Table 2.

Both groups were very homogeneous in terms of anthropometric data (BMI). They were similar in terms of other confounders, such as smoking habit, sedentary lifestyle, family history, and medications. However, there was significantly higher prevalence of personal history of hypertension in AGA groups than in control subjects (p<0.05).

Metabolic syndrome

The prevalence of metabolic syndrome was established according to ATP-III criteria (Table 1). Of patients with early-onset AGA, 42.5% fulfilled three or more of the criteria for metabolic syndrome compared with 17.5% of the control patients. Patients with early AGA had the 3.48-fold higher risk of metabolic syndrome than in the control groups (Table 3). Table 4 shows the differences between

Table 2. Demographic and clinical characteristics

	Case (%) n = 40	Control (%) n = 40	p-value
Medication			
Antihypertensive agent	27.5	12.5	0.094
Antidiabetic agent	12.5	12.5	1.000
Lipid lowering agents	17.5	10.0	0.330
Sedentary lifestyle	55.0	45.0	0.370
Smoking habit	20.0	20.0	1.000
Family history			
Diabetes mellitus	22.5	17.5	0.576
Hypertension	32.5	20.0	0.204
Dyslipidemia	0.0	5.0	0.494
Cardiovascular disease	22.5	15.0	0.390
Underlying diseases			
Diabetes mellitus	15.0	10.0	0.499
Hypertension	37.5	17.5	0.045*
Dyslipidemia	15.0	5.0	0.136
Cardiovascular disease	5.0	2.5	1.000

* Statistically significant difference

cases and controls for all the parameters of the metabolic syndrome. The t-test for equality of means revealed no significant difference in mean values of all parameters in both groups (p>0.05).

Analysis of the relationship between metabolic syndrome and severity of AGA are shown in Table 5. Although moderate to severe AGA were more prevalent of metabolic syndrome than in mild AGA (p = 0.695 and 0.355 respectively), the result was not statistically significant (p = 0.629).

Discussion

The metabolic syndrome is highly associated with cardiovascular diseases and type 2 diabetic mellitus[7]. The association between metabolic syndrome and AGA may provide useful clue to prevent both diseases. Previous studies demonstrated the association between early-onset AGA and metabolic syndrome[7,8]. However, this association was not supported by another study[9].

The present study showed significantly higher prevalence of metabolic syndrome in patients with early-onset AGA (42.5%) compared to that in control subjects (17.5%). Patients with early-onset AGA had the 3.48-fold higher risk (odd ratio = 3.48) of the presence of metabolic syndrome. The results of the present study in Thai men confirmed that early-onset AGA was associated with higher prevalence of metabolic syndrome.

The t-test of means revealed no statistically significant difference between the two groups of all parameter for metabolic syndrome (waist circumference, hypertriglyceridemia, systolic blood pressure, diastolic blood pressure, and fasting plasma glucose). Some studies showed significant differences in some parameters such as triglyceride, waist circumference, and systolic blood pressure[3,8].

Unlike a previous study, the authors did not find statistical correlation between metabolic syndrome and severity of AGA. In 2010, Su et al reported greater prevalence of metabolic syndrome in severe AGA than in mild AGA in Taiwan[7]. This difference may result from different methods of study. The present study was the case-control study instead of the community-based survey.

In conclusion, metabolic syndrome should be screened in men with early-onset AGA to identify those

Table 3. Association of androgenetic alopecia and metabolic syndrome

	MS		No MS	
	Number	(%)	Number	(%)
AGA	17	(42.5)	23	(57.5)
No AGA	7	(17.5)	33	(82.5)

Odds ratio (OR) = 3.48, 95% confidence interval = 1.25-9.75, p = 0.015 (statistically significant difference)
MS = metabolic syndrome

Table 4. All parameters of the metabolic syndrome in both groups

Metabolic syndrome parameter	Early AGA (mean ± SD)	Control group (mean ± SD)	p-value
Systolic blood pressure (mmHg)	128.70±13.78	125.43±8.60	0.207
Diastolic blood pressure (mmHg)	85.38±8.29	82.55±7.92	0.123
High density lipoprotein (mg/dl)	49.88±11.99	47.90±9.72	0.421
Fasting blood suga r(mg/dl)	100.83±20.05	97.88±19.11	0.503
Triglyceride (mg/dl)	147.57±53.95	154.88±79.23	0.631
Waist circumference (cm)	86.68±6.67	84.86±9.47	0.330

AGA = androgenetic alopecia

Table 5. Prevalence of metabolic syndrome in 40 cases of AGA classified by severity

Severity	MS (n = 17)		No MS (n = 23)		OR (95% CI)	p-value
	n	%	n	%		
Mild	2	11.8	4	17.4	Reference	
Moderate	13	76.5	18	78.3	1.44 (0.23-9.11)	0.695
Severe	2	11.8	1	4.3	4.00 (0.21-75.66)	0.355

OR = odd ratio; AGA = androgenetic alopecia; MS = metabolic syndrome

at risk. Such information may raise awareness in susceptible individuals and may provide motivation to start preventive measures against the development of cardiovascular diseases.

Acknowledgement

The authors wish to thank Assistant Professor Puwat Charukamnoetkanok, MD for his English review.

Potential conflicts of interest

None.

References

1. Han A, Mirmirani P. Clinical approach to the patient with alopecia. Semin Cutan Med Surg 2006; 25: 11-23.
2. Duskova M, Pospisilova H. The role of non-aromatizable testosterone metabolite in metabolic pathways. Physiol Res 2011; 60: 253-61.
3. Arias-Santiago S, Gutierrez-Salmeron MT, Castellote-Caballero L, Buendia-Eisman A, Naranjo-Sintes R. Androgenetic alopecia and cardiovascular risk factors in men and women: a comparative study. J Am Acad Dermatol 2010; 63: 420-9.
4. Matilainen V, Koskela P, Keinanen-Kiukaanniemi S. Early androgenetic alopecia as a marker of insulin resistance. Lancet 2000; 356: 1165-6.
5. Chen W, Yang CC, Chen GY, Wu MC, Sheu HM, Tzai TS. Patients with a large prostate show a higher prevalence of androgenetic alopecia. Arch Dermatol Res 2004; 296: 245-9.
6. Assmann G, Schulte H, Seedorf U. Cardiovascular risk assessment in the metabolic syndrome: results from the Prospective Cardiovascular Munster (PROCAM) Study. Int J Obes (Lond) 2008; 32 (Suppl 2): S11-6.
7. Su LH, Chen TH. Association of androgenetic alopecia with metabolic syndrome in men: a community-based survey. Br J Dermatol 2010; 163: 371-7.
8. Acibucu F, Kayatas M, Candan F. The association of insulin resistance and metabolic syndrome in early androgenetic alopecia. Singapore Med J 2010; 51: 931-6.
9. Mumcuoglu C, Ekmekci TR, Ucak S. The investigation of insulin resistance and metabolic syndrome in male patients with early-onset androgenetic alopecia. Eur J Dermatol 2011; 21: 79-82.
10. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). JAMA 2001; 285: 2486-97.

การศึกษาความสัมพันธ์ระหว่างภาวะผมบางจากพันธุกรรมและฮอร์โมนเพศชายที่เป็นตั้งแต่อายุน้อยกับกลุ่มอาการผิดปรกติทางระบบเผาผลาญอาหารในชายไทย: การศึกษาแบบมีกลุ่มเปรียบเทียบ

นพรัตน์ เพ็งสะและ, ชูชัย ตั้งเลิศสัมพันธ์, ธนพัฒน์ พิชวงศ์, สฤษดิ์พงศ์ แซ่หลี

ภูมิหลัง: *การศึกษาในอดีตที่ผ่านมานั้น มีการศึกษาความสัมพันธ์ระหว่างภาวะผมบางจากพันธุกรรมและฮอร์โมนเพศชายที่เป็นตั้งแต่อายุน้อย (early-onset androgenetic alopecia) นั้น กับกลุ่มอาการผิดปรกติทางระบบเผาผลาญอาหาร (metabolic syndrome) ซึ่งมีความเสี่ยงต่อโรคหลอดเลือดหัวใจ แต่ผลการศึกษาเหล่านั้นให้ผลที่ขัดแย้งกันจนถึงปัจจุบันนี้ ยังไม่เคยมีการศึกษาถึงความสัมพันธ์ดังกล่าวในชายไทย*

วัตถุประสงค์: *เพื่อศึกษาหาความสัมพันธ์ระหว่างภาวะผมบางจากพันธุกรรมที่เป็นตั้งแต่อายุน้อยกับกลุ่มอาการผิดปรกติทางระบบเผาผลาญอาหาร (metabolic syndrome) ในชายไทย*

วัสดุและวิธีการ: *ผู้เข้าร่วมการศึกษา คือ ชายไทย จำนวน 80 ราย จากคลินิกตรวจสุขภาพ แบ่งเป็น 2 กลุ่ม กลุ่มแรกคือ กลุ่มผู้ป่วยที่เป็นภาวะผมบางจากพันธุกรรมและฮอร์โมนเพศชายที่ได้รับการวินิจฉัยเป็นครั้งแรกขณะอายุน้อยกว่า 35 ปี จำนวน 40 ราย กลุ่มที่สองคือ กลุ่มควบคุม ซึ่งเป็นชายไทยที่ไม่ได้มีภาวะผมบางจากพันธุกรรมและฮอร์โมนเพศชาย จำนวน 40 ราย การเก็บข้อมูลอาศัยการซักประวัติ ตรวจร่างกาย แบบสอบถาม และบันทึกเวชระเบียน*

ผลการศึกษา: *จากการศึกษาพบว่าผู้ป่วยที่มีภาวะผมบางจากพันธุกรรมและฮอร์โมนเพศชายที่เป็นตั้งแต่อายุน้อยมีความเสี่ยงมากกว่า 3.48 เท่าในการเกิดกลุ่มอาการผิดปรกติทางระบบเผาผลาญอาหาร (metabolic syndrome) เมื่อเปรียบเทียบกับกลุ่มควบคุม (ค่า p = 0.015, odds ratio = 3.48, 95% confidence interval [CI] = 1.25-9.75) นอกจากนี้ไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติระหว่างระดับความรุนแรงของภาวะผมบางกับการได้รับการวินิจฉัยว่ามีกลุ่มความผิดปกติดังกล่าว (p = 0.629) และไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติในค่า parameter ทุกตัวที่ศึกษาระหว่างกลุ่มผู้ป่วยและกลุ่มควบคุม*

สรุป: *ภาวะผมบางจากพันธุกรรมและฮอร์โมนเพศชายที่เป็นตั้งแต่อายุน้อยนั้นมีความสัมพันธ์กับกลุ่มอาการผิดปรกติทางระบบเผาผลาญอาหาร (metabolic syndrome) ในชายไทย ดังนั้นการตรวจคัดกรองหากลุ่มความผิดปรกติดังกล่าวอาจมีประโยชน์ทำให้ลดความเสี่ยงที่จะเป็นโรคหัวใจและหลอดเลือดในอนาคตได้*