Relationship between female androgenetic alopecia and serum lipid levels

Zohreh Tehranchinia, MD
Nastaran Namazi, MD
Sarah Ershadi, MD
Laya Rahbar Nikoukar, MD
Gity Taheri, MD

Skin Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Correspondence Author:
Laya Rahbar Nikoukar, MD
Email: l.r.nikookar@gmail.com
Skin Research Center, Shahid Beheshti University of Medical Sciences, Shohada-ye-Tajrish Hospital, Shahrdari Street, Tajrish Square, Tehran, Iran

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Background: Androgenetic alopecia (AGA) is a non-scarring alopecia which consists of miniaturization of the terminal hair under the influence of androgens. Some scholars have reported an association between AGA and coronary artery disease (CAD), probably due to alterations in CAD risk factors. However, this association is not supported by other studies, thus rendering the subject open to discussion.

Methods: A total of 100 women were enrolled in this study: 50 diagnosed with AGA based on physical examination and 50 age-matched controls. BMI as well as serum total cholesterol, high-density lipoprotein (HDL-C), low-density lipoprotein (LDL-C), and triglyceride were measured.

Results: The mean BMI was 25.3±3.5 kg/m^2 in the AGA group and 24.2±3.4 kg/m^2 in the control group (P=0.11). The mean level of triglyceride, total cholesterol, HDL-C, and LDL-C in the AGA group was 141.7±55.4 mg/dl, 194.9±35.8 mg/dl, 41.1±12.3 mg/dl, and 129.7±32.6 mg/dl, respectively. These figures showed no significant difference in the control group (P=0.10)

Conclusion: It seems that a diagnosis of AGA in female patients is not linked to increased serum lipids.

Keywords: androgenetic alopecia, coronary artery disease, hyperlipidemia, male pattern baldness

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INTRODUCTION

Androgenetic alopecia (AGA) is a non-scarring alopecia affecting about 50 percent of adult men and women. In genetically susceptible individuals, androgens trigger shortening of the anagen phase which results in the hair follicle miniaturization and transition of the terminal hair to the vellus hair in the scalp [1-3]. In the last decades, the association between androgenetic alopecia and coronary artery disease (CAD) caught the attention of the researchers. Several studies have reported a relationship between androgenetic alopecia and CAD in men [4-9], while some other investigations failed to support this association [10-13]. A few studies have suggested that the association between androgenetic alopecia and CAD is related to the CAD risk factors [14,15]. Dyslipidemia is an established risk factor for CAD [16]. Arias-Santiago *et al.* reported that male and female patients with androgenetic alopecia had higher serum lipid levels than non-alopecic subjects [17]. However, this topic is less investigated in women. Mansouri *et al.* showed that female androgenetic alopecia was associated with CAD in women under the age of 55 [18]. Controversial reports have rendered the subject open to discussion. This study aimed to investigate the relationship between serum lipid levels and AGA in female patients.

PARTICIPANTS AND METHODS

This cross-sectional study included 100 female volunteers, 50 with androgenetic alopecia and

50 healthy controls, who were admitted to the Dermatology Clinic of Shohada and Loghman Hospitals, Tehran, Iran. Known cases of ischemic heart disease, diabetes mellitus, hypertension, hepatic or renal disorders, connective tissue disorders, thyroid disorders, or any inflammatory condition, as well as those treated with retinoids, thiazides, β receptor antagonists, cyclosporine, corticosteroids, and lipid lowering agents were excluded. Obesity, smoking and alcohol consumption also excluded the subjects. Androgenetic alopecia was diagnosed based on the history and physical examination performed by a dermatologist.

Demographic data were collected by interview and blood samples were obtained in an approved lab. The Technicon RA-1000 analyzer and Technicon enzymatic reagents were used to determine total cholesterol (TC), triglyceride (TG), and high-density lipoprotein (HDL-C). Low-density lipoprotein (LDL-C) was calculated as TC- [HDL-C + (TG/2.2)].

Statistical analyses were performed using the SPSS (SPSS Inc., Chicago, IL, USA) for Windows version 16.0 and the results were expressed as mean±SD. Data were compared using the Student's *t*-test and *P* values less than 0.05 were considered s statistically significant.

RESULTS

One hundred volunteers were enrolled in this study, 50 with androgenetic alopecia and 50 as control. The mean age of the participants was 44.6±13.3 years in the GA group and 40.3±14 years in the control group (*P*=0.11). BMI was calculated as weight/height^2 (kg/m^2). The mean BMI was 25.3±3.5 kg/m^2 in the AGA group and 24.2±3.4 kg/m^2 in the control group (*P*=0.11).

The results of lipid measurements are summarized in table 1. According to the results, there was no significant difference in serum lipid levels between the two groups.

The mean level of serum lipids in each age group is summarized in table 2.

DISCUSSION

In this study, the level of serum lipids was determined in 100 females; 50 with AGA and 50 control subjects. The two groups were similar with regards to age, BMI, smoking, and other factors affecting serum lipids such as the medication use. According to the results, we observed no significant difference in the levels of serum lipids between the two groups.

The relationship between alopecia and coronary artery disease has attracted attention since 1970s, if not earlier [19]. Several studies have shown an association between AGA and CAD in male patients [4-8]. Some studies have suggested that this association is secondary to CAD risk factors, such as serum lipids. They observed atherogenic serum lipid profile in patients with AGA [9,14,15]. However, some other studies failed to confirm an association between AGA and an increased incidence of coronary heart disease or CAD risk factors [10-13,20]. Moreover, there are few studies in

Table 1. Serum lipids levels in the participnts.

	Groups		*P* value
	AGA (n=50)	Control (n=50)	
Total cholesterol (mg/dl) mean±SD	194.9±35.8	185.4±44.3	0.24
Triglyceride (mg/dl) mean±SD	141.7±55.4	148±83.8	0.66
LDL-C* (mg/dl) mean±SD	129.7±32.6	120.5±25.6	0.12
HDL-C† (mg/dl) mean±SD	41.1±12.3	45.1±11.5	0.10

*LDL-C: low-density lipoprotein, †HDL-C: high-density lipoprotein

Table 2. Serum lipids levels in different age groups.

	Age groups				
	≤25 N=12	26-35 N=21	36-45 N=21	46-55 N=33	>55 N=13
Total cholesterol (mg/dl) mean±SD	166	172	188	201	218
Triglyceride (mg/dl) mean±SD	93	124	185	147	156
LDL-C* (mg/dl) mean±SD	114	126	129	123	133
HDL-C† (mg/dl) mean±SD	44	43	48	41	40

*LDL-C: low-density lipoprotein, †HDL-C: high-density lipoprotein

women in this regard. Mansouri *et al.* reported a higher incidence of CAD in women with AGA based on angiographic findings [18]. Arias *et al.* also observed a higher prevalence of dyslipidemia, metabolic syndrome, and atheromatous plaques in women with early-onset AGA [17,21]. Yi *et al.* reported an association between AGA and metabolic syndrome (including hypertriglyceridemia and low serum HDL-C) in female but not male patients with AGA [22]. Youssef et al. observed that female patients with AGA had higher levels of serum TC, TG, and LDL-C, a higher LDL/HDL-C ratio, and a lower level of serum HDL-C. They also observed a positive correlation between the duration and stage of AGA and common carotid artery intima-media thickness in women [23].

Regarding the above-mentioned studies, a positive association is suggested between early-onset AGA and coronary heart disease or CAD risk factors. However, these findings were not observed in other studies. The reports are also different regarding gender. Ellis *et al.* surveyed 1219 male patients aged 18-70 years and observed that both baldness and coronary risk factors increased with age. However, when adjusted for age, CAD risk factors were not different for baldness [12]. In a cross-sectional study, Shahar *et al.* examined 5056 men aged 52-75 years. They observed that neither baldness nor its pattern could predict the incidence of myocardial infarction. They also found no relationship between the baldness pattern and carotid intimal-medial thickness, a measure of atherosclerosis [13]. As mentioned earlier, we failed to show an association between AGA and levels of serum lipids in female patients. This discordance of the results may be attributed to study methods and subjects. Some studies have only included early-onset AGA, while our study subjects were 25 to more than 55 years old. It is also noteworthy that we excluded obese subjects and the mean BMI was 25.3±3.5 in AGA and 24.2±3.4 in control groups, which may have affected the level of serum lipids in our study subjects.

In total, whether androgenetic alopecia is associated with coronary heart disease and/or CAD risk factors is open to debate. More meticulous studies are required to prove or disprove this association.

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