

## Androgenic Alopecia and Subclinical Atherosclerosis: Is Any Relationship?

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### Abstract

**Background and Purpose:** Androgenic alopecia (AGA) is one of the common presenting problems in dermatology. Relationship between AGA and atherosclerosis/cardiovascular disorders has been surveyed in many studies with different results: some approved it and the others did not. The aim of this study was comparative survey of carotid intima – media thickness between cases with AGA and controls.

**Subjects and methods:** This case control study was conducted from August 2016 to March 2017 at ambulatory dermatology clinics of 2 university hospital, Tehran. The case group consisted of patients with androgenetic alopecia in the range of 18- 60 years. The controls were age and “bone mass index” matched friends and families. Individuals with cardiovascular risk factors/diseases were excluded. Carotid intima- media thickness (IMT) was measured at right common Carotid before bifurcation by a faculty radiologist. Data were analyzed in SPSS 22 software.

**Results:** Totally 94 individuals (47 cases, 47 controls) were studied. The case and control groups were matched regarding age and BMI. IMT in the case and control groups were  $0.56 \pm 0.15$  and  $0.55 \pm 0.14$  mm respectively ( $p=0.674$ ). IMT in the cases with vertex alopecia was significantly higher than frontal alopecia:  $0.61 \pm 0.14$  vs  $0.5 \pm 0.14$  ( $p=0.018$ ). Comparison of IMT between cases with vertex alopecia and the controls revealed are not significant difference.

**Conclusion:** This study showed no significant increase of IMT in androgenetic alopecia (especially vertex type) in comparison with the controls. Further studies are recommended.

**Keywords:** Androgenetic alopecia; Carotid intima-media thickness

### Subjects and Methods

### Introduction

Androgenetic alopecia (so called male pattern baldness) is one of the most common presenting problem at ambulatory dermatology clinics (40-50% of males at 4th or 5th decades) [1,2].

In the other hand, cardiovascular diseases is one of the most common cause of mortality and morbidity [3], so in addition to looking for more effective therapeutic management, surveying the methods for more appropriate and on time diagnosis of cardiovascular disease, has been a priority in the management of this group of diseases. Based on such strategy, diagnosis of subclinical atherosclerosis using measurement of carotid Intima Media Thickness (IMT) as an early form of the disease has been considered as a valuable method for approaching the problem [4].

In this issue, androgenetic alopecia, as a manifestation of androgenetic activity in the body, has been surveyed as a risk factor/ associated feature of clinical (ischemic heart disease) or subclinical (increased IMT) form of atherosclerosis [5-11]. Such relationship has been surveyed in many studies in which some studies approved the relationship [12-15], but the other did not [16-19]. So, according to these different paradoxical results, in this study, carotid IMT was studied in patients with androgenetic alopecia in comparison to the controls.

This case-control study was conducted from August 2016 to March 2017, at ambulatory dermatology clinics of Loghman and Shohada teaching hospitals, affiliated to Shahid Beheshti Medical University, Tehran, Iran. The case group consisted of the patients in the range of 18-60 years, presenting with androgenetic alopecia. The cases included consecutively. The controls were age and “bone mass index” matched males, selected from the cases' friends and families. Exclusion criteria consisted of: history of cardiovascular or cerebrovascular event, diabetes mellitus, hypertension, hyperlipidemia and smoking. Demographic variables and the data from past medical history were recorded. Degree of androgenetic alopecia was determined by a faculty dermatologist using Hamilton Norwood scale. Carotid intima-media thickness was measured at right common carotid artery, before bifurcation by a faculty radiologist. Mean of the 3 measurements was recorded. Data were analyzed using SPSS 22 software. Appropriate descriptive and analytical statistical tests (independent T test, ANOVA) were used.  $p$  value $<0.05$  was considered as significant level.

### Results

Totally 94 individuals (47 in the case and 47 in the control group) were studied. The age of the cases and controls were:  $41.7 \pm 9.04$  and  $41.6 \pm 7.18$  years, respectively ( $p=0.960$ ). Body mass index (BMI) in the cases and controls were  $26.02 \pm 3.15$  and  $25.7 \pm 4.7$  kg/m<sup>2</sup> respectively ( $p=0.754$ ). In the case and control groups, 55.4% and 51% were

overweight or obese ( $p=0.663$ ). In the cases: 19 (40.4%), 19 (40.4%) and 9 (19.1%) had frontal, mild to moderate vertex and severe vertex and androgenetic alopecia, respectively.

The Intima Media Thickness (IMT) in the case (androgenetic alopecia) and control groups were:  $0.56 \pm 0.15$  and  $0.55 \pm 0.14$  mm respectively ( $p=0.674$ ) (Figure 1). Among <40 years individuals, the IMT in the cases and controls were  $0.51 \pm 0.11$  and  $0.50 \pm 0.10$  mm respectively ( $p=0.840$ ). Also in overweight or obese individuals, the IMT in the case and control groups were  $0.58 \pm 0.15$  and  $0.57 \pm 0.12$  mm respectively ( $p=0.887$ ).



**Figure 1:** Comparison of intima-media thickness (IMT) between the case (androgenetic alopecia) and control groups ( $p=0.674$ ).

In the androgenetic alopecia (the case group), the IMT in the frontal, mild to moderate vertex and severe vortex alopecia were  $0.50 \pm 0.14$ ,  $0.60 \pm 0.12$  and  $0.64 \pm 0.14$  mm, respectively. Comparison of IMT between "frontal" and "vertex" type androgenetic alopecia in the case group, revealed significant difference:  $0.61 \pm 0.14$  mm in vertex versus  $0.5 \pm 0.14$  mm in frontal alopecia. ( $p=0.08$ ) (Figure 2).

## Discussion

This case-control study is one of the first studies surveying the relationship between androgenetic alopecia and carotid intima-media thickness in the country. Androgenic activity in the body (and androgenetic alopecia as a manifestation of such condition), has been surveyed as a probable risk factor/associated feature of atherosclerosis since recent years, and some evidences have been presented in this issue, as the studies of Ajayi et al and Herman et al which showed the effects of androgen on stimulation of platelet function and endothelial damage [20-21].

So surveying the relationship between androgenetic alopecia and cardiovascular diseases or subclinical atherosclerosis (intima-media thickness) has been considered in many researches.



**Figure 2:** Comparison of Intima-Media Thickness (IMT) between the two types of androgenetic alopecia ( $p=0.018$ ).

Comparison of IMT between the cases with moderate to severe vertex alopecia with the controls revealed higher measures of IMT in the vertex alopecia, but nonsignificant difference ( $p=0.108$ ).

In this study, the case (androgenetic alopecia) and control groups were matched regarding age and BMI, also known cardiovascular outcomes or risk factors were excluded from the both groups. This matching is an important feature of our study which has been not considered in some similar studies.

Based on our findings, although measures of IMT were higher in the case group than the control, but the difference between the groups was not statistically significant. Similar non-significant differences were

showed in comparison of IMT between the case and control groups among <40 years or obese individuals. In the case group, measures of IMT in vertex type androgenetic alopecia were significantly higher than frontal type:  $0.61 \pm 0.14$  mm versus  $0.5 \pm 0.14$  mm. ( $p=0.018$ )

Although the IMT was higher in vertex type androgenetic alopecia than the controls, but the difference was not significant. Comparison of IMT between the case and control groups, among obese or elder than 40 years individual showed similar non-significant results.

It should be considered that means of IMT in the both groups (alopecia and the controls) were in the normal range.

Review the similar studies regarding relationship between androgenetic alopecia and atherosclerosis revealed that in the most studies in which, like our study, individuals with cardiovascular risk factors or outcomes were excluded from the study, then the relationship was surveyed in such situation, the results were similar to our study, as there was not significant relationship between androgenetic alopecia and subclinical atherosclerosis (IMT) or cardiovascular diseases.

Like the study of Shahar et al in which surveying 5056 males in the age of 52-72 years, after excluding the cases with cardiovascular disease or risk factors, showed nonsignificant difference in IMT and MI between the males with and without androgenetic alopecia. In the study of Cook et al, 748 admitted males after excluding diabetes mellitus were studied. The results showed weak relationship between androgenetic alopecia and cardiovascular diseases [22].

In the study of Ben Halim et al, 65 males admitted because of myocardial infarction and the controls were studied. Exclusion criteria were diabetes mellitus and hypertension. The results, like our study, did not revealed significant relationship between androgenetic alopecia and MI [23]. Herrera and Lynch with surveying the data of a prospective 22 years study, showed that androgenetic alopecia is not associated with increased risk of coronary artery disease [24]. Also Herrera in a prospective 34 years study on 2017 males showed that after adjusting age and cardiovascular risk factors, there is not significant relationship between androgenetic alopecia and cardiovascular outcomes [25]. Ellis et al showed that male pattern baldness is not a cardiovascular risk factor in general population [18,26].

Comparison of our findings with above studies revealed that matching of cases and controls, also excluding cardiovascular risk factors/ diseases in our study indicates more distinct surveying the relationship between androgenetic alopecia and IMT without the effect of confounding factors.

In some studies like the study of Lotufo et al also Schnohr et al, a weak relationship (odds ratio: 1.2-1.4) was detected between androgenetic alopecia and coronary artery disease [11,27].

Some studies had different results; Lesko et al compared 665 post MI males with controls without excluding cardiovascular risk factors. The results showed that androgenetic alopecia, especially vertex type, is a risk factor for MI [5]. Also, Trieu and Eslick in a meta-analysis, surveyed 31 studies regarding the relationship between androgenetic alopecia and cardiovascular diseases, without focusing on exclusion of risk factors and matching of androgenetic alopecia group with the controls. The authors concluded that androgenetic alopecia is a risk factor with does response relation for cardiovascular diseases [12]. The studies of Miric et al and Robora et al showed similar results as Trieu and Eslick [9,10].

In the study of Dogramaci et al, like our study, the alopecia group and controls were matched and risk factors were excluded. The results were different from our findings; they showed higher IMT in androgenetic alopecia than the controls, while both IMT measures were in the normal range [13]. These different results may be related to genetic factors.

So, based on the findings of this study and comparison with similar studies, it seems that, although androgenic stimulation and androgenetic alopecia, can increase carotid intima-media thickness, but in the absence of other known cardiovascular risk factors, have not significant effect on subclinical atherosclerosis or cardiovascular disease.

Considering the important role of genetic factors in atherosclerosis, also different results of our study in comparison to some other studies, surveying of relationship between androgenetic alopecia and atherosclerosis/ cardiovascular diseases in the country was recommended.

Limitation of our study was relatively small size of cases.

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