A Study on Association between Androgenetic Alopecia and Cardiovascular Risk Factors in Males with History of Hair Fall

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ABSTRACT

BACKGROUND

Review of literature revealed that Androgenetic Alopecia (AGA) or Male Pattern Baldness (MPB) and Coronary Artery Disease (CAD) are closely associated. Few studies showed an increased incidence of certain factors such as family history of CAD, family history of baldness, hypertension, increased Body Mass Index (BMI), central obesity, hyperglycaemia, and dyslipidaemia in all men with MPB, which were considered as cardiovascular risk factors. Recently newer risk factors such as Serum Lipoprotein a (SL-a), serum homocysteine (SH), and serum adiponectin are reported. A meta-analysis study showed that vertex type of baldness is more commonly associated with CAD. We wanted to study the association between androgenetic alopecia and cardiovascular risk factors in male patients with history of hair fall and family history of coronary artery disease.

METHODS

This study was done among 136 men aged between 20 and 65 years with the history of hair fall and a family history of coronary artery disease. In all the subjects, blood pressure and pulse rate were recorded. Lipid profile and fasting blood sugar were done. Other parameters such as weight, height, BMI, waist circumference, and the pattern of baldness were documented.

RESULTS

In majority of the subjects, 42.6 % belonged to the age group of 45-65 years with mean age of 48.63 years. Vertex type of baldness was observed in 78 persons constituting 57.3%. Among the grades of baldness, Grade - IV, V, and VI baldness were observed in majority of the subjects in the age group of 31-40 years. 73.0 % of persons with vertex type had positive family history of baldness and family history suggestive of ischemic heart disease. All subjects with vertex type had more cardiovascular risk factors in comparison to none type such as total Cholesterol, low LDL, high VLDL, and TC/HDL more than 5 and diabetes. Hence vertex type may be considered as a marker for the evaluation of well-known cardiovascular risk factors.

CONCLUSIONS

All persons having history of hair fall and MPB especially vertex type should be evaluated for the well-known cardiovascular risk factors and should be advised to have periodical tests to be done to reduce the co-morbidity associated with increased cardiovascular risk factors.

KEY WORDS

Hair Loss, Androgenetic Alopecia, Male Pattern Baldness, Cardiovascular Risk Factors

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BACKGROUND

Androgenetic Alopecia (AGA) or Male Pattern Baldness (MPB) is a common feature of all men characterized by thinning of hair over the vertex and frontal areas of the scalp.¹ It may occur at any age after the onset of puberty ² affecting 30 to 40% of adult men.3 AGA is an androgen dependent condition and present with hair loss in different well defined patterns such as frontal type and vertex type.^{4,1} MPB is found to be associated with increased incidence of cardiovascular risk factors ⁵ especially vertex type of MPB.⁶ Certain factors such as family history of CAD, hypertension, central obesity, hyperglycaemia, dyslipidaemia and increased body mass index (BMI) were considered as cardiovascular risk factors and were reported to be involved in the occurrence of coronary artery disease in men with MPB 5. Among these age, hypertension, dyslipidaemia along with smoking were considered as classical coronary risk factors which influence both baldness and coronary artery disease suggesting that baldness can be considered as a marker of atherosclerosis.^{1,2} IHD was considered as a major cause of death and few studies revealed that MPB has been associated with an increased risk of CAD.7 A study by Justine et al showed that male pattern baldness is not associated with the established cardiovascular risk factors.

Hence this study has been done to elucidate the association between AGA and cardiovascular risk factors in male persons who attended the OPD of Dermatology with the history of hair fall and to counsel the persons to have periodical tests to reduce the sequelae of abnormal cardiovascular risk factors.

METHODS

A descriptive cross-sectional study was conducted among all the male persons who attended the OPD with the complaint of hair fall. The sample size was 136. All the subjects were in the age group of 25 to 65 years. A detailed family history of cardiovascular disease was enquired in all men with the history of hair fall. History of diabetes mellitus and hypertension was recorded. Height and weight were recorded using standard measuring tape in centimetres and digital weighing scale in kilograms respectively. Body Mass Index (BMI) was calculated using the formula (weight in Kg)/ (height in metre)² and were classified according to WHO classification. Waist circumference was measured at the level of the umbilicus with a measuring tape in centimetres and the value of more than 102 cm was considered to have an increased risk of of developing CAD subsequently. Using the standard sphygmomanometer, the blood pressure was recorded twice in sitting position and the lower reading of the two was documented. Those with systolic blood pressure of more than 140 mm of Hg and diastolic blood pressure of more than 90 mmHg were considered as hypertensive group.

Biochemical & Serological tests such as Fasting blood sugar levels, Serum Triglycerides (TG), Serum Total Cholesterol (TC), High Density Lipoproteins (HDL), Low Density Lipoproteins (LDL), and Very Low-Density

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Lipoproteins (VLDL) were done. All subjects with the blood sugar levels of more than 126 mg/dl were considered as having diabetes mellitus. All the subjects having TG levels of more than 100 mg/dl, TC levels of more than 200 mg/dl, HDL levels of less than 40 mg/dl LDL levels more than 100 mg/dl, and VLDL levels more than 100 mg/dl and TC to HDL ratio was calculated and those having a value of more than 5:1 were considered to be more prone for the development of ischemic heart disease.

All the subjects with the complaint of hair loss were categorized under different grades using Modified Hamilton Baldness Scale ^{4.} The different grades in this classification were Grade-I (no loss) to Grade-VII (severe vertex type) ^{4.} These grades were further simplified for the purpose of analyses into three grades such as none (Grade-I), Frontal only (Grade II and III) and Vertex (Grade III vertex, IV, V, VI, VII) according to the Hamilton Baldness Scale.^{2,7}

Statistical Analysis

Statistically the data was analysed using MS EXCEL and relevant statistical tests like standard error of difference between proportions (Z-test) was done and P value less than 0.05 was considered as statistically significant.

RESULTS

Age Distribution

Out of the study group of 136 males, majority (58 subjects) belonged to the age group of 46-56 yrs. constituting (42.6%), while 12.5% of subjects belong to the group of 26-35 yrs. The mean age of the study population was 48.63 years.

Sl. No.	Age (Yrs.)	n	%	
1	26-35	17	12.5	
2	36-45	23	16.9	
3	46-55	58	42.6	
4	56-65	38	27.9	
Т	otal	136	100.0	
Mean age = 48.63 years				
Table 1. Age Distribution of Subjects				

Distribution of Baldness Patterns

Among 136 males, 31 persons had no baldness (22.7%), 27 persons had frontal type of baldness (19.8%), and the rest of 78 persons had vertex type of baldness (57.3%). Majority of the subjects with baldness belongs to the grade IV baldness (18.3%). The distribution of hair loss in our study has been classified as none, frontal and vertex as per the studies done by Mohamed NE et al and Justine A ELLIS et al.

Baldness Group	Baldness Grades	n	%
None	I	31	22.7%
Frontal only	II	18	13.2%
FIGILATORIY	III	9	6.6%
	III Vertex	13	9.5%
	IV	25	18.3%
Vertex	V	18	13.2%
	VI	15	11.0%
	VII	7	5.1%
Total		136	100%
Table 2. Distribution of Baldness Patterns			

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Baldness and the Age of Onset

In our study, Grade II baldness was observed in majority between 31 and 40 years (61.1%). Grade III and Grade III vertex was observed between 41 and 50 years constituting 66.6% and 53.8% respectively. The results showed that Grades IV, V, and VI of baldness occurred in the age group of 31- 40 years in the maximum percentage of subjects whereas Grade VII baldness occurred much earlier in their first decade (11-20 years) constituting 57.1%.

	11-22 Yrs.	21-30 Yrs.	31-40 Yrs.	41-50 Yrs.	51-60 Yrs.
Grade II	-	-	61	35	4
Grade III	-	12	22	66	-
Grade III vertex	-	14	30	54	-
Grade IV	-	18	57	25	
Grade V	-	40	62	-	8
Grade VI	-	45	55	-	10
Grade VII	43	-	-	-	57
Table 3. Age at Onset versus Grading of Baldness					

Family History of, Baldness and IHD

In the present study the results showed that 73.0% of subjects with vertex type of baldness had a positive family history of both baldness and ischemic heart disease and 19.3% subjects of none type of baldness had a similar family history.

Pattern of MPB	Family History of Baldness & Ischemic Heart Disease n (%)	
None type l	6 (19.3%)	
Frontal	15 (55.5%)	
Vertex	57 (73.0%)	
Table 4. Pattern of Baldness, and Family History of Baldness & IHD		

	None Type	Frontal Type	Vertex Type	9	
Cardiovascular Risk	n=31	Only $n = 27$	n =78	р	
Factors	n (%)	n (%)	n (%)	-	
BMI (>24.9)	6 (19.3)	6 (22.2)	44 (56.4)	0.001	
BMI (<24.9)	25 (80.7)	21 (77.8)	34 (43.6)	0.001	
Waist circumference (>102)	2 (6.4)	2 (7.4)	25 (32.0)	0.002	
Waist circumference (<102)	29 (93.6)	25 (92.6)	53 (68.0)	0.002	
Triglycerides (>100 m/dl)	4 (12.9)	9 (33.3)	35 (44.8)	0.007	
Triglycerides (<100 m/dl)	27 (87.1)	18 (66.7)	43 (55.2)		
T. Cholesterol (>200 mg/dl)	1 (3.2)	2 (7.4)	21 (26.9)	0.004	
T. Cholesterol (<200 mg/dl)	30 (96.8)	25 (92.6)	57 (73.1)	0.004	
HDL (<40 mg/dl)	4 (12.9)	9 (33.3)	43 (55.1)	0.001	
HDL (>40 mg/dl)	27 (87.1)	18 (66.7)	35 (44.9)	0.001	
LDL (>100 mg/dl)	10 (32.2)	12 (44.4)	12 (44.4) 41 (52.5) 0.026		
LDL (<100 mg/dl)	21 (67.8)	15 (55.6)	27 (47.5)	0.020	
VLDL (<40 mg/dl)	6 (19.3)	11 (40.7)	44 (56.4)	0.002	
VLDL (>40 mg/dl)	25 (80.7)	16 (59.3)	34 (43.6)		
TC/HDL (>5.1)	1 (3.2)	4 (14.8)	27 (34.6)	0.001	
TC/HDL (<5.1)	30 (96.8)	23 (85.2)	51 (65.4)	0.001	
Presence of Diabetes	3 (9.6)	8 (29.6)	33 (42.3)	0.004	
Absence of Diabetes	28 (90.4)	19 (70.4)	45 (57.7)	0.004	
Presence of hypertension	4 (12.9)	6 (22.2)	21 (26.9)	0.200	
Absence of hypertension	27 (87.1)	21 (77.8)	57 (73.1)	0.289	
Table 5. Summary of Cardiovascular Risk Factors in Each					
Group of Baldness with Percentage in Parentheses					

Pattern of Baldness and Presence of Cardiovascular Risk Factors

The cardiovascular risk factors such as body mass index (BMI), Waist circumference, Triglycerides, Total Cholesterol, HDL, LDL, VLDL, TC/HDL, hyperglycaemia, and hypertension were recorded and analysed Table 5 describes the pattern of hair loss such as none type, frontal type and vertex type and the various cardiovascular risk factors. As depicted in the table all the risk factors are high among study subjects with vertex pattern type of baldness when compared to frontal baldness or with none type of baldness. Pre-obese or obesity

(BMI > 24.9) is 56.4% in vertex type of baldness as compared to 22% and 19% in frontal baldness and none type respectively. All the parameters of Lipid profile are elevated in vertex pattern of baldness as compared to other groups. Presence of diabetes and hypertension was also high among men with vertex pattern of baldness. This table also shows the number of cases along with percentage in parentheses that fall into risk category in each parameter.

DISCUSSION

In 1972 Cotton et al showed that Male Pattern Baldness and Cardiovascular disease were closely related.9 and MPB was considered as a risk factor for coronary artery disease. Along with MPB some more risk factors were reported such as hyperglycaemia, hypertension, increased BMI, and dyslipidaemia which were considered as cardiovascular risk factors. A case control study showed that hypertension has been associated with AGA and increased incidence of cardiovascular disease secondary to hyperinsulinaemia.10 Factors such as progressive baldness and the pattern of baldness from frontal to vertex were reported to be associated with the coronary artery disease.^{11,12} In our study majority of the subjects belong to the age group of 44-45 years which were not consistent with the previous results shown by Yamada T et al where younger age group of persons were reported to be associated with cardiovascular risk factors and early severe CAD.1 Our study observed that baldness increased in prevalence and severity with age. Similarly, elderly men had higher blood pressure, DM, body weight, and cholesterol. Thus, these two variables of increasing grade of baldness with increasing age and association of cardiovascular risk factors appears to be the reason for the strong correlation between the degree of baldness and cardiovascular risk factors in contradiction of the previous study.1

With reference to the pattern of baldness, our results showed statistically significant association of cardiovascular risk factors such high TG, high TC, low HDL, high LDL, high VLDL, TC/HDL ratio of more than 5 and DM (p < 0.05) with vertex baldness than frontal baldness which were in consistent with the previous studies.1,12,13. Whereas few other studies revealed association of hypertension in persons with alopecia.^{14,15,16,17} Our study revealed no significant association between hypertension and vertex baldness and thus differed with studies of Trevisan et al,18 and Lotufo et al.6 With increasing severity of vertex baldness from Grade-III vertex to Grade VII the percentage of subjects with cardiovascular risk factors was increased.1 Further in depth analysis of our data showed a less percentage of subjects with Grade-VI baldness had elevated levels of TG, LDL and elevated TC/HDL ration in comparison to those who had less severe grade of baldness. A detailed history of the group Grade VI disclosed that they had regular physical activity which may be attributed to the protection against the occurrence of CAD. In our study 73.0% of vertex type persons had positive family history of baldness and family history suggestive of ischemic heart disease and 19.3% of none type of baldness similar history which were also reported in previous studies.^{5,18} Higher BMI (>24.9) and waist circumference (>102 cms) were observed in the vertex group of our study and similar observation was reported in a previous study.²⁰ and a similar observation in younger men with moderate to severe baldness was reported by Gopinath and Upadya.²¹ Whereas in Vora et al there was no significant association of BMI and waist circumference with AGA.²²

CONCLUSIONS

Male Pattern Baldness may be considered as an early physiological marker for the evaluation of cardiovascular risk factors. This study also suggests that all the subjects with vertex type of androgenetic alopecia should be screened for cardiovascular risk factors such as hypertension, dyslipidemia and institute early hyperglycemia, and treatment which reduces the possibility of precipitation of coronary artery disease. All subjects with vertex type of baldness should be counseled to change their lifestyle as a prophylactic programme to reduce the associated cardiovascular risk factors. To establish the relationship between vertex type of MPB and cardiovascular risk factors with subsequent occurrence of coronary artery disease, and to explain the mechanism involved in the causation of AGA and CAD, further appropriate cross-sectional study on a large number of subjects is required.

REFERENCES

- [1] Yamada T, Hara K, Umematsu H, et al. Male pattern baldness and its association with coronary heart disease: a meta-analysis. BMJ Open 2013; 3:e002537.
- [2] Mohamed NE, Elkhazragy YA, Tawfeek NAE, et al. Early androgenetic alopecia as a predictor of ischemic heart disease. American Journal of Dermatology and Venereology 2015;4(2):18-25.
- [3] Olsen EA, Androgenetic alopecia. In: Olsen EA, edr. Disorders of hair growth: diagnosis and treatment. New York, NY: McGraw-Hill Publication 1994: p. 257-83.
- [4] Norwood OT. Male pattern baldness: classification and incidence. South Med J 1975; 68(11):1359-65.
- [5] Sharma L, Dubey A, Gupta PR, et al. Androgenetic alopecia and risk of coronary artery disease. Indian Dematol Online J 2013; 4(4):283-7.
- [6] Lotufo PA, Chae CU, Ajani UA, et al. Male pattern baldness and coronary heart disease: The Physicians' Health Study. Arch Intern Med 2000; 160(2):165-71.
- [7] Lopez AD, Mathers CD, Ezzati M, et al. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. The Lancet 2006; 367(9524):1747-57.

- [8] Ellis JA, Stebbing M, Harrap SB. Male pattern baldness is not associated with established cardiovascular risk factors in the general population. Clinical Science (Lond) 2001; 100(4):401-4.
- [9] Cotton SG, Nixon JM, Carpenter RG, et al. Factors discriminating men with coronary heart disease from healthy controls. Br Heart J 1972; 34(5):458-64.
- [10] Arias-Santiago S, Gutiérrez-Salmeron MT, Castello-Caballero L, et al. Male androgenic alopecia and cardiovascular risk factors: a case control study. Actas Dermosifiliogr 2010; 101(3):248-56.
- [11] Schnohr P, Lange P, Nyboe J, et al. Grey hair, baldness and wrinkles in relation to myocardial infarction: the Copenhagen City Heart Study. Am Heart J 1995; 130(5):1003-10.
- [12] Lesko SM, Rosenberg L, Shapiro S. A case-control study of baldness in relation to myocardial infarction in men. J Am Med Assoc 1993; 269(8):998-1003.
- [13] Scow DT, Nolte RS, Shaughnessy AF. Medical treatments for balding in men. Am Fam Physician 1999; 59(8):2189-94.
- [14] Hirsso P, Rajala U, Hiltunen L, et al. Obesity and lowgrade inflammation among young Finnish men with early onset alopecia. Dermatology 2007; 214(2):125-9.
- [15] Hirsso PI, Laakso M, Matilainen V, et al. Association of insulin resistance linked diseases and hair loss in elderly men. Finnish population based study. Cent Eur J Public Health 2006; 14(2):78-81.
- [16] El-Esawy FM, Abd El-Rahman SH. Androgenetic alopecia as an early marker for hypertension. Egyptian Journal of Dermatology and Venereology 2013; 33(2):63-6.
- [17] Ahouansou S, Le Toumelin P, Crickx B, et al. Association of androgenetic alopecia & hypertension. Eur J Dermatol 2007; 17(3):220-2.
- [18] Trevisan M, Farinaro E, Krogh V, et al. Baldness and coronary heart disease risk factors. J Clin Epidemiol 1993; 46(10):1213-8.
- [19] Ford ES, Freedman DS, Byers T. Baldness and ischemic heart disease in a national sample of men. Am J Epidemiol 1996; 143(7):651-7.
- [20] Lau K, Hoger PH. Skin diseases associated with obesity in children. Bund Gesum G J 2013; 56(4):539-42.
- [21] Gopinath H, Upadya GM. Metabolic syndrome in androgenic alopecia. Indian J Dermatol Venereol Leprol 2016; 82(4):404-8.
- [22] Vora RV, Kota RKSK, Singhal RR, et al. Clinical profile of androgenic alopecia and its association with cardiovascular risk factors. Indian J Dermotol 2019; 64(1):19-22.