

Metabolic Syndrome in the Spectrum of Hair Grayness

Hayder R. Al-Hamamy *

Sabeeh Al-Mashhadani*

Husam A. Salman*

Zaid F. Abdullah**

MBChB, PhD, DDV ,CABD

MBChB ,MSc

MBChB ,FIBMS

MBChB

Summary:

Background: hair graying is an aging sign; it is associated with ischemic heart disease. Metabolic syndrome often associates with increased risk for atherosclerotic arterial disease.

Objective: To test retrospectively the association between onset of hair graying and risk of metabolic syndrome.

Methods: Four hundred and eighty one gray hair individuals, with no history of atherosclerotic diseases were included. The individuals have been divided into metabolic syndrome and control groups. Each individual was asked about the decade (2nd-6th) of onset of hair grayness.

Results: Patients with metabolic syndrome had peak onset of hair grayness in the 4th decade which was statistically higher than the control group (p values= 0.045). While the peak onset in the control group was in the 5th decade which was different from the metabolic syndrome group (p-value = 0.024). The difference was not significant in the 2nd, 3rd and 6th decades of life.

Conclusion: Patients with metabolic syndrome had an earlier age of onset of hair grayness.

Keywords: hair grayness, metabolic syndrome.

Fac Med Baghdad
2012; Vol.54, No. 2
Received Dec 2011
Accepted Apr. 2012

Introduction:

Graying of hair is usually a manifestation of the natural aging process and is thought to be due to progressive depletion in functioning follicular melanocytes (1). The timeframe of normal canities is different. In Caucasian populations, the age of onset was found to be 34.2 ± 9.6 years. In African Americans, onset is shifted to slightly later in life at 43.9 ± 10.3 years, whereas the late 30's are the rule for Asians (2). Onset is defined as premature when graying starts before 20 in Caucasian, 25 in Asian, and 30 in Negro (3, 4) Graying process may be understood as an easily accessible and quite obvious indicator of the overall oxidative stress and antioxidant capacity (5). The term metabolic syndrome was applied to the clustering of risk factors that often associate with increased risk for atherosclerotic cardiovascular disease (6). One advantage of identifying this particular cluster of risk factors is that it should bring together the fields of cardiovascular disease and diabetes for a concerted and unified effort to reduce risk for both conditions simultaneously (7). In 2001, the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) introduced the metabolic syndrome as a risk factor (8,9), it is an attempt to represent the main pathophysiologic processes; visceral obesity, dyslipidemia,

insulin resistance, and essential hypertension (10) .

Patients and methods:

A total number of 481 individuals with gray hair were participated in the study. They were recruited from the medical and surgical wards and the Department of Dermatology of Baghdad Teaching Hospital. The following patients were excluded from the study; those who were diagnosed of having ischemic heart disease because of the suspected modification of metabolic syndrome criteria by therapies and/or by changing life style and those with other known atherosclerotic diseases like strokes or peripheral vascular ischemia. According to the Adult Treatment Panel III (ATP III) criteria (8, 9) of metabolic syndrome, those who met at least 3 criteria were included in a group called metabolic syndrome group. These criteria are fasting plasma glucose ≥ 100 mg/dl, waist circumference ≥ 102 cm for men and 88 cm for women, triglycerides ≥ 150 mg/dl, high density lipoprotein < 40 mg/dl in men and < 50 in women and blood pressure $\geq 130/85$ mmHg During interrogation of each patient, the blood pressure and waist circumference were measured and one more of the three biochemical tests (high density lipoproteins, serum triglycerides and fasting blood sugar) were done in a 12 hour fasting state in the next morning, to complete at least three positive criteria. Investigations were done in the Teaching Laboratories of Medical City. Those who fail to meet at least three criteria

* Department of Dermatology and Venereology, College of Medicine, University of Baghdad.

** Department of Dermatology & Venereology, Baghdad Teaching Hospital, Medical City.

were included in a sex and age-matched control group. Each individual whether in the metabolic syndrome or control group was asked at a later point in the interrogation one particular question "At which decade of life did you firstly notice that you have gray hair?" Statistical analysis was made by comparing the data in terms of Chi square. P value of less than 0.05 was considered significant.

Results:

A total of 232 individuals met the Adult Treatment Panel III of metabolic syndrome. Those who failed to meet at least 3 criteria were 249; they were assigned as a control group. Age and sex are elucidated in table-1. The decade of onset of hair graying was shown in table-2. The difference was significant in the 4th and 5th decades (p value was 0.045 and 0.0243 respectively). Table-3.

Table-1: Ages and sex distribution of gray hair individuals in both metabolic syndrome and control groups

Group	Total No.	Age			Sex	
		Range	Mean	SD	Male	Female
Metabolic syndrome	232	46-61	53.3	5.612	138	94
Control	249	45-63	52.6	6.692	150	99

Table-2: The decade of onset of hair grayness in the metabolic syndrome and control groups.

Decades	No. of Control	%		No. of Metabolic Syndrome	%	
<20	7	2.81%	2.811%	10	4.31%	4.31%
20-29	40	16.06%	18.88%	47	20.26%	24.57%
30-39	72	28.92%	47.79%	87	37.50%	62.07%
40-49	118	47.39%	95.18%	84	36.21%	98.28%
≥50	12	4.82%	100.0%	4	1.72%	100.0%
sum	249	100.00%		232	100.00%	

Table-3: Chi square(X^2) and P value for each decade.

Decades	X^2	p value
<20	0.79	0.3736
20-29	1.43	0.2324
30-39	4.00	0.0455
40-49	5.07	0.0243
≥50	3.58	0.0586

Discussion:

Metabolic syndrome is a concept established to comprehend the culprit cardiometabolic risk factors which are thought to play major roles in the development of atheroma. The effect of oxidative stress is a common hypothesis that considered in literatures reviewing the pathogenesis of three different entities, metabolic syndrome, hair graying and myocardial infarction. The association between myocardial infarction and hair graying was tested in previous studies (6, 11, 12), and the association between metabolic syndrome and oxidative stress was also tested (13). However the association between metabolic syndrome and hair graying is being tested for the first time in this study. Patients with metabolic syndrome had a peak onset of hair grayness in the 4th decade with significant difference compared with the control group, p values was

0.045. While the control group has peak onset in the 5th decade with significant difference compared with metabolic syndrome group (p-value = 0.024). This means that patients with metabolic syndrome had significantly earlier onset of hair graying than the control group. In agreement with our results a previous Iraqi study was conducted on 60 patients with premature grayness of hair in comparison to 60 healthy individuals, Sharquie et al found for the first time a correlation between premature hair graying and dyslipidemia and glucose intolerance. The level of high-density lipoprotein-cholesterol was significantly lower in patients with premature grayness of hair compared to control (14). In another Iraqi study, Sharquie et al confirmed the correlation between premature hair graying and oxidative stress markers that can play a pivotal role in the aging process (15). This might explain the association found

in the present study between graying and metabolic syndrome, which was previously found to be associated with higher oxidative stress markers (16). Two studies in 1957 and 1978 investigated the association between hair graying and ischemic heart disease, they showed a positive correlation between them (11, 12). Also a 12 year-prospective study tested in 1995 the possible relation between aging signs (such as graying of the hair, baldness, and facial wrinkling) in 750 cases of myocardial infarction in different decades of life (6) and found a significant correlation between graying of hair and baldness and the risk of myocardial infarction in men but not women.

Conclusion:

A correlation between the onset of hair graying, and the incidence of cardiometabolic risk factors known collectively as metabolic syndrome has been demonstrated. People with 182. metabolic syndrome are more likely to have earlier hair graying.

References:

1. Kligman AM. Pathologic dynamics of human hair loss. *Arch Dermatol* 1961; 83:175-
2. Price VH. Treatment of hair loss. *N Engl J Med.* 1999; 341:964-973.
3. Keogh EV, Walsh RJ. Rate of graying of human hair. *Nature* 1965; 207:877-878.
4. Tobin DJ, Paus R. Graying: Gerontobiology of the hair follicle pigmentary unit. *Exp Gerontol* 2001; 36:29-54.
5. Lu CY, Lee HC, Fahn HJ, Wei YH. Oxidative damage elicited by imbalance of free radical scavenging enzymes is associated with large-scale mtDNA deletions in aging human skin. *Mutat. Res* 1999; 423: 11-21.
6. Schnohr P, Lange P, Nyboe J, Appleyard M, Jensen G. Gray hair, baldness, and wrinkles in relation to myocardial infarction: the Copenhagen City Heart Study. *Am Heart J* 1995; 130:100.
7. Diabetes mellitus: a major risk factor for cardiovascular disease. A joint editorial statement by the American Diabetes Association; The National Heart, Lung, and Blood Institute; The Juvenile Diabetes Foundation International; The National Institute of Diabetes and Digestive and Kidney Diseases; and The American Heart Association. *Circulation* 1999; 100:1132-3.
8. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. 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.
9. National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). 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) final report. *Circulation* 2002; 106:3143-421.
10. Illian L, Lien F, Guyton JR. Metabolic syndrome. *Dermatologic Therapy* 2008; 21:362-375.
11. Leban J, Dnboucher G, Claude E. Affections cardioarterielles et canities precoce. *Algerie Med* 1957; 61:871-6.
12. Gould L, Reddy CVR, Oh KC, Kim SG, Becker W. Premature hair graying: a probable coronary risk factor. *Angiology* 1978; 29:800-3.
13. Ando K, Fujita T. Metabolic syndrome and oxidative stress. *Free Radical Biology & Medicine*
14. Sharquie KE, Al-Bayati AA, Al-Hussaini AA, Al-Hilo MM. Glycosylated hemoglobin and lipoproteins in patients with premature hair grayness. *Saudi Med J* 2002; 23(10):1257-1260.
15. Sharquie KE, Turki KM, Abu-Raghef AR, Al-Geboori HG. Oxidative stress in patients with premature hair grayness. *Saudi Med J* 2005; 8:1310-1.
16. Ando K, Fujita T. Metabolic syndrome and oxidative stress. *Free Radical Biology & Medicine* 2009; 47:213-18.