

# The Genetic Association between Baldness, Coronary Heart Diseases and ABO Blood Group System in Men in Baqubah City- Diyala Province in Iraq

Ali Ibrahim Ali Al-Ezzy

Department of Pathology, College of Veterinary Medicine, Diyala University, Iraq  
Corresponding author: [alizziibrahom@gmail.com](mailto:alizziibrahom@gmail.com)

S. H. Al-Samarrae

Department of Veterinary Public Health, College of Veterinary Medicine, Diyala University, Iraq  
[asamerhussein@yahoo.com](mailto:asamerhussein@yahoo.com)

## Abstract

**Background and objectives:** Coronary heart disease (CHD) is a major cause of death and disability worldwide. This study designed to determine the correlation of ABO histo-blood groups with baldness and susceptibility to cardiac diseases in Baqubah city, Diyala province in Iraq. **Patients and methods:** In this cross sectional, hospital based case control study, 68 male were enrolled. Group (A) include 34 males with CHD, ages ranged (45 – 55) year old. Group (B), include 34 healthy males, age range (45 – 55) years old. Coronary artery diseases diagnosis based on laboratory investigation of complete lipid profile analysis (LDL, triglyceride, HDL), Echocardiography and history of cardiac catheterization. ABO Histo-blood groups determined using commercial kits. **Results:** In healthy men, the ratio of individuals with normal hair to bald one was 1:1. Regarding to patients group, 32% of CHD patient with normal hair and 68% bald with statistical significant difference ( $p \geq 0.01$ ). The frequency distribution of blood group type O between healthy people and CHD patients was 50% and 62%, respectively, and the difference was statistically significant ( $p \geq 0.05$ ). The frequency of histo-blood group of B type within bald healthy group was more than that reported in patients with normal hair. On the contrary, the frequency of histo-blood group of O type reported among patient with normal hair than bald CHD with statistical significant difference ( $p \geq 0.05$ ). **Conclusion:** people with hereditary baldness may have a predisposition to heart disease compared with people with natural hair. Blood groups distribution may affect indirectly on rates of heart disease difference

**Keywords:** Coronary heart disease; ABO blood group; Baldness, Iraq

## Introduction:

Coronary heart disease (CHD) is a major cause of death and disability worldwide [1]. Advanced obstructive CHD can exist in patients with minimal or no symptoms and can progress rapidly [2], also early detection is extremely important. Many clinicians carry out screening for a symptomatic CHD and participants in well-being programmes often also request such screening, but the usefulness of CHD screening has yet to be confirmed [1]. Male pattern baldness, also called androgenetic alopecia (AGA), is the most common cause of hair loss [3]. It affects approximately 30–40% of adult men and is seen in 80% of men by the age of 80 years [1]. AGA is considered to be a heritable, androgen-dependent condition that is characterized by varying degrees of thinning/hair loss primarily at the vertex and the frontal areas (temples) of the scalp [4].

The ABO System classifies blood into four possible blood types, A, B, AB and O [5]. A person with blood group A has upon the surface of his erythrocytes a protein named Antigen-A, a person with blood group B has a protein named Antigen-B, a person with blood group AB has Antigen-A and Antigen-B, and a person with blood group O has neither Antigen-A, nor Antigen-B [6]. The blood plasma might contain one, both or none of the antibodies Anti-A and Anti-B. Corresponding antibodies and antigens are never found in the blood of the same individual. As an example, group A blood will never contain Anti-A. The combination of the antigens and the anti-bodies is genetically determined [7]. The antigens are present at birth, whereas the antibodies develop during the first year of your life. Landsteiner's discovery caused extensive investigations, and a large number of other blood type systems were discovered, among which the Rhesus System described in 1940 is the most important [5].

Human blood group antigens are glycoproteins and glycolipids expressed on the surface of red blood cells and a variety of human tissues, including epithelium, sensory neurons, platelets, and vascular endothelium [8]. It has long been acknowledged that human ABO blood type might affect the risk factors of cardiovascular disease. In non-O individuals, plasma levels of factor VIII–von Willebrand factor (vWF) complex are  $\approx 25\%$  higher than group O individuals [9]. Accumulating evidence indicates that elevated factor VIII–vWF levels are a risk factor for coronary heart disease (CHD) [10]. Other studies also indicate that ABO blood group might influence plasma lipid level. Several genome-wide association studies found that variants at ABO locus

were associated with plasma lipid levels[11]and inflammatory markers, including soluble intercellular adhesion molecule [12] plasma soluble E-selectin levels[11,12 and P-selectin levels,10 and tumor necrosis factor- $\alpha$ , which were markers of inflammation associated with the CHD risk[8].

No previous study for the possible correlation between ABO histo-blood group system, Baldness and CHD in Iraq so, this study designed to determine the correlation of ABO histo-blood groups with baldness and susceptibility to CHD in Baqubah city, Diyala province in Iraq.

## Materials and Methods:

### Selection of patients and control:

In this cross sectional, hospital based case control study, 34 male were enrolled according to inclusion criteria: having coronary artery diseases; have any grade of androgenic alopecia ;the proportion of baldness in the head, each person has a ratio of baldness more than 30% was considered a bald man, and the remainder as haired men. Control group consist of 34 apparently healthy, Bald or normal hair males .Ethics committee of Diyala University, college of medicine, approved the present study. At first the aim of study was explained for all participants and after obtaining their oral consent they have been studied.

According to inclusion criteria, they divided to two groups: group (A) include 34 males admitted to Baqubah teaching hospital, their ages ranged ( 45 – 55) year old. Group (B), include 34 healthy males, age range (45 – 55) years old.

**Coronary artery diseases diagnosis:** based on laboratory investigation of complete lipid profile analysis (LDL, triglyceride, HDL),Echocardiography and history of cardiac catheterization .

### Determination of Histo-blood group:

Three ml of blood was taken via cubital venipuncture and kept in EDTA tubes. ABO RhD Blood grouping Kit starts with a sample applied to the sample well and add provided sample diluent later. The monoclonal anti-A anti-B anti-D immobilized respectively on the pad in sample region can react with the corresponding antigen on the surface of the Red blood cells (RBC). A positive sample produces an immune response, and the RBC can be captured on the sample region as a red signal, indicates that the test is positive. A negative sample does not produce an immune response, after adding sample diluents, the RBC can be washed away, and the absence of the RBC indicates that the test is negative.[13]

## Results and Discussion

In healthy Men as shows in table (1 ), the ratio of haired men to bald one was 1:1, i.e. 50% of men population are bald in Baqubah city. In people with heart disease , (11man with normal hair and 23man bald) so we find that 32% patient haired and 68% bald, compared with the healthy group ,there was increased proportion of people of baldness with significant difference ( $p \geq 0.01$ ). This give an indication that the bald people have a chance to affected by CHD more than counterparts normal hair. These results come in accordance with other reports[14] , find that men who had lost the majority of their hair had a 32% increased risk of developing coronary artery disease, compared to their peers who maintained a full head of hair. Also agree with A meta-analysis of observational studies comprising a total of 36,690 participants showed that vertex baldness is associated with an increased risk of CHD with the relationship depending on the severity of baldness while frontal baldness is not [14]. Other find that balding men had a 70% higher risk of having heart disease, while those in younger age groups had a 84% elevated chance[14]. Figure (1) show this demonstration clearly

In table (2) and figure(2),frequency distribution of blood groups between patients and control ,the two groups of individuals was mostly close and there is no significant difference between the frequencies, but the main difference was in the frequency of blood group type O, the frequency distribution of blood group type O between healthy people and CHD patients, 50% and 62%, respectively, and the difference was statistically significant ( $p \geq 0.05$ ) .This corresponds with several studies suggest that people who have their blood type O people are less adaptable to the environment and be more susceptible to various diseases including CHD compared with A,B,AB types [8, 15].

In table (3) the frequency blood groups A, B, AB, and O in patients with natural hair 18%, 27%, 0%, and 55%, compared with 22%, 13%, 0%, and 65% balding patients respectively. These differences possibly because of limited number of participant and it do not have a significant difference statistically between these results. In population which is shown in table(4) , blood groups type A, B, AB, and O within haired patient were 23.5%, 6%, 11.5%, and 59%, compared with blood group of bald patient; 29.5%, 29.5%, 0%, and 41% respectively. We conclude from these results that histo-blood group of B type distributed more frequently among bald patients compared with patients with normal hair. On the contrary, histo-blood group of O type distributed more frequently among CAD patient with normal hair in comparison to CAD balding group and the results were statistically significant, ( $p \geq 0.05$ ).

This study concludes that people with hereditary baldness may have a predisposition to heart disease than people with natural hair. On the other hand, blood types distribution may affect indirectly on rates of CHD difference

**Table (1) :Distribution of bald proportion between healthy and CHD patients**

status	Normal hair	Bald	Total
	No.(%)	No.(%)	No.(%)
Healthy	17(50%)	17(50%)	34(100%)
Diseased	11(32%)	23(68%)	34(100%)
Total	28	40	68

**Table (2): Distribution of blood groups among healthy and CHD patients**

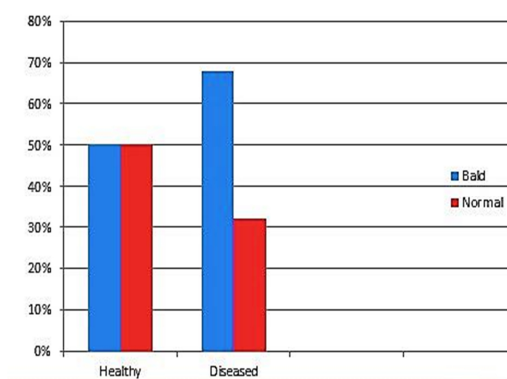
Blood group	Normal	Diseased
	No.(%)	No.(%)
A	9(26.5%)	7(20.5%)
B	6(17.5%)	6(17.5%)
AB	2(6%)	0(0%)
O	17(50%)	21(62%)
Total	34(100%)	34(100%)

**Table (3):Distribution of blood groups for bald and normal hair CHD patients**

Blood group	Normal hair	Bald
	No.(%)	No.(%)
A	2(18%)	15(22%)
B	3(27%)	3(13%)
AB	0(0%)	0(0%)
O	6(55%)	15(65%)
Total	11(100%)	23(100%)

**Table (4): Distribution of blood groups for bald and normal hair people in healthy group**

Blood group	Normal hair	Bald
	No.(%)	No.(%)
A	4(23.5%)	5(29.5%)
B	1(6%)	5(29.5%)
AB	2(11.5%)	0(0%)
O	10(59%)	7(41%)
Total	17(100%)	17(100%)



**Figure (1):The distribution of bald proportion among CHD patients and healthy group**

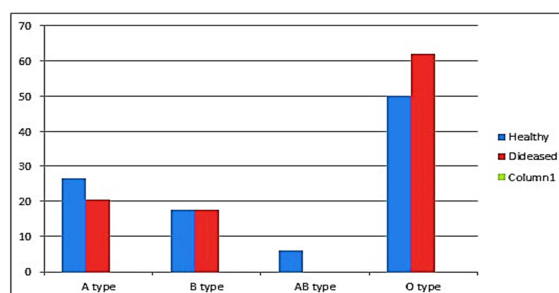


Figure (2):The Differences in distribution of blood groups among CHD patients and healthy group

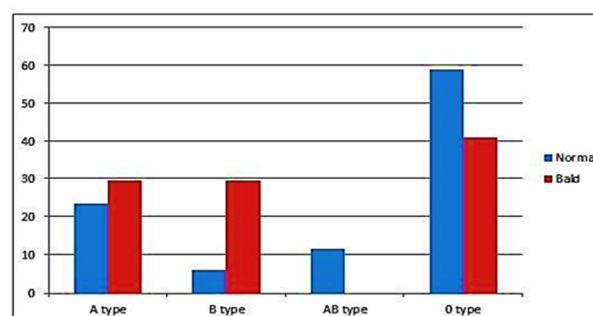


Figure (3) The distribution of blood types among bald and normal hair people within healthy group

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