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The genetic association between baldness and cardiac diseases and with ABO blood group system In Man in Baquba City

Summary

1- 68 male individuals were studied in our survey, a- 34 a person with heart disease and treated at the General Hospital of Baquba city. b- Another group of men included in this survey consist of 34 individuals, and they are healthy. Those two groups were divided according to 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. All the two groups of individual have been diagnosed with blood groups A, B, AB, and O types.

In healthy Men as shows in table 1 the ratio of haired men to those bald one is 1:1, (17 individual haired and the others 17^{th} bald) so we can say that 50% of Man population are bald in Baquba city. we find that 32% patient haired and 68% bald, compared with the healthy group see an increase in the proportion of people of baldness and the result was significant from a statistical standpoint, ($p \geq 0.01$). This clearly indicates that the people of baldness chance to matter more than their counterparts with normal hair in order to become affected with heart disease.

The frequency distribution of blood group type O between *healthy* people and patients who suffer from heart disease, 50% and 62%, respectively, and the difference was statistically significant ($p \geq 0.05$).

With in healthy group; bald people with blood group B more than it is in the patients with normal hair. On the contrary, the patient with normal hair has more blood group type O than it exists more than in the balding group and the results were statistically significant, ($p \geq 0.05$).

Introduction and literature review

Blood groups are genetically determined. In different population exhibits significant differences in the frequency of each blood group

The ABO blood group system is the most important blood type system (or blood group system) in human blood transfusion. The associated anti-A antibodies and anti-B antibodies are usually IgM antibodies, which are usually produced in the first years of life by sensitization to environmental substances such as food, bacteria and viruses. ABO blood types are also present in some animals, for example apes such as chimpanzees, bonobos, and gorillas.

Ludwik Hirszfeld and E. von Dungem discovered the heritability of ABO blood groups in 1910, with Felix Bernstein demonstrating the correct blood group inheritance pattern of multiple alleles at one locus in 1924. Watkins and Morgan, in England, discovered that the ABO epitopes were conferred by sugars, specifically N-acetylgalactosamine for the A-type and galactose for the B-type. After much published literature claiming that the ABH substances were all attached to glycosphingolipids, Athreya and Coriell. [1] found that the band 3 protein expressed a long polylactosamine chain which contained the major portion of the ABH substances attached. Later, Yamamoto's group showed the precise glycosyl transferase set that confers the A, B and O epitopes.

The H antigen is an essential precursor to the ABO blood group antigens. The H locus is located on chromosome 19. It contains 3 exons that span more than 5 kb of genomic DNA, and it encodes a fucosvltransferase that produces the H antigen on RBCs. The H antigen is a carbohydrate sequence with carbohydrates linked mainly to protein (with a minor fraction attached to ceramide moiety). It consists of a chain of β -D-galactose, β-D-N-acetylglucosamine, β -D-galactose, and 2-linked, a-L-fucose, the chain being attached to the protein or ceramide[2] .

The ABO system consist of the A,B and H carbohydrate antigens synthesized by a serried of enzymatic reaction catalyzed by glycosyltransferase and antibodies against these antigens. The A, B and O genes are at the same genetic locus on chromosome 9 at q34, and the A and B alleles are co_ dominant against the recessive O allele [3] .Several point mutation on the A gene have been described. They cause a number of amino acid changes and alter the glycosyltransferase from A to B. Single guanine deletions at position 261 on the ABO gene resulting truncated, enzymatically inactive O protein (referred to asO^1) . Another O allele (O^2), which lacks this deletion, has been identified. A commonly occurring variant of the O^1 gene, $O^{1\ vanant}$ has also been reported [4].

The combination of these alleles offers several genotypes, which result in four phenotypes, but the alleles have now been shown to be highly polymorphic [5-6].

The importance of ABO histo-blood groups is supported by the observation that their geographical distribution varies significantly, suggesting that positive selective factors may have influenced gene spread [7].

Lell, et al.[8] mentioned a relationship between erythrocytic antigens of the ABO and Rh blood systems and cardiovascular pathology was revealed by comparing the distribution of blood groups in 13,175 patients and 7,800 donors. Prevalence of A gene and Rh+ phenotype in congenital and acquired heart diseases and ischemic heart disease was found. The frequency of B gene is increased in patients with acquired heart diseases.

Camargo, et al. [9] find in a series of male survivors of ischaemic heart disease there were fewer patients belonging to the risk-factor blood group (group A) before than after age 55 who were either non-infarction patients in light work or infarction patients in active or heavy work. Conversely, there were more A's before than after age 55 who were either non-infarction patients in active or heavy work or infarction patients in light work.

Hair loss or baldness (technically known as alopecia) is a loss of hair from the head or body. Baldness can refer to general hair loss or male pattern baldness specifically. Some types of baldness can be caused by alopecia areata, an autoimmune disorder. The extreme forms of alopecia areata are alopecia totalis, which involves the loss of all head hair, and alopecia universalis, which involves the loss of all hair from the head and the body.

Baldness can have many causes, including fungal infection (tinea capitis), traumatic damage, such as by compulsive pulling (trichotillomania), as a result of radiotherapy or chemotherapy, and as a result of nutritional deficiencies such as iron, and as a result of autoimmune phenomena, includingalopecia areata and hair loss associated with systemic lupus erythematosus.

The possible relation between balding and coronary heart disease has attracted interest since the 1960s , if not earlier. At least 10 studies have addressed the topic, some of which were pioneering, preliminary research, whereas others have met contemporary standards for epidemiologic studies [10].

Unfortunately, that small body of literature has generated inconsistent findings, and the titles of recent reviews reflect the controversy. The following questions, in particular, await empirical answers:1) Is any baldness, regardless of pattern, meaningfully associated with myocardial infarction (MI) or atherosclerotic burden? Are frontal baldness and vertex baldness equivalent in that respect? Does the extent of vertex baldness matter?

In 1993, Lesko et al. published results from a large, hospital-based, case- control study of male pattern baldness and myocardial infarction. Vertex baldness, but not frontal baldness alone, was strongly associated with MI in a monotonic “dose-response” fashion: the greater the extent of vertex baldness, the greater the risk of MI. We attempted to replicate those findings in a cross- sectional sample, derived from a population-based cohort. We also extended the question to address the relation between baldness pattern and carotid intimal- medial thickness, a measure of the systemic burden of atherosclerosis studies [11-12].

Prevalent myocardial infarction

Prevalent MI at the time of the fourth examination of the cohort was defined as self-reported history of physician-diagnosed MI, silent MI by electrocardiography, or hospitalized MI since the baseline examination, ascertained by the study surveillance system studies [13].

Intimal-medial thickness of the carotid arteries:

The intimal-medial thickness (IMT) of the extra cranial carotid arteries was measured according to published methods studies [14-15]. In brief, trained technicians scanned the arteries on each side of the neck by high-resolution B-mode ultrasound and videotaped, from fixed angles, three 1-cm segments: the common carotid artery (proximal to the dilation of the carotid bulb), the bifurcation (proximal to the flow divider), and the internal carotid artery (distal to the flow divider). Using magnified images, trained readers later identified two arterial boundaries (intima-blood; media-adventitia) and measured the intimal-medial thickness at each segment. Missing values from no visualized sites were replaced by imputed values studies [16] . We modeled the average thickness of the far wall of six arterial segments (three segments on each side x 2), as measured during the fourth cohort examination.

Other variables:

To replicate the analysis of Lesko et al., we tried to select similarly defined covariates, when available from interviews or physical measurements. With few exceptions, specified below, covariates were measured during the fourth examination (at which the baldness pattern was classified). Smoking status was classified as current smoker, former smoker, or never smoker. Family history of MI was defined as self-reported maternal or paternal history of MI (baseline examination). Use of low density lipoprotein cholesterol-lowering and ant hypertension medications was determined from self-reported information or medication bottles. Educational level was classified into three categories (baseline examination): less than high school, high school graduate, and education beyond high school.

Prevalent diabetes mellitus was defined as non fasting glucose of >200 mg/dl, fasting glucose of >126 mg/dl, a history of diabetes, or pharmacologic treatment of diabetes. The concentration of high density lipoprotein cholesterol was measured . [17]. Cardiovascular disease-free men Shoud have had neither Coronary heart diseases nor stroke

A case of mid-frontal baldness: Andre Agassi :

Symptoms of alopecia include hair loss in patches usually in circular patterns, dandruff, skin lesions, and scarring. Alopecia areata (mild - medium level) usually shows in unusual hair loss areas e.g. eyebrows, backside of the head or above the ears where usually the male pattern baldness does not effect. In male- pattern hair loss, loss and thinning begin at the temples and the crown and either thins out or falls out. Female-pattern hair loss occurs at the frontal and parietal.

Excessive daily hair loss :

People have between 100,000 and 150,000 hairs on their head. The number of strands normally lost in a day varies, but on average is 100 studies [18] . In order to maintain a normal volume, hair must be replaced at the same rate at which it is lost. The first signs of hair thinning that people will often notice are more hairs than usual left in the hairbrush after brushing or in the basin after shampooing. Styling can also reveal areas of thinning, such as a wider parting or a thinning crown.

Skin conditions :

A substantially blemished face, back and limbs could point to cystic acne. The most severe form of the condition, cystic acne arises from the same hormonal imbalances that cause hair loss, and is associated with DHT production. Seborrheic dermatitis, a condition in which an excessive amount of sebum is produced and builds up on the scalp (looking like an adult cradle cap) is also a symptom of hormonal imbalances, as is an excessively oily or dry scalp. Both can cause hair thinning.

Psychological :

Hair thinning and baldness cause psychological stress due to its effect on appearance. Although societal interest in appearance has a long history, this particular branch of psychology came into its own during the 1960s and has gained momentum as messages associating physical attractiveness with success and happiness grow more prevalent studies[19] .

The psychology of hair thinning is a complex issue. Hair is considered an essential part of overall identity: especially for women, for whom it often represents femininity and attractiveness. Men typically associate a full head of hair with youth and vigor. Although they may be aware of pattern baldness in their family, many are uncomfortable talking about the issue. Hair thinning is therefore a sensitive issue for both sexes. For sufferers, it can represent a loss of control and feelings of isolation. People experiencing hair thinning often find themselves in a situation where their physical appearance is at odds with their own self-image and commonly worry that they appear older than they are or less attractive to others. Psychological problems due to baldness, if present, are typically most severe at the onset of symptoms studies.[20]

Hair loss induced by cancer chemotherapy has been reported to cause changes in self-concept and body image. Body image does not return to the previous state after regrowth of hair for a majority of patients. In such cases, patients have difficulties expressing their feelings (alexithymia) and may be more prone to avoiding family conflicts. Family therapy can help families to cope with these psychological problems if they arise studies . [21]

Causes:

Although not completely understood, alopecia can have many causes: Male pattern hair loss .

More than 95% of hair thinning in men is male pattern hair loss (also known as androgenic alopecia) studies . [22] Male pattern hair loss is characterized by hair receding from the lateral sides of the forehead (known as a "receding hairline") and/or a thinning crown (balding to the area known as the ‘vertex’)studies [23].Both become more pronounced until they eventually meet, leaving a horseshoe-shaped ring of hair around

the back of the head.

The incidence of pattern baldness varies from population to population and is based on genetic background. Environmental factors do not seem to affect this type of baldness greatly. One large scale study in Mary borough, Victoria, Australia showed the prevalence of mid-frontal baldness increases with age and affects 73.5 percent of men and 57 percent of women aged 80 and over. A rough rule of thumb is that the incidence of baldness in males corresponds to chronological age. For example, according to Medem Medical Library's website, male pattern baldness (MPB) affects roughly 40 million men in the United States. Approximately 25 percent of men begin balding by age 30; two-thirds begin balding by age 60.

There is a 4 in 7 chance of receiving the baldness gene studies [24]. Onset of hair loss sometimes begins as early as early as the end of puberty, and is mostly genetically determined. It was previously believed that baldness was inherited from the maternal grandfather. While there is some basis for this belief, both parents contribute to their offspring's likelihood of hair loss. Most likely, inheritance is technically "autosomal dominant with mixed penetrance".

The trigger for this type of baldness is dihydrotestosterone, a more-potent form of testosterone often referred to by its acronym DHT. DHT is an androgenic hormone, body- and facial-hair growth promoter that can adversely affect the ′ prostate as well as the hair located on the head studies [25] .The mechanism by which DHT accomplishes this is not yet fully understood. In genetically prone scalps (i.e., those experiencing male or female pattern baldness), DHT initiates a process of follicular miniaturization, in which the hair follicle begins to deteriorate. As a consequence, the hair’s growth phase (anagen) is shortened, and young, unpigmented vellus hair is prevented from growing and maturing into the deeply rooted and pigmented terminal hair that makes up 90 percent of the hair on the head.1131 In time, hair becomes thinner, and its overall volume is reduced so that it resembles fragile vellus hair or "peach fuzz" until, finally, the follicle goes dormant and ceases producing hair completely.

Nutrition :

Studies have shown that poor nutrition, limited food intake, and deficiencies in certain nutrients can cause thinning. These include deficiencies of biotin, protein, zinc and poor human iron metabolism, although complete baldness is not usually seen. A diet high in animal fats (often found in fast food)
and vitamin A is also thought to have an effect on hair loss.

- Hypervitaminosis A
- Iron deficiency or malnutrition in general
  Infection[edit]

- Dissecting cellulitis
- Fungal infections (such as tinea capitis)
- Folliculitis
- Secondary syphilis studies. [26]
- Demodex folliculorum, a microscopic mite that feeds on the sebum produced by the sebaceous glands, denies hair essential nutrients and can cause thinning. Demodex folliculorum is not present on every scalp and is more likely to live in an excessively oily scalp environment.

Drugs :

- Temporary or permanent hair loss can be caused by several medications, including those for blood pressure problems, diabetes, heart disease and cholesterol studies [27]. Any that effect the body's hormone balance can have a pronounced effect: these include the contraceptive pill, hormone replacement therapy, steroids and acne medications studies [28].
- Medications (side effects from drugs, including chemotherapy, anabolic steroids, and birth control pills studies [29-30] .

Trauma:

Traction alopecia is most commonly found in people with ponytails or comrows who pull on their hair with excessive force. In addition, rigorous brushing and heat styling, rough scalp massage can damage the cuticle, the hard outer casing of the hair. This causes individual strands to become weak and break off, reducing overall hair volume.

- Trichotillomania is the loss of hair caused by compulsive pulling

and bending of the hairs. Onset of this disorder tends to begin around the onset of puberty and usually continues through adulthood. Due to the constant extraction of the hair roots, permanent hair loss can occur.

- Traumas such as childbirth, major surgery, poisoning, and severe stress may cause a hair loss condition known as telogen effluvium, studies [31] in which a large number of hairs enter the resting phase at the same time, causing shedding and subsequent thinning. The condition also presents as a side effect of chemotherapy - while targeting dividing cancer cells, this treatment also affects hair's growth phase with the result that almost 90% of hairs fall out soon after chemotherapy starts studies [32].

Radiation to the scalp, as when radiotherapy is applied to the head for the treatment of certain cancers there, can cause baldness of the irradiated areas.

Pregnancy

Hair loss often follows childbirth without causing baldness. In this situation, the hair is actually thicker during pregnancy due to increased circulating oestrogens. After the baby is born, the oestrogen levels fall back to normal prepregnancy levels, and the additional hair foliage drops out. A similar situation occurs in women taking the fertility-stimulating drug clomiphene studies [33] .

Other

Air and water pollutants as well as minerals in water and the phototoxic effects of sunlight can cause thinning by aging the scalp skin and damaging hair.

- Alopecia areata is an autoimmune disorder also known as "spot baldness" that can result in hair loss ranging from just one location (Alopecia areata monolocularis) to every hair on the entire body (Alopecia areata universalis). Although thought to be caused by hair follicles becoming dormant, what triggers alopecia areata is not known. In most cases the condition corrects itself, but it can also spread to the entire scalp (alopecia totalis) or to the entire body (alopecia universalis).
- Localized or diffuse hair loss may also occur in cicatricial alopecia (lupus erythematosus, lichen piano pilaris, folliculitis decalvans, central centrifugal cicatricial alopecia, postmenopausal frontal fibrosing alopecia,

etc.). Tumours and skin outgrowths also induce localized baldness (sebaceous nevus, basal cell carcinoma, squamous cell carcinoma).

- Hypothyroidism (an under-active thyroid) and the side effects of its related medications can cause hair loss, typically frontal, which is particularly associated with thinning of the outer third of the eyebrows (also seen with syphilis). Hyperthyroidism (an over-active thyroid) can also cause hair loss, which is parietal rather than frontal studies [34].

Materials and Methods

1- 68 male individuals were studied in our survey, divided to two groups:

a- 34 a person with heart disease and treated at the General Hospital of Baquba city. In general their ages ranged within 45 – 55 year old, all marred and have Childs.

b- Another group of men included in this survey consist of 34 individuals, and they are healthy, and also selected within the age 45 – 55 years old.

3- Those two groups were divided according to 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.

4- All the two groups of individual have been diagnosed with blood groups A, B, AB, and O types.

Statistical analyses

Statistical analyses followed the methods of Steel and Torrie [35] The (χ^2) test statistical analysis and (LSD)were used to differentiate between and within the groups groups**.** The "T" test statistical analysis were used to differentiate between the two groups

Results and Discussion

In healthy Men as shows in table 1 the ratio of haired men to those bald one is 1:1, (17 individual haired and the others 17th bald) so we can say that 50% of Man population are bald in Baquba city.

Table (1) shows the distribution of bald proportion between healthy and diseased individuals.

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

Also in people with heart disease where people with normal hair varies with people balding (11man with normal hair and 23man bald) so we find that 32% patient haired and 68% bald, compared with the healthy group see an increase in the proportion of people of baldness and the result was significant from a statistical standpoint, ($p \geq 0.01$). This clearly indicates that the people of baldness chance to matter more than their counterparts with normal hair in order to become affected with heart disease.

These results resemblance to a large extent to the findings of the many researchers during their research involved the relationship between the people of baldness and various heart diseases. [20] Figure (1) show this demonstration clearly

Figure 1 shows the distribution of bald proportion between healthy and diseased individuals.

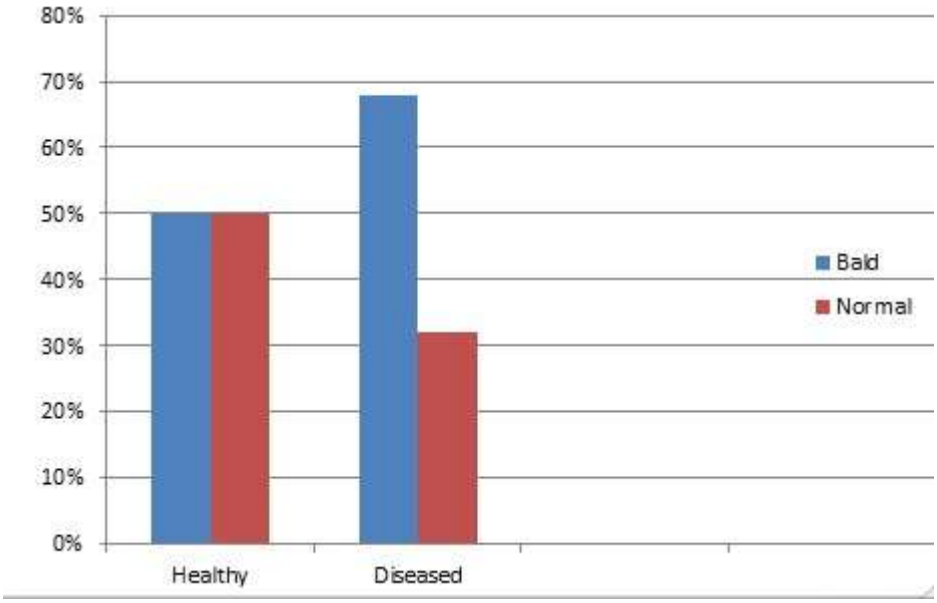


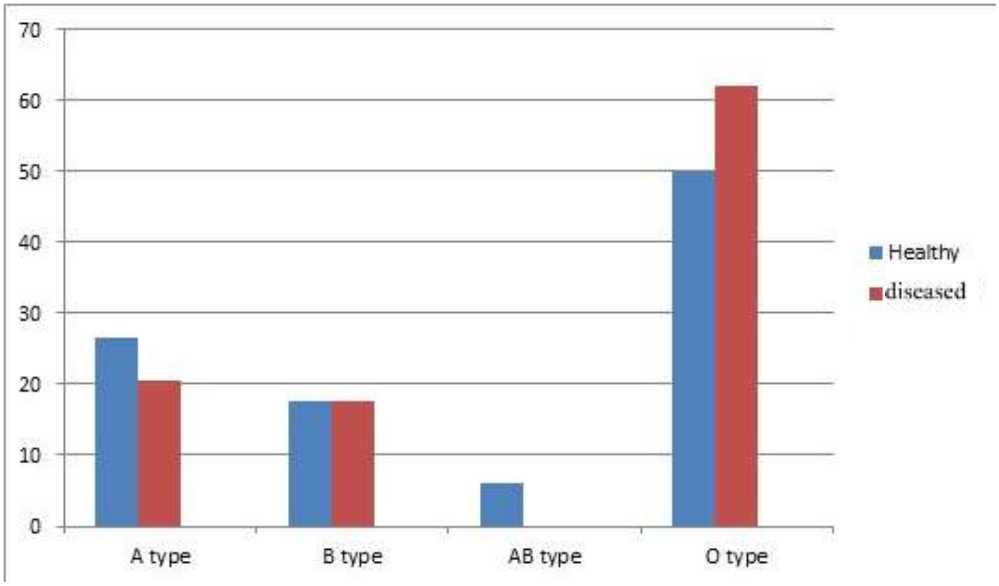
Table (2) shows the detailed distribution of types of blood groups of people between patients with cardiac disease, and between healthy people who do not complain of certain diseases.

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%

In table 2 Frequency distribution of blood groups between 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 patients who suffer from heart disease, 50% and 62%, respectively, and the difference was statistically significant ($p \geq 0.05$).
And as shown clearly in figure

Figure (2) shows the differences in distribution of blood groups between patients with cardiac disease, and between healthy people



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 affections. [4]

Table (3) shows the frequency distribution of blood group types among bald people and people within normal hair within the heart patients group admitted to the general hospital in Baquba.

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%

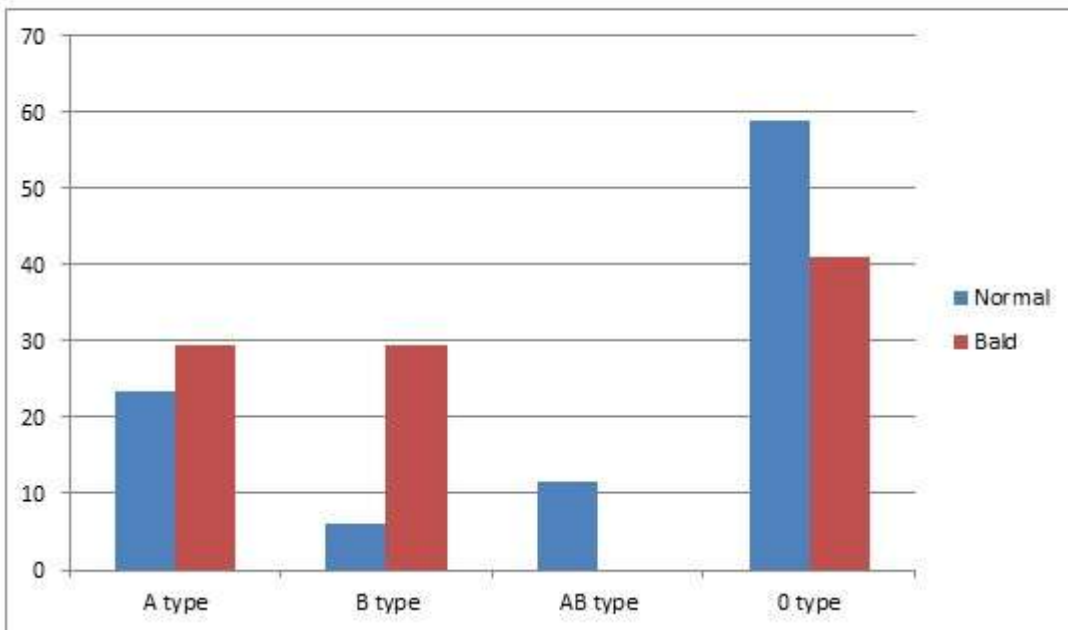
In table 3 the frequency blood groups A, B, AB, and O in patients natural hair 18%, 27%, 0%, and 55%, compared with 22%, 13%, 0%, and 65% balding patients respectively. These differences in frequency among a group of balding people and their counterparts from normal hair, possibly because of lack of people surveyed and it does not have a significant difference statistically between these results.

Table (4) shows the frequency distribution of blood group types among bald people and people within normal hair within 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%

In this 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.

Figure (3) shows the distribution of blood types among bald people and people with normal hair within healthy group.



We conclude from these results that the balding patients among them people with blood group B more than it is in the patients with normal hair. On the contrary, the patient with normal hair has more blood group type O than it exists in the balding group and the results were statistically significant, ($p \geq 0.05$).

Than previously possible to conclude that 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 heart disease different

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الخلاصه

العلاقه الوراثيه بين الصلع والامراض القلبيه مع صنف الدم A,B,AB,O
في الرجال في مدينه بعقوبه

شملت هذه الدراسه 68 رجل وكالاتي:34 رجل ممن يعانون من امراض قلبيه متنوعه والذين تتم معالجتهم في مستشفى عام بعقوبه والمجموعه الثانيه تتألف ايضا من34 رجل ممن يتمتعون بصحه جيده .كل مجموعه من هذه المجموعتين تم تقسيمها الى صنفين وحسب كثافه شعر الرأس المجموعه التي بها نسبه الصلع 30% واعلى تم تصنيف اصحابها بالاشخاص الصلع اما الباقي فتم احتسابهم اشخاص مشعري الرأس. جميع هذه المجموعات تم تشخيص صنف الدم لكل شخص وفق نظام A,B,AB,O الخاص بصنف الدم.

في الاشخاص الاصحاء كانت نسبه الصلع الى ذوي الشعر 1:1(17شخص اصلع مقابل 17 مشعر) وبمعنى اخر يمكن القول بان 50% من نسبه الرجال البالغين في مدينه بعقوبه هم من الصلع.

النتيجه كانت مختلفه تماما عند مجموعه الاشخاص المصابين بامراض قلبيه إذ كانت نسبه الاشخاص ذوي الشعر32% مقارنه بـ 68% صلع ، وكان الفرق معنوي ($p\leq0.01$) مع المجموعة الاولى وهذا يؤشر بوضوح باحتماليه تعرض الاشخاص الصلع الى امراض قلبيه اكثر مما يعرض له الاشخاص ذوي الشعر.

ايضا كان تكرار نوع الدم O اكثر عند الاشخاص المصابين بامراض قلبيه منه عند الاشخاص السليمين 62% مقارنه ب50% وكان الفرق معنوي($p\geq 0.01$) في مجموعه الاشخاص الاصحاء كانت نسبه تكرار صنف الدم O عند الاشخاص ذوي الشعر اعلى مما موجود عند الصلع ($p\geq0.01$) .