

Evaluation of lipid profile with different ABO blood groups among Iraqi healthy people

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Abstract

Blood types are determined by the presence or absence of certain antigens – substances that can trigger an immune response if they are foreign to the body. There are four major blood groups determined by the presence or absence of two antigens A and B on the surface of red blood cells. One hundred (100) of sera Iraqi healthy people from Waist city were enrolled in this study, it consists (60 male and 40 female). The age range for the male subjects was (17-50) years while the female population was (25-52) years. Samples were collected attending during the period from September to December 2019. The mean age was (50 years) for men, and (42 years) for women. According to blood type were divided into a group (O) (45 cases), group (A) (25 cases), group (B) (21 cases) and group (AB) (9 cases), was done by ABO blood test and Lipid profile test consist of (total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low density lipoprotein (LDL) and very low-density lipoprotein (VLDL)) done by enzymatic method. Our result shows that the percentage of blood group (O) was significantly higher in women and men compared to all blood groups. The results of the present study demonstrate that the concentration of TC, LDL, HDL higher in blood groups (B) with non-significant in a male in contrast the concentration of TC, TG, LDL and VLDL was higher in Blood groups (A) in females that lead to risk factor for the development of CHD. More comprehensive studies are required to confirm these results. The study aimed to identify the relationship between different blood groups and fat levels in healthy people and approximate risks for cardiovascular diseases in each group.

keywords: ABO, TC, TG, HDL, LDL, VLDL.

تقييم مستوى الدهون الشامل مع مجموعات الدم ABO المختلفة بين الأصحاء العراقيين

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الخلاصة

يتم تحديد أنواع الدم من خلال وجود أو عدم وجود مستضدات معينة - وهي مواد يمكن أن تؤدي إلى استجابة مناعية إذا كانت غريبة على الجسم. هناك أربع فصائل دم رئيسية يتم تحديدها من خلال وجود أو عدم وجود مستضدين A و B على سطح خلايا الدم

الحمراء. تم تسجيل مائة (100) من الأمصال العراقية الأصحاء من محافظة واسط في هذه الدراسة ، وتتكون من (60 ذكر و 40 أنثى). كان المدى العمري للذكور (17-50) سنة والإناث (25-52) سنة. تم جمع العينات خلال الفترة من أيلول- كانون الاول 2019. وكان متوسط العمر (50 سنة) للرجال ، و (42 سنة) للنساء. حسب فصيلة الدم تم تقسيمها إلى مجموعة (O) (45 حالة) ، المجموعة (A) (25 حالة) ، المجموعة (B) (21 حالة) والمجموعة (AB) (9 حالات) ، تم إجراء فحص الدم ABO لكافة المجاميع. يتكون اختبار فحص الدهون من) الكوليسترول الكلي (TC) ، والدهون الثلاثية (TG) ، والبروتين الدهني عالي الكثافة (HDL) ، والبروتين الدهني منخفض الكثافة (LDL) والبروتين الدهني منخفض الكثافة ((VLDL) تم إجراؤه بالطريقة الأنزيمية. أظهرت نتائج البحث أن نسبة فصيلة الدم (O) كانت أعلى بشكل ملحوظ عند النساء والرجال مقارنة بجميع فصائل الدم. أظهرت نتائج الدراسة الحالية أن تركيز TC و LDL و HDL أعلى في مجموعات الدم (B) مع عدم وجود أهمية في الذكور على عكس تركيز TC و TG و LDL و VLDL كان أعلى في مجموعات الدم (A) في الإناث يؤدي إلى عامل خطر لتطور أمراض الشرايين التاجية. هناك حاجة لدراسات أكثر شمولاً لتأكيد هذه النتائج. هدفت الدراسة إلى التعرف على العلاقة بين مجموعات الدم المختلفة ومستويات الدهون لدى الأشخاص الأصحاء وتقريب مخاطر الإصابة بأمراض القلب والأوعية الدموية في كل مجموعة.

الكلمات المفتاحية: مجاميع الدم ، الكوليسترول ، الدهون الثلاثية ، الدهون العالية الكثافة ، الدهون القليلة الكثافة ، الدهون القليلة الكثافة جدا .

Introduction

The ABO blood group system is composed of three major alleles [two codominant (A and B) and one recessive (O)] [1]. Alleles A and B of locus ABO encode the activity of glycosyltransferases A and B that convert antigen precursor H to determinant A or B, and antigens A and B add additional sugar units. Unit O (N-acetylgalactosamine or galactose). Individuals in Group O lack these transferases and express them without altering the basic H antigen [2]. In particular, the ABO antigen is expressed not only on the surface of red globules, but also on a wide variety of human cells and tissues, especially epithelium, platelets, vascular endothelium, and neurons [3]. Therefore, these sugar components are considered to be important not only for blood transfusion and transplantation medicine, but also for the pathogenesis of various systemic diseases [4]. Among these pathologies, the association between ABO antigens and cardiovascular disease (MCV) has revealed the best clinical trials, as documented by several systematic reviews and meta-analyses [5].

ABO blood group studies have been of great interest due to their medical importance in a variety of diseases [6]. The ABO antigenic determinant is expressed on the N-linked strand of the circulating von Willebrand (VWF) factor, increasing its susceptibility to thrombosis and myocardial infarction. ABO is also associated with inflammatory markers such as soluble intercellular adhesion molecule 1, selectin E and selectin P plasma rates, and factors of tumor necrosis, which are also associated with (CAD). ABO blood groups can affect the triglyceride and total cholesterol levels of cyclic lipoproteins, and different groups have different absorption rates. Low-density lipoprotein cholesterol

(LDLC), which is positively associated with cholesterol levels, especially coronary heart disease [7].

Nevertheless, the true relationship between the sanguine group and coronary heart disease is not completely clear. There are many points on this subject in various studies. Some studies have not reported a significant association between pedigree groups and risk of coronary heart disease. Many studies have shown that the O group is a risk factor for coronary artery disease, but some have found that the non-O group is more likely to be associated with coronary artery disease. Biswas showed that sanguine group AB reduced the risk of coronary heart disease, and Lee pointed out that the sanguine group increased the risk of coronary heart disease [8].

Subject and methods

Subject: Five (5 ml) of blood samples were collected from fasting subjects, (1) ml blood was immediately put into a tube with Ethylenediaminetetraacetic acid (EDTA) and the remaining 4 ml of blood was put in a plain tube and both were labeled, sample with EDTA was gently mixed with the anticoagulant and used for the blood groups determination while samples in the plain tube were allowed to clot before centrifuging for five minutes at 6000 revolutions\minute and the serum were separated immediately into plain sterile sample tube with Pasteur pipette and frozen in the refrigerator at -4°C.

Methods

1- ABO and Rh blood groupings were carried out by standard tile techniques [9], with appropriate positive and negative controls using one drop of whole blood mixed with one drop of appropriate antisera and rocked gently for agglutination. Quality monoclonal blood grouping reagents manufactured by Rapid Labs Limited, (United Kingdom).

2- lipid test (TC, TG and HDL) was done by enzymatic methods, LDL and VLDL were calculated mathematically.

3- The results were statistically analyzed using the Statistical Package for Social Sciences (SPSS) version 21. Data values are given as mean, standard deviation, percentages and correlation coefficients. Comparison between tests carried out in the different blood groups according to the male and female populations respectively were made using single factor analysis (ANOVA) and results were considered significant at ($p < 0.05$).

Result and discussion

Results

among Results were obtained from 100 participants to determine the CDV healthy people for various ABO blood **groups** for both female and male subjects. The age range for the male subjects was 17-50 years while the female was 25-53 years.

Table (1): Distribution of patients according to age and gender.

Gender	Male	Female
Mean and SD	Mean and SD±	Mean and SD±
Age	42.12 ± 16.47	50.33 ± 15.11

The demographic distribution of the blood groups in the subjects is shown in table2. Table 2, shows that the number of males and females is higher in group O (45%), then groups B (21%) then A (21%) and groups AB (9%). It is possible that due to genetic variation.

Table (2): distribution of the blood group percentage according to gender.

Blood groups	Male%	Female%	Total %
A	12 %	13%	25 %
B	14 %	7 %	21 %
AB	6 %	3 %	9 %
O	28 %	17 %	45 %
TOTAL%	60%	40%	100%

Table 3 showed the analysis of the mean concentration of total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low density lipoprotein (LDL) and very low-density lipoprotein (VLDL) in male subjects. The concentration of TC, HDL and LDL, higher in blood groups B with non-significant (191.82 ± 47.837 mg/dl), (43.42 ± 8.826 mg/dl) (163.67 ± 141.6 mg/dl) while TG, VLDL had a higher concentration in group A (178.27 ± 136.521 mg/dl), (35.45 ± 27.303 mg/dl) compared to other blood groups. while show low concentration in group AB in TC, TG, HDL and VLDL in a male subject. Our observation reveals blood group B phenotype as the blood group most at risk of cardiovascular disease in male participants perceived stress significantly worsened LDL- C levels, TC and HDL.

Table (3): mean and SD $\pm$ of lipid profile test (TC, TG, HDL and VLDL) in male subjects according to ABO blood group.

Blood groups	Mean and SD				
	TC (mg/dl) (n.v <200)	TG (mg/dl) n.v (60-165)	HDL(mg/dl) n.v (40-60)	LDL (mg/dl) (n.v <130)	VLDL (mg/dl) (n.v <45)
Group A	176.82 $\pm$ 55.461	178.27 $\pm$ 136.521	38.00 $\pm$ 5.2	103.36 $\pm$ 56.934	35.45 $\pm$ 27.303
Group B	191.82 $\pm$ 47.837	136.58 $\pm$ 81.240	43.42 $\pm$ 8.826	163.67 $\pm$ 141.6	27.25 $\pm$ 16.299
Group AB	152.2 $\pm$ 14.932	123.6 $\pm$ 49.561	37.8 $\pm$ 5.357	90.00 $\pm$ 18.601	24.40 $\pm$ 10.139
Group O	182.00 $\pm$ 44.570	145.61 $\pm$ 52.324	40.54 $\pm$ 8.094	112.54 $\pm$ 43.172	28.93 $\pm$ 10.338

Table 4, illustrates the mean concentration of (TC), (TG), (HDL), (LDL) and (VLDL) in female subjects according to ABO blood groups. The concentration of TC, TG and VLDL was higher in blood groups A with non-significant (195.83 $\pm$ 84.538 mg/dl), (191.58 $\pm$ 161.060 mg/dl), (38.08 $\pm$ 32.109) respectively compared to other blood groups and AB group was lower in TC, TG, HDL, LDL and VLDL (161.33 $\pm$ 52.729 mg/dL), (108 $\pm$ 40.361 mg/dl), (33 $\pm$ 4.359 mg/dl), (105.67 $\pm$ 48.170 mg/dl), (21.6 $\pm$ 7.767 mg/dl) compared to other groups. The results show that type A blood type is a phenotype as the blood group most at risk for cardiovascular disease in females.

Table (4): mean SD $\pm$ of lipid profile test (TC, TG, HDL and VLDL) in female subjects according to ABO blood group.

Blood group	TC (mg/dl) (<200)	TG (mg/dl) (40-140)	HDL(mg/dl) (<40/50)	LDL (mg/dl) (<130)	VLDL (mg/dl) (<45)
Group A	195.83 $\pm$ 84.538	191.58 $\pm$ 161.060	37.92 $\pm$ 6.960	122.83 $\pm$ 60.356	38.08 $\pm$ 32.109
Group B	192.00 $\pm$ 70.546	162.83 $\pm$ 112.008	33.00 $\pm$ 8.149	127 $\pm$ 51.623	32.5 $\pm$ 22.341
Group AB	161.33 $\pm$ 52.729	108 $\pm$ 40.361	33 $\pm$ 4.359	105.67 $\pm$ 48.170	21.6 $\pm$ 7.767
Group O	195.5 $\pm$ 16.263	155.53 $\pm$ 73.472	37.33 $\pm$ 9.969	125.20 $\pm$ 45.160	30.53 $\pm$ 13.804

Table 5 showed that there was no significant difference ($p < 0.05$) between blood group among male and female participants in group A, B, AB and O. this result was agreement in some authors reported that gender distribution has no significant association with blood groups [10], that result

disagrees with the other study that shows strong positive correlations between TC and HDL among female and male subject [11].

Table (5): comparison between males and females among blood groups A, B, AB and O.

		TC	TG	HDL	LDL	VLDL
A	T-test	0	0	0	0.54	0
		· 3	· 0	· 4		· 5
		3	5	0		2
	p-value	0	0	0	0.59	0
		· 7	· 9	· 6		· 9
		5	6	8		5
B	T-test	0	0	0	0.54	0
		· 5	· 5	· 4		· 0
		0	0	5		5
	p-value	0	0	0	0.59	0
		· 9	· 6	· 5		· 9
		6	8	9		5
AB	T-test	0	0	1	0.55	0
		· 1	· 2	· 4		· 2
		7	9	9		4
	p-value	0	0	0	0.69	0
		· 7	· 6	· 1		· 8
		7	8	7		2
O	T-test	0	1	2	0.59	1
		· 4	· 1	· 4		· 1
		5	4	6		4
	p-value	0	0	0	0.54	0
		· 6	· 5	· 2		· 2
		5	0	5		6

Discussion

Genetic and environmental factors play important roles in the development of CVD. Many studies show a positive causal relationship between blood group and cardiovascular disease risk, but the underlying pathophysiology has not yet been clarified. The risk factors for developing *cardiovascular disease* are known to be proportional to levels of serum total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), and triglycerides (TG). This study examined the serum lipid

profiles of various ABO blood groups in clearly healthy volunteers in Wasit. Find out which blood groups are most likely to be at risk for cardiovascular disease. The results of this study showed that there was no significant association between serum TC, TG and lipoprotein levels between different blood groups. These observations are in agreement with the conclusions of (Amirzadegan et al.). In addition, those who did not show a positive correlation between different blood types and the development of coronary artery disease showed. High cholesterol levels are considered a risk factor for developing ischemic heart disease, and people with blood type B have higher total cholesterol and low density lipoprotein levels than other blood types. Lower high density lipoproteins were also found in the AB blood group of male subjects.

These results indicate that people with blood group B are at risk for developing these diseases because high serum cholesterol and low density lipoprotein cholesterol are known to be major risk factors for developing CVD. Indicates that there is a strong possibility. There was no significant association with the serum lipid profile of the sex population studied, with the exception of A blood, which showed a significant increase in high density lipoprotein levels in women compared to men. This increase may be the result of increased circulating estrogen levels in the participants. This claim is based on the facts of Knopp et al. [12]. Estrogen has a beneficial effect on lipoprotein metabolism by increasing the synthesis of VLDL-C, followed by a decrease in LDL-C and an increase in HDL-C. Therefore, the observed significance present in the female blood group A compared to its male counterpart may be related to hormones.

Conclusion

Family history can play an important role in the development of cardiovascular disease risk factors, as the lipid profile is a genetic component, but many factors play an important role in the development of clinical cardiovascular disease. We believe that other factors, such as environmental factors, are likely to be the predisposing factors. It should be noted that people with AB blood group in this study had a lower cardiovascular risk profile for TC, TG, HDL, LDL and VLDL in men and women compared to other blood groups.

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