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Blood groups and its association with chronic diseases in local population of Karbala city

فصائل الدم وعلاقتها مع الامراض المزمنه عند السكان المحليين لمدينة كربلاء

*Thikra Abd Aun Hasan * Ibtisam Abbas Nasir
* Karbala university – College of science –Department ofBiology

Abstract

This study was carried out at AL-Hussain medical city and the public hospital of Al-Hindi for the period between (October 2012 to February 2013). Blood groups have been tested for 162 individuals (male and female) with no illness record and for 162 individuals (male and female) suffering from different chronic illness included: Hypertension, asthma, allergy, heart disease, diabetes, arthritis, as well as high plasma cholesterol level.

The results achieved in this study showed that there was no significant correlation between ABO blood group and studied chronic diseases. This study showed that individuals with O^+ group was the most common group with a percentage of (33.33%) followed by A^+ (27.47%) and B^+group (20.99%)respectively for healthy and non-healthy individuals. The mainchronic disease with greatest rate associated with type A^+ was diabetes, hypertension in compare with other diseases includingasthma, heart disease and arthritis respectively. It is found that diabetes had the highest prevalence among individuals with A^- group followed byasthma and allergy; while individuals with B^+ were suffering from diabetes, hypertension and with a lower percentage suffering from heart disease, arthritis, asthma and allergy respectively. Individuals with B^- group had the lowest percentage and were suffering from hypertension, diabetes (equal percentage) asthma and allergy. The dominance of chronic disease among individuals with AB group were found to be in the following order:diabetes, hypertension, heart disease, asthma, allergy and high cholesterol level. Prevalence of chronic disease between individuals with $O^+$was found to be as follows:diabetes ,hypertension,heart disease ,asthma and allergy , arthritis, high blood cholesterol respectively. The frequency of chronic disease among individuals with $O^-$was as follows:diabetes ,hypertension, heart disease , arthritis, asthma and allergy respectively.

الخلاصه

اجريت هذه الدراسة في مدينة الحسين الطبية و المستشفى العام في الهندية للفترة مابينتشرين الاول 2012 و لغاية شباط 2013 , وقد تم فحص زمر الدم ل 162 شخص من الذكور و الاناث ممن يعانون من الامراض المختلفة و شملت : ارتفاع ضغط الدم , الربو , و الحساسية , امراض القلب , مرض السكري , التهاب المفاصل , بالأضافة الى ارتفاع كوليسترول الدم بالاضافة الى 162 شخص اصحاء لا يعانون من اي مرض وقد تم ملاحظة ان اكثر الامراض التي كان يعاني منها هؤلاء الاشخاص كانت مرض السكري و يليها ارتفاع ضغط الدم ثم امراض الربو و الحساسية و امراض القلب و نسبة قليلة ارتفاع كوليسترول الدم . اظهرت نتائج الدراسة الحالية عدم وجود علاقة معنوية بين مجاميع الدم والامرض المزمنة قيد الدراسة .

وقد لوحظ ان اكبر نسبة كانت لزمرة الدم O^+ (33.33%) يليها A^+ (27.47%) و B^+ (20.99%) للأصحاء و غير الاصحاء بالنسبة للذكور و الاناث , وكانت زمرة الدم A^+ أشخاصها يعانون من ارتفاع سكر الدم و ارتفاع الضغط بنسبة اكبر من الامراض الاخرى و التي هي الربو و الحساسية ثم امراض القلب و التهاب المفاصل على التوالي . اما زمرة الدم A^- كانت نسبتها جداً قليلة و اشخاصها يعانون من السكري و الربو والحساسية على التوالي , اما صنف الدم B^+ كان اشخاص هذه الزمرة يعانون من مرض السكري يليه ارتفاع ضغط الدم و بنسب اقل مصابين بأمراض القلب و التهاب المفاصل و الربو و الحساسية على التوالي , و الاشخاص ذو صنف الدم B- كانت نسبتهم جداً قليلة و يعانون من ارتفاع الضغط و مرض السكري بنسب متساوية ثم الربو والحساسية , اما فصلة الدم AB^+ اشخاصها كانوا يعانون ايضاً من مرض السكري و ارتفاع الضغط و بنسب اقل مصابين بأمراض القلب و الربو و الحساسية و ارتفاع كوليسترول الدم . زمرة الدم AB^- هي من الزمر النادرة ولم يتم الحصول على اي عينة منها , اما الزمرة O^+ وكانت نسبتها الاكبر اشخاصها يعانون من أمراض السكري ثم يليها ضغط الدم ثم امراض القلب و الربو و الحساسية على التوالي و بنسب اقل يعانون من التهاب المفاصل و ارتفاع كوليسترول الدم اما الاشخاص من صنف الدم O^- ايضاً كانوا يعانون من السكري ثم ارتفاع ضغط الدم و امراض القلب على التوالي و بنسب اقل يعانون من التهاب المفاصل و الربو و الحساسية .

Introduction

The ABO blood types were first discovered by Karl Landsteiner in 1900 at the University of Vienna in the experimental of trying to study why blood transfusions at times cause death and at sometimes save a patient, while the Rh factor has been discovered in 1903 by Levine [1]. The blood groups is classified into four groups according to the existence of anti-A or anti-B antibodies in serum and of A and B antigens on the surface of the red blood cells. Therefore, the red blood cells of blood category A have antigen A and the serum having anti-B antibody. Consequently, anti-A antibodies will not be created by them because they would cause the damage of their own blood. Individuals with this type can receive blood from individuals with blood categories A or O [2,3]. Likewise, blood category B contains antigen B and anti-A antibody, individuals with this blood type can receive blood from individuals with blood category B or O only [4, 5]. Additionally, blood category AB has both A and B antigens but no antibodies and individuals with this category can receive blood from individuals with A, B, O blood categories[4, 5, 6]. Blood category O do not produce ABO antigens but has both anti-A and anti-B antibodies , individuals with type O blood can receive only type O blood themselves [2,3].

In addition, blood groups can be classified into two groups by the Rh system, when the red blood cells have the antigen known as Rhesus factor are known to be Rhesus positive, and when the red blood cells doesn't have the factor are believed to be Rhesus negative [7,8,9]. When blood transfer from one person to another, the blood should be compatible ABO and Rh group. If an incompatible blood is transfused between two individuals, a severe haemolytic reaction with RBC damage (haemolysis), renal failure and shock is expected to occur, and death is a probability [6]. From here comes the advantage of knowing the blood type for each person (donor and recipient) to reduce the accidental of a transfusion reaction and to identify the relation between some disease and each blood type.

A large number of studies showed a significant connection between human blood group and certain diseases, such as asthma, arthritis, heart and liver disease, hypertension, diabetes, stomach infection and cancer [10,11,12]. Researchers have found that people with blood category O were significantly associated withasthma [13,14]. As well as, allergic rhinitis and gastric and intestinal diseases [15,16], diabetes and duodenum ulcer [17,18]. In addition, individuals with blood group O are less likely to have high cholesterol and heart disease as has been found in some countries [19]. Some researchers have found the non- O blood group is a genetic risk element for development liver fibrosis among patients with hepatitis C virus[20,21], and children with blood type O^+ are the most susceptible to thalassemia as compared to individuals of other blood groups [22].

Some blood groups have more trends to develop allergies, for example, individuals with blood group B are more likely to develop allergy while blood group AB was the most protected one[23].Individuals with A blood groupis more possibly to develop breast cancer and epithelial ovarian cancer.[24,25]. Moreover, individuals with A and O blood groups had the highest rate among the diabetics[26], while coronary artery disease were more prevalence in blood group B than other blood groups[27]. In addition, earlier studies showed an association between the ABO blood group and survival from some types of cancer, patients with type AB were more possibly to have better survival rate from colon cancer than patient with A, B and O blood groups[28]. On the other hand, another study has been found a correlation between child intelligent and blood type, so it has been suggested that students with AB blood type are more intelligent as compared to students of other blood groups [29].

The current study was designed to study the possible correlation between blood groups and some chronic diseases in local population of Karbala city.

Material and Methods

This study was carried out atAL-Hussein medical city and at AL-Hindi public hospital for the period between (October 2012 to February 2013). Blood groups was determined for healthy control people , their age range between 40-70 years and then blood groups wasdetermined for 162 patients

(the patients were clinically evaluated), age ranged between 40-70 years whom suffered from chronic disease included:hypertension, asthma, allergy, heart disease, diabetes, high cholesterol and arthritis which considered the most common disease at the present time. The blood samples were tested directly following collection. ABO blood group set which contain Anti- B, anti-A and anti-D (RH) have been used and blood group was determined by agglutination technique using antisera A, B, and D.

Statistical analysis

Data were analysed using the Chi square to estimate the significance of the results.P-values < 0.05 were considered significant.

Results and discussion

In table (1), the most common diseases in the current studywas diabetes with a percentage of 37.65 % followed byhypertension with a ratio of 23.46 %. Whereas, heart disease, asthma, allergy with a percentage of 14.82 % and arthritis with 8.03% respectively. The lowest rate was 1.24% for high cholesterol.Diabetes and hypertensionwere the most prevalence diseases in the present study which is probably due to living and dietary style or to genetic reasons.

According to Buchanan and Higley[11]nationality must be taken in consideration in the demonstration of blood group, our results showed that themost common blood type among individuals in Karbala was type O^+ with a percentage of 33.33 % followed byA^+ with 27.47 %. While there were no sample from AB^- blood type which is considered a rare blood group in the present study which might be due to the small sample size (table 2).There was no significant difference between blood group distribution and gender (table 3) . The current result is similar to previous study [30] by Martino *et al*., who indicated no correlation between gender and blood group distribution.

In our study, Chi-square test results showed no significant correlation between ABO blood groups and studied chronic disease.Table 4 shows that the most common disease within blood type $A^+$was diabetes with a ratio of 36.7% followed by asthma and allergy (22.4%) , hypertension (20.4 %) and heart diseases and arthritis (10.2%) respectively. The results are in parallel with previous study[31] by El-sayed et *al.*,which suggested that individuals with blood group A is a risk factor for diabetes as well as hypertension. While,current results disagree to those reported by Kamil*et al*[32]which proposed a negative connection between diabetes type 2 and A and O blood groups with greater ratio of A and O groups individuals were non-diabetic, and B blood group was dispersed with highest percentage among patients with diabetes.

Our study did show a higher percentage of blood group A^- in the diabetic group (66.6%), however this failed to reach statistical significance, followed by asthma and allergy with 33.3% and this result is in parallel with previous study [33]. The most prevalence disease in type B^+ was diabetes with a percentage of 46.8% then comes hypertension with 21.8% and with a less percentage of 15.6% , 12.5 and 3.1% suffers from heart disease, arthritis , asthma and allergy respectively. Nevertheless this as well was not statistically significant, a larger model study will be required in our population to further study this result.

This study shows that individuals with B^- blood group suffered from diabetes and hypertension by 40% and a ratio of 20% suffered from allergy and asthma,however there was nostatistically significantdifference ($P>0.05$), which is consistent with previous studies [34,23]. While the most common disease within individuals with AB^+ were diabetes and hypertension with a ratio of 36.5% and 25% respectively. 12.5% with AB^+ blood group suffered from heart disease, asthma, allergy and high blood cholesterol which is in parallel with previous finding [35-38] which suggest that individuals with ABare at a high risk level for developing diabetes, hypertension and heart disease. During the current study we didn't find sample from individuals with AB^- as it considered as a rare blood type.

The most prevalence diseases within O^+ blood group was diabetes(29.17 %) followed by hypertension (27.08%), heart disease (20.83%), asthma and allergy (16.67%) and a low ratio of

4.2% and 2.08% suffered from arthritis and high blood cholesterol respectively. This result is in similar to a previous studies [17,39] and in contrast with [14]. Individuals with O^- suffered from diabetes, hypertension and heart disease with a percentage of 41.18%, 23.53% and 17.65% respectively and with a low percentage 11.77% , 5.88% have arthritis , asthma and allergy respectively which contradicting a previous study [13] by Kauffmann*et al* (1996), who suggested that individuals with Oblood group, the most individuals that have asthma and chest allergy.

Table 4 shows high blood cholesterol was more common in AB^+ and O^+ blood types and this result in contrast with previous study [40] by Kawalinder *et al*.,2011, who showed a significant correlation between A blood group and high blood cholesterol followed by AB group; while O group displayed the lowest values of blood cholesterol.

Even though the fact that the relationship of blood groups with some diseases is clearly established, and the suggestion that blood groups may possibly play an important role in some diseases, different studies show no relationship between ABO blood group with those diseases, including diabetes, asthma and hypertension [41-43].

To sum up, the present study shows no significant relationship between the ABO bloodgroups and studied chronic disease. The most common diseases which have been recorded during this study includeddiabetes and hypertension and blood group O^+ is the most prevalent blood group in Karbala population.

Table (1): Chronic disease percentage

Type of disease	Number	Percentage %
Arthritis	13	8.03
Hypertension	38	23.46
Diabetes	61	37.65
Heart disease	24	14.82
Asthma and allergy	24	14.82
High blood cholesterol	2	1.24
Summation	162	100%

Table (2):Distribution of the BO blood typeamong healthy and non-healthy individuals

Blood group	Number of healthy people (%)	Number of non-healthy people (%)	Summation (%)
A^+	40 (24.69)	49 (30.25)	89 (27.47)
A^-	4 (2.47)	3 (1.85)	7 (2.16)
B^+	36 (22.22)	32 (19.75)	68 (20.99)
B^-	4 (2.47)	5 (3.09)	9 (2.78)
AB^+	9 (5.56)	8 (4.94)	17 (5.25)
AB^-	-	-	-
O^+	60 (37.04)	48 (29.63)	108 (33.33)
O^-	9 (5.56)	17 (10.49)	26 (8.03)
Summation	162(100%)	162(100%)	324 (100 %)

*statistical analysis showed no significant difference.

Table (3):Distribution of the ABO blood typeaccording to gender

	Healthy people			Non-healthy people		
Blood groups	Number of male (%)	Number of female (%)	Summation (%)	Number of male (%)	Number of female (%)	Summation (%)
A^+	25 (62.5)	15 (37.5)	40 (24.69)	20 (40.82)	29 (59.18)	49 (30.25)
A^-	2 (50)	2 (50)	4 (2.47)	1 (33.33)	2 (66.67)	3 (1.85)
B^+	16 (44.44)	20 (55.56)	36 (22.22)	15 (46.88)	17 (53.13)	32 (19.75)
B^-	2 (50)	2 (50)	4 (2.47)	3 (60)	2 (40)	5 (3.09)
AB^+	5 (55.56)	4 (44.44)	9 (5.56)	3 (37.5)	5 (62.5)	8 (4.94)
AB^-	-	-	-	-	-	-
O^+	32 (53.33)	28 (46.67)	60 (37.04)	26 (54.17)	22 (45.83)	48 (29.36)
O^-	5 (55.65)	4 (44.44)	9 (5.56)	9 (52.49)	8 (47.06)	17 (10.49)
Summation	87 (53.70)	75 (46.30)	162 (100%)	77 (47.53)	85(52.47)	162 (100%)

*statistical analysis showed no significant difference.

Table (4): Distribution of the ABO blood type in various diseases

Blood groups	Arthritis N (%)	Hypertension N (%)	Diabetes N (%)	Heart disease N (%)	Asthma and allergy N (%)	High blood cholesterol N (%)
A^+	5 (10.2)	10 (20.4)	18 (36.7)	5 (10.2)	11 (22.4)	-
A^-	-	-	2 (66.6)	-	1 (33.3)	-
B^+	4 (12.5)	7 (21.8)	15 (46.8)	5 (15.6)	1 (3.1)	-
B^-	-	2 (40)	2 (40)	-	1 (20)	-
AB^+	-	2 (25)	3 (36.5)	1 (12.5)	1 (12.5)	1 (12.5)
AB^-	-	-	-	-	-	-
O^+	2 (4.2)	13 (27.08)	14 (29.17)	10 (20.83)	8 (16.67)	1 (2.08)
O^-	2 (11.77)	4 (23.53)	7 (41.18)	3 (17.65)	1 (5.88)	-

*statistical analysis showed no significant difference.

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