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The correlation between Blood group type and Diabetes Mellitus Type II

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Abstract

Background and objective: Type 2 diabetes mellitus is typically a multifactorial disorder involving genetic and environmental factors to variable extents. The aim of this research was to find out if there is a relationship between the “ABO” and “Rhesus” blood groups and type 2 diabetes mellitus.

Methods: A case-control study was carried out at Azadi Teaching Hospital in Duhok city for six months, from 1st July 2019 to 1st January 2020. The study included 800 individuals including 400 randomly selected diabetic patients and 400 non-diabetic adults of both genders. Standard slide agglutination method at room temperature was performed to determine the ABO and Rh blood groups.

Results: Out of 400 patients, 185 (46.25%) were male and 215 (53.75%) were female. It was found that out of 400 randomly selected patients, majority had O blood group 193 (48.25%), 109 (27.25%) had A, 65 (16.25%) had B, 33 (8.25%) had AB group. A higher frequency of O blood group was encountered among the diabetics comparing to the control (48.25% vs. 37.75%). On applying the Chi-square test, the blood groups O and type 2 diabetes mellitus were found to have a statistically significant relationship (Chi-square value - 8.14, P <0.005) and no statistically significant association between the Rh group and type 2 DM was observed (P >0.05).

Conclusion: According to this study, people with the O blood group are at a greater risk of having type 2 diabetes mellitus, but there was no discrepancy in type 2 diabetes mellitus risk between Rhesus positive and negative classes. The level of blood groups A among diabetic patients is also concluded to be substantially lower.

Keywords: ABO& Rhesus blood groups, Correlation, Diabetes mellitus; Duhok.

Introduction

DM type IIis defined as a chronic hyperglycemic condition, characterized by insulin resistance and declining B-cell function, ultimately leading to B-cell failure.[1] According to the International Diabetes Federation, the global prevalence of diabetes in 2017 was reported to be about 8.8% among adults.[2] The prevalence of diabetes in Iraq increased from 5% in 1978 to 19.7% in 2012, with prevalence of impaired plasma glucose levels reaching up to 48.8%.[3] The reported prevalence of DM type II in Iraqis varies from 8.5% to 13.9%. The prevalence of diabetes in Iraq increased from 5% in 1978 to 19.7% in 2012, with prevalence of abnormal blood glucose levels of 48.8%.[3] Genetic and environmental factors can affect the epidemiology of DM type II. Genetic factors apply their effect following exposure to an environment characterized by sedentary behavior and high-calorie intake.[4]

Blood groups of an individual is genetically determined and hence may have an association with genetically predisposed diseases, for instance, blood group A individuals have been found to be at

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increased risk for stomach cancer,[5] while duodenal and gastric ulcerations are more commonly occur in people with the blood groupO,[6] Blood groups and the Rh factor have also been shown to be useful in predicting periodontitis in other research.[7] Whereas Rh antigens have been linked with an increased risk of breast cancer.[8]

Investigators from a number of nations published a variety of results about the susceptibility of individuals with certain blood group type for diabetes in various populations, the results were controversial. However, few study was conducted in Iraq, Therefore, the current study was conducted to find out if there is any correlation between DM type II and the ABO and Rh blood groups in the Duhok population.

Methods

In this case - control study, a total of 800 individuals including 400 diabetic patients (185 females and 215 males) and 400 non diabetic adults of both genders were enrolled during a period of six months and included in the current study. Diabetic patients who visited the diabetes center and the laboratory department in Azadi Teaching hospital in Duhok governorate were enrolled in this study. The study was explained to the patients and informed consent was taken. Blood samples 2.5 ml were obtained from each diabetic patient and also control group.

These samples were tested directly after blood collection. Anti-A, anti-B and anti-D monoclonal reagents were used to determine patient blood group and rhesus phenotype by slide agglutination method at room temperature. Standard technique and manufacturer's instructions were followed by Lab21 Healthcare Ltd, Goa, United Kingdom.

Apparently healthy students of Duhok Polytechnic University students were taken as control population and their blood groups were registered and applied.

Inclusion criteria:

Patients with DM type II who agreed to be included in study were enrolled regardless of their age, gender, social and economic state, or duration of disease.

Exclusion criteria:

1- Patients with insulin dependent diabetes mellitus

2- Patients unwilling to take part in the study.

Statistical Analysis

Data were entered to an excel sheet and analyzed by Open Epi program and applying Chi-square test to identify any association between blood groups and DM type II. Data were expressed as percentage and absolute numbers of frequency. The P <0.05 was considered to be statistically significant.

Results

The distribution of ABO and Rh blood group among healthy individuals and diabetic patients is shown in Tables 1 and 2. As shown in Table 1, we found increased frequency of blood group O in diabetic patients comparing with the control group (48.25% vs. 37.75%).

In both healthy control and diabetic patient groups, the pattern of the prevalence of ABO blood groups was as follows O>A>B>AB, with blood group A being encountered at higher frequency among controls.

The most prevalent blood group in diabetic patients was O (48.25%) while in controls was less (37.75%). The association between blood group O and DM type II was statistically significant (P <0.005). A negative correlation was found between blood group A and DM type II (P <0.05) with a high proportion of group A individual being non-diabetic.

Blood groups A, B and AB were associated with lower risk of DM compared to blood type O.

As shown in Table 2, the frequency of Rh positive and Rh negative blood groups were almost equal with no statistically significant association between Rh group and DM type II.

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Table 1 Distribution of ABO blood groups in diabetic patient compared to controls

Blood group	Diabetics	Control	Total	*P* value
	No. (%)	No. (%)	No. (%)	
A	109 (27.2)	146 (36.5)	255 (31.9)	0.009
B	65 (16.3)	80 (20.0)	145 (18.1)	0.143
AB	33 (8.3)	23 (5.8)	56 (7.0)	0.126
O	193 (48.2)	151 (37.7)	344 (43.0)	0.005
Total	400 (100.0)	400 (100.0)	800 (100.0)	

Table 2 Distribution of Rh blood group in diabetic patients compared to controls

Rh type	Patients	Controls	Total	*P* value
	No. (%)	No. (%)	No. (%)	
Rh+	368 (92.0)	372 (93.0)	740 (92.5)	0.614
Rh-	32 (8.0)	28(7.0)	60 (7.5)	
	400 (100.0)	400 (100.0)	800 (100.0)	

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Discussion

The governorate of Dohuk is part of the Kurdistan Region of Iraq (KRI), Dohuk borders Turkey and is Iraq's northernmost governorate, with a population of approximately 421858 inhabitants.

In Duhok, there are insufficient epidemiological studies related to diabetes, to our knowledge no previous study of association between blood groups with DM type II has been done in Duhok region.

ABO blood type and Rh factors are genetically inherited traits and there is evidence from literature that persons with certain blood types are more susceptible to have certain diseases. Findings on the association between ABO blood group distribution and DM type II is contradictory; some studies found a negative correlation while others found a positive correlation.

A study of the distribution of ABO and Rh antigens among healthy population of Duhok region in 2014. reported the proportions of blood groups as follows: 42.79% O+, 32.80% A+, 18% B+ and only 5.5% were AB+.[9]

A study conducted by Karagoz et al. found an association between blood type "ABO" and the risk of gestational diabetes, they reported that females with blood types "AB" had a greater chance of gestational diabetes than females with other blood types.[10]Our study showed higher frequency and an association of blood group O with DM type II, this finding agrees with what reported by Aggarwal et al. where they found a significant association between blood group O and DM type II.[11] On the other hand our findings were different from those reported by Kamil et al, Fagherazzi et al. and Bener et al.[12,13,14]

The current study also showed decreased association of DM type II with blood group A, this finding is comparable to the previous studies reported by Kamil et al. and Waseem et al. who found a negative correlation between blood group A and DM type II.[12, 15]

The present study showed no relation between Rh blood groups with DM type II. This is consistent with reports of three other studies.[11,16,17]

The likely reason for these contradictory results can be attributed to the racial and environmental factors which may play a role in the genetic expression of this disease.

Conclusion

The study found a higher blood group O in diabetic patients group comparing to the control group. There is a negative association between the Rhesus blood group and DM type II. Individuals with O blood type need to check their blood glucose level periodically.

Funding

Not applicable.

Competing interests

The author declares that he has no competing interests.

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