Association of ABO Blood Groups with Diabetes Mellitus

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Abstract

The aim of this study is to highlight the potential relationship between blood groups and diabetes for the local population of the city of SuqAl-Shuyuk in Thi-Qar, Iraq. The study included the identification of blood groups to 276 diabetes patients for the period from December 2018 to March 2018. ABO blood groups of all subjects were determined by slide agglutination method. Chi-square statistical analysis among different blood groups between non-diabetic (n= 100) and diabetic population (n= 276) revealed no significant relationship of any blood group with diabetes mellitus (p > 0.05). But relative risk (RR) were calculated in reference to blood group O, it has been observed that slight increase of risk of developing diabetes mellitus among AB (RR 1.111), A (1.045) and B (1.025).

Keywords: Diabetes Mellitus (DM), ABO Blood Groups, A, B, AB, O.

Introduction

Diabetes Mellitus (DM) defines a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin action orinsulin secretion or both (WHO consultation 1999) [1]. Diabetes is generally divided into insulin-dependent diabetes (NIDDM or type 2), characterized by high blood glucose level in the context of insulin resistance to insulin deficiency and insulin-dependent diabetes (IDDM or type 1), the body's failure to create insulin and requires Of patients injected insulin [2].

The main human blood group system is ABO. Since their detection by Landsteiner in 1900 [3] numerous researchers have made effort to determine the significance of particular ABO Phenotype for susceptibility to disease. Some diseases show a strong relationship with ABO blood groups, especially intestinal ulcers much higher in the blood group "O" [4], while cancer of Stomach [5], tumors of salivary glands [6] are more frequent in blood group 'A' individuals .McConnell et al. studied 1333 diabetic patients and concluded increase frequency of A blood group among these diabetic patients [7]. cavazzutti and Tedeschi showed an increased frequency of blood group B among diabetics [8]. Sidhu et al. and Shyamalkoley suggested that there is no association between the distribution of the ABO blood groups and DM [9-10]. Investigations showed varying findings in different countries regarding the susceptible of blood group as risk factor for diabetes mellitus in different population. Since diabetes mellitus is a serious complication of various organs such as eye, kidney, heart, neuron, etc., the current study was carried out to find the association between different ABO blood groups and diabetes mellitus in local population Thi-Qar city.

Materials and Methods

This study was carried out on total 276 diabetic patients which attending Diabetic clinic and Souk Al-Shuyouk Hospital in Thi-qar, Iraq. The study was conducted from December 2018 to March 2018. (197) patients with type 2 (Non-insulin dependent) diabetic and (70) patients with type 1(Insulin dependent, were randomized to this study in addition to 100 healthy blood donors [60 males and 40 females] selected to serve as control groups. After a comprehensive clinical examination of each subject, information was recorded in the spreadsheet. Standard Slide Agglutination Test for the determination of
ABO blood groups was used. Statistical analysis was performed using SPSS statistical software (version 19) and Excel 2010. The analysis was conducted on a set of all eligible subjects enrolled in the study. The prevalence of diabetes in various ABO blood groups was summarized as counts and percentages. Chi-square test and relative risk was used to assess the trends in the prevalence of diabetes and association with categorical data while continuous data were depicted in terms of Mean and SD. The results were significant at p <0.05.

**Results**

The studies have a population consisting of 152 males and 125 females. Most of the populations with average of BMI was (27.80 ± 3.0 kg/m^2). Most of the patients were in < 5 years of duration (38%), 30% patients were diabetic for 5-10 years, 23% of patients were with more than 10 years of DM, and only 9% patients were newly diagnosed. With regards to blood grouping in the control group, maximum subjects were B (40%) followed by O (29%), a (22%) and AB (9%). Among diabetics, most of the patients in diabetic group were B (41%) followed by blood group O (26%), A (23%) and AB (10%).

Comparison of distribution of different blood groups in non-diabetic and diabetic population was found to be similar in both the groups (Figure 1). Chi-square statistical analysis between the different blood groups was observed absence of significant association of any blood type with non-diabetic diabetes (n = 100) and diabetic population (n = 276) (p > 0.05). But relative risk (RR) were calculated in reference to blood group O, it has been observed that slight increase of risk of developing diabetes mellitus among AB (RR 1.111), A (1.045) and B (1.025) (Tables 2).

<table>
<thead>
<tr>
<th>Blood group</th>
<th>DM n (%)</th>
<th>Control group n(%)</th>
<th>RR</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>63(23)</td>
<td>22(22)</td>
<td>1.045</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>B</td>
<td>113(41)</td>
<td>41(40)</td>
<td>1.025</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>AB</td>
<td>29(10)</td>
<td>9(9)</td>
<td>1.111</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>O</td>
<td>71(26)</td>
<td>29(29)</td>
<td>Above values of RR are in reference to Blood group “O”</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

Total 276 patients with type 2 diabetes mellitus and type 1 were included in this study. Of those 276 diabetic patients 124 (45%) were female and 152 (55%) were male. 100 volunteers as control group were selected for this study to compare distribution of ABO blood groups. Age and BMI of both the groups showed (Table 1).

With average age of diabetic patient was (62.0±3.0) years and with average age control subjects was (54.50 ±11.2) years. Average of BMI was (27.80 ± 3.0 kg/m^2) in diabetic subjects and was (26.9±2.7 kg/m^2) in control subjects. Being overweight or obese is the main modifiable risk factor for type 2 diabetes, but in this study most of the population was in the normal BMI. Most of the patients were in (< 5) years of duration (37%), 31% patients were diabetic for (5-10) years, 22% of patients were with more than (10) years of diabetes mellitus, and only 10% patients were newly diagnosed. Most of the patients in diabetic group were B (41%) followed by blood group O (26%), A (23%) and AB (10%). Similar trend also observed in control group i.e. maximum B (40%) followed by O (29%), A (22%) and AB (9%).

This finding of higher frequency of blood group B in both diabetics and control groups (41% and 40% respectively) was similar to Jha S et al. [11], Sharma S et al. [12], Henry MU et al. [13] and Egawa et al. [14]. Zytanoglu I and Maher did not show
significant differences between controls and patients with diabetes [15,16]. 190 patients with diabetes were tested for several hereditary markers of red blood cells and serum, and compared with controls by Dr. K Berg et al. No association was found between diabetes and ABO, as reported in previous literature [17].

While Bibawi and Khatwa from Egypt found increased incidence of Group A and AB and a correspondingly lower incidence of B and O blood group in diabetes [18]. On the other hand, many investigators noticed mixed results. Anderson G. and Lauritsen E. found a significant surplus in group O among diabetics. In female diabetic patients too, there was an increase in O group but not significant [19].Jolly JG and Sarup BM et al. Large odds of the O group were found among diabetics. In female diabetic patients too, there was an increase in O group but not significant [19].Jolly JG and Sarup BM et al. Large odds of the O group were found among diabetics [20]. Jassim again found a significant increase in the incidence of O blood groups from other groups in male and female patients in Baghdad, Iraq [21].

Various clinical studies have shown that individuals of the O-phenotype group are more likely to develop diabetes. When compared by Chi square statistical analysis among different blood groups between non-diabetic (n= 100) and diabetic population (n= 276) no significant relationship of any blood group with diabetes mellitus (DM) was observed (p > 0.05). But relative risk (RR) were calculated in reference to blood group O, it has been observed that slight increase of risk of developing diabetes mellitus among AB( RR 1.111), A (1.045) and B (1.025).

**Conclusion**

We found that person with O+ ve blood group has least chance of developing diabetes mellitus whereas subject with AB + ve blood group are more vulnerable to develop diabetes mellitus. The relationship between ABO and DM blood groups remains unclear despite many studies that point to this subject. The salt question is still - do ABO antigens have any association with DM? No study has convincingly explained the mechanisms by which A or B antigens can modify DM risk. More research is needed to solve this problem.

**References**


15. Zeytinoglu I (1956) Research on the relation of blood groups (ABO) and Rhesus factor (standard) ofindiabetes; predominance of group A in certain complications of diabetes;


