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RESEARCH ARTICLE

The Distribution of the ABO and Rh (D) Blood Types in Patients with Type II Diabetes Mellitus

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Abstract

Objective: To find out the association of type II diabetes mellitus (DM) with different ABO and Rh blood groups.

Materials & Methods: The study involved 253 patients who reported to Haematology Laboratory for blood investigations over a period of 6 months. Based on their hematological findings i.e. Random & Fasting Blood Sugar levels, two groups were created; Group I (Diabetic patients) & Group II (Healthy controls). Both the groups were screened for ABO & Rh blood grouping.

Results: Blood groups AB & B showed less common association, whereas patients with blood group A were associated more with diabetes mellitus (DM), as compared to controls. Blood group O showed similar distribution among both groups. Higher percentage of diabetics than controls had Rh positive blood group (97.3% vs 93.9%), whereas less percentage of diabetics showed Rh negative blood group (6.1% vs 2.7%). Higher percentage of diabetics with blood group B, AB and O were positive, whereas it was same in blood group A.

Conclusion: The results obtained revealed an association between Rh positive blood groups and DM and a negative association between blood groups B & AB, as these groups were less common in diabetics.

Introduction

From the discovery of blood groups since 1900, efforts have been made to discover a possible association between ABO and Rh blood groups and different diseases. The data extracted from various studies on patients with gastric cancer, salivary gland tumors, duodenal ulcer, colorectal cancer, thyroid disorders, ovarian tumors, small cell carcinoma of lung and coronary heart disease have shown association with ABO blood groups.[1-6] This information has made investigators to assume that some other diseases might also be associated with ABO and Rh blood groups. The significance of such associations may help in identifying possible susceptibility to diseases and adopt possible preventive measures to decrease the prevalence.

Diabetes mellitus is a common emerging medical problem worldwide, having significant morbidity and mortality. According to ICMR-INDIAB national study, in India, there are 62.4 million people with Type 2 Diabetes Mellitus[7] and the numbers are expected to increase to 101 million by year 2030.[8]

The etiopathogenesis of diabetes mellitus is multi-factorial & complex and appears to involve interactions of various immunological, genetic and environmental factors.[9] It has a genetic predisposition, although environmental factors do play their role in its genetic expression.[10] Infact, human chromosome 1q21-q23 has shown well replicated linkage to Type-2 Diabetes Mellitus.[11] The ABO blood group genes are mapped at 9q34.2 region in which genetic alteration is common.[12] Like many other inherited traits, blood groups are also genetically predetermined and therefore may have an

association with diabetes mellitus. Hence, identification of a positive association with blood groups might reflect increased susceptibility and a negative association to protection against diabetes mellitus.
Based on this hypothesis, we conducted the present study to find out a possible association between type II diabetes mellitus (DM) and ABO & Rh blood groups.

Materials & Methods

All the patients reporting to Haematology Laboratory for blood investigations over a period of 6 months were included in the study, which involved a total of 253 patients. Written informed consent was obtained from all individuals and they were enrolled irrespective of their age, sex or socio-economic status. Based on their history and hematological findings of Random Blood Sugar (RBS) levels and Fasting Blood Sugar (FBS) levels, two groups were created; Group I (Diabetic patients; RBS > or = 200 mg/dl & FBS > or = 126 mg/dl) & Group II (Healthy controls). Both the groups were screened for ABO & Rh blood grouping. The blood samples were collected by veni-puncture in 4 ml K2EDTA vacutainers and labeled for determination of blood groups. ABO and Rh (D) blood grouping were performed simultaneously using slide agglutination method. Standard technique of serology and manufacturer's directions enclosed with the different blood grouping reagents were followed. All information was recorded on a proforma and saved for record. Analysis of the findings were done to arrive at conclusions. The data entry and statistical analysis was done using statistical package for social sciences (SPSS) version 14 for windows. Contingency Coefficient (CC) analysis was done to prove any association between DM and ABO-Rh blood groups.

Results

Out of 253 patients reporting to the laboratory, only 73 were diabetics (group I) and the rest were healthy individuals (group II). The distribution of ABO and Rh blood group among healthy individuals and diabetic patients were recorded. Frequency of blood groups AB & B were less common in diabetics, whereas blood group A & O were more common, as compared to controls. But on the same side, blood group O showed similar distribution among both the groups. [Table 1] Hence, no association between ABO Blood Group & DM was noted. Higher percentage of diabetics were Rh positive (97.3% vs 93.9%) whereas less percentage of diabetics were Rh negative (6.1% vs 2.7%). [Table 2] Again, no association between Rh blood group & DM was seen. When we considered both ABO and Rh types together, a higher percentage of diabetics with blood group B, AB and O were positive, whereas it was same in blood group A, for both the groups. [Table 3] Even the CC & P values did not show any association between ABO & Rh blood groups and DM. [Table 4]

Other informations inferred from this study are:

Blood group O was the most prevalent group in the whole population (40.7%), diabetics (47.9%) and controls (37.8%), followed by blood group B. Rh positive blood group was the most prevalent in the whole population (94.9%), diabetics (97.3%) and controls (93.9%). Although blood group O>B>A>AB (whole population), no association between ABO & Rh blood groups with DM could be established.

Table 1: Distribution of ABO blood groups in diabetics as compared to controls

Blood Group	Diabetics % (No.)	Controls % (No.)
A	30.1 (22)	24.4 (44)
B	17.8 (13)	30.6 (55)
AB	4.1 (3)	7.2 (13)
O	47.9 (35)	37.8 (68)
TOTAL	100 (73)	100 (180)

CC = 0.151 & P value = 0.117

Table 2: Distribution of Rh blood groups in diabetics as compared to controls

Blood Group	Diabetics % (No.)	Controls % (No.)
Rh Positive	97.3 (71)	93.9 (169)
Rh Negative	2.7 (2)	6.1 (11)

CC = 0.069 & P value = 0.271

Table 3: Distribution of combined ABO & Rh blood groups in diabetics as compared to controls

Blood Group	Diabetics % (No.)	Controls % (No.)
A Positive	95.5 (21)	95.5 (42)
A Negative	4.5 (1)	4.5 (2)
B Positive	100 (13)	94.5 (52)
B Negative	0 (0)	5.5 (3)
AB Positive	100 (3)	92.3 (12)
AB Negative	0 (0)	7.7 (1)
O Positive	97.1 (34)	92.6 (63)
O Negative	2.9 (1)	7.4 (5)

Table 4: Contingency coefficient (CC) & P- values

Blood Group	CC	P value
A	0.000	1.000
B	0.104	0.389
AB	0.123	0.620
O	0.091	0.3356

Discussion

Various contradictory associations between ABO & Rh blood groups with DM have been reported. According to study done by Kamil & his colleagues, blood group A was less commonly seen in diabetics, with the difference that they also found negative association with blood group O.[13] Another study found negative association of blood groups A & B and a positive association with Rh negative blood group with DM.[10,14,17] One more varying finding was a positive association of blood group A and O negative and diabetes.[21] Few others have found no such associations with ABO & Rh blood groups and DM. [15- 20] However, other investigators have found equal distribution of ABO & Rh blood groups among diabetics and non-diabetics.[9, 17, 19, 22]

In the present study, the highest ABO blood group in the whole population considered was blood group O in both diabetics & controls. We found that the association with DM and blood groups, AB & B were less common and blood group A & O more common. With regard to Rh blood group, we noted a positive association with Rh positive and a

negative association with Rh negative blood groups. Combining the ABO & Rh blood groups together, we found equal distribution in blood groups A positive & A negative, greater in B positive, AB positive & O positive and lesser in B negative, AB negative & O negative with DM. Although, we did find some positive & negative associations of ABO & Rh blood groups, they were not statistically significant. Hence, an association with ABO & Rh blood group could not be established.

The possible explanation of these conflicting findings is that the racial and geographical factors have a role in genetic expression of this disease. Moreover, most of the studies conducted have small sample size. Probably studies on larger scale and a meta analysis of work done so far will provide a solution to this dilemma.

Conclusion

Even though an elaborate study to find out the association of type II DM with ABO & Rh blood group if any, showed few positive associations, they were not statistically significant to draw definite conclusions. Studies with larger sample sizes probably will strengthen and signify the findings.

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