The Distribution of the ABO Blood Types in Patients with Diabetes Mellitus

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KEYWORDS Genetic Marker. Polymorphism. Non-Association

ABSTRACT The present study deals with the distribution of the ABO blood types in patients with diabetes mellitus (n = 511). All the samples were collected from Varni Pathology Clinic, Sagar, Madhya Pradesh during March, 1989 to July, 1991. An adequate number of controls (n = 475) were also taken adjusting all the conditions except the disease, for comparisons. For the ABO blood types, standard serological procedures were followed using the anti-A, anti-B and anti-D antisera. The results suggest no association between the ABO blood types and diabetes mellitus.

INTRODUCTION

Diabetes mellitus is a multi-factorial trait. The etiology of diabetes mellitus is complex and appears to involve inter-actions of genetic, immunological and environmental (Ekoe et al., 2001). Infect, human chromosome 1q21-q23 showed well replicated linkage to type-2 diabetes mellitus (Elbein et al., 2005). The ABO blood group genes are mapped at 9q34.2 region in which genetic alteration is common (Guleria et al., 2005). The rationale behind this study was that there might be an association between the ABO blood group and diabetes mellitus. It is reported that the ABO blood group distribution varies in different geographical and ethnic groups, and socio-economic groups (Beardmore and Karimi-Booshehri, 1983). In India, the ABO blood group frequency is variable, the frequency for B ranges from 6% in negritos of Andamans to 48% in Birijas of Bihar while group A is 20-30% in Western and Eastern Himalayas (Barua, 2002). The blood group frequency in North India is B > O > A > AB (Bhasin et al., 1992).

The distribution of the ABO blood group in peptic ulcer and gastric cancer patients was studied by Aird et al. (1954), Clarke et al. (1955, 1959), Buckwalter et al. (1956), Brown et al. (1956), Doll et al. (1960), Beasley (1960), and Sharara et al. (2006). However Rahman (1976) studied on 2312 confirmed cases of diabetes mellitus for the frequency of the ABO blood groups along with 8936 controls. No association was apparent in the subjects studied with the ABO blood groups. Sidhu et al. (1988), Iyengar et al. (1989) and Qureshi and Bhatti (2003) studied in the same direction. In the present study, an attempt has been made to investigate any association with the ABO blood types and diabetes mellitus.

MATERIALS AND METHODS

A total of 511 blood samples from patients with diabetes mellitus (Type 2) were collected from the Varni Pathology Clinic, Sagar, Madhya Pradesh. The samples represented adequately the Brahmin (n=146), Bania (n=127), Kayasth (n=52), Shudra (n=59) and Muslim (n=51). For comparisons, 475 unrelated normal healthy individuals were sampled randomly from the same area matching age, sex, socio-economic status etc. except the disease condition. Since sex differentiations are known not to exist in the ABO blood type system, the samples collected from both males and females were pooled for the various analyses.

For the ABO blood types, standard serological procedures were followed using the anti-A, anti-B and anti-D antisera. Statistical calculations were done using the chi-square test.

RESULTS AND DISCUSSION

In Table 1 the distribution of the ABO blood types in patients with diabetes mellitus and controls is shown. Blood group A is more common (27.98%) in patients than controls (26.74%). Blood group B is also found oftener in patients (38.55%) than controls (37.47%). But in blood group O, the controls are more numerous (26.32%) than patients (24.46%). In blood group AB also, the
controls outnumber (9.47%) the patients (9.00%). These differences, however, are not significant statistically (P>0.05). The allele frequencies in both the patients and the controls are in the order O>B>A.

Table 2 gives the distribution of the ABO blood types and their allele frequencies in patients with diabetes mellitus. Blood group A has the largest phenotypic frequency (35.29%) in the Muslim while the Bania with 23.62% display the lowest frequency for this blood group. For blood group B, the Shudra has the highest frequency (49.15%) and the Kshatria has the lowest (26.32%) of it. The Kshatria has the highest frequency (28.95%) and the Shudra the lowest (16.95%) of blood group O. For blood group AB, the Bania has the highest frequency (12.60%) and the Shudra the lowest (5.08%). The allele frequencies have the order O>B>A in the Brahmin, Bania and the Shudra and have the order O>A>B in the Kshatria, Kayasth and the Muslim.

The distribution of the ABO blood types and their allele frequencies in controls is given in Table 3. The Muslim has the highest phenotypic frequency (35.42%) of blood group A and the Bania with 20.87% display the lowest frequency of it. For blood type B, the Brahmin has the highest frequency (39.42%) and the Shudra the lowest (33.96%). The Brahmin has the highest frequency (29.93%) of blood type O and the Kayasth the lowest (17.78%). For blood group AB, the Shudra has the highest frequency (13.21%) and the Brahmin the lowest (5.84%). The allele frequencies have the order O>B>A in all the controls (except the Muslim).

When the comparisons were made regarding the distribution of the ABO blood types between the diabetic patients from central India (Sagar) and north India (Patiala) (Table 4), it was found that, patients from central India had the higher mean values in blood type A (27.98%) and AB (9.00%) than their north Indian counterparts (19.06% and 7.93% respectively). Patients from north India had the higher mean values in blood type B (42.06%) and O (30.95%) than the patients from central India (38.55% and 24.46% respectively). However, no significant differences (P>0.05) were noted among them ($\chi^2 = 5.18$).

Table 5 shows the distribution of the ABO blood types in controls from central India (Sagar) and north India (Patiala) (Table 5). Controls from central India had the higher mean values in blood type A (26.47%), B (37.47%) and AB (99.47%) than their north Indian counterparts (22.16%, 35.10% and 8.62% respectively), whereas, in blood type O, controls from north India had the higher mean value (34.13%) than the controls from central India (26.32%). Nonetheless, no significant differences (P>0.05) were found between them ($\chi^2 = 7.63$).

Table 1: Distribution of the ABO blood types in patients with diabetes mellitus and controls.

<table>
<thead>
<tr>
<th>Sample</th>
<th>n</th>
<th>Phenotype frequency</th>
<th>Allele frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Patients</td>
<td>511</td>
<td>143</td>
<td>197</td>
</tr>
<tr>
<td>Controls</td>
<td>475</td>
<td>127</td>
<td>178</td>
</tr>
</tbody>
</table>

$\chi^2: 0.6074; P>0.05; H.W. equilibrium = Hardy Weinberg equilibrium.$

Table 2: Distribution of the ABO blood types and allele frequencies in patients with diabetes mellitus.

<table>
<thead>
<tr>
<th>Sample</th>
<th>n</th>
<th>Phenotype frequency</th>
<th>Allele frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Brahmin</td>
<td>146</td>
<td>36</td>
<td>62</td>
</tr>
<tr>
<td>Bania</td>
<td>127</td>
<td>30</td>
<td>53</td>
</tr>
<tr>
<td>Kshatria</td>
<td>76</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Kayasth</td>
<td>52</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Shudra</td>
<td>59</td>
<td>17</td>
<td>29</td>
</tr>
<tr>
<td>Muslim</td>
<td>51</td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>
Finally, comparisons were made regarding the distribution of the ABO blood types in pooled patients and pooled controls from central India (Sagar) and north India (Patiala) (Table 6). Pooled patients had the higher mean values in blood type A (26.22%) and B (39.25%) than their pooled control counterparts (24.36% and 36.24% respectively), whereas, pooled controls had the higher mean values in blood type O (30.35%) and AB (9.03%) than the pooled patients (25.75% and 8.79% respectively). However, no significant differences ($P>0.05$) were noted between them ($\chi^2_{(3)} = 4.36$).

The findings of the present study suggest that there is no association between the distribution of the ABO blood types and diabetes...
mellitus. Non-association of the ABO blood groups and diabetes mellitus was also studied by Sidhu et al. (1988), Iyengar et al. (1989) and Qureshi and Bhatti (2003).

REFERENCES


