‘B’ Blood Group System Risk Factor for Type 2 Diabetes Mellitus Among Sudanese Population

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Abstract: “ABO” blood phenotypes are group of inherited antigen that found on RBCs surface and other tissues. Some studies advocates that “ABO” blood group genotypes would be associated with diseases occurrence like type 2 DM. This case control study was conducted among 200 patients with type 2 diabetes mellitus and 200 apparently healthy individual as control. The ABO phenotype was determined using direct blood group phenotype. Chi-square test was used to assess the possible link between ABO blood groups and type 2 DM. The percentage of blood group B in diabetic patients was significantly higher than in control {odds ratio (OR) 2.069, 95% confidence interval (CI) 1.29-3.32, p value =0.002}. Blood group “B” is positively associated with incidence of type 2 DM, While Blood group “O” has negative association.

Keywords: DM: Diabetes Mellitus, ABO: blood group antigens A, B, AB and O, WHO: world health Organization

INTRODUCTION

Expression of ABO blood group antigens could be predictive factor for disease occurrence. Association of ABO genes and Susceptibility to diabetes mellitus remain doubtful. In Sudan, published data was lacking regarding this association, so our study was conducted to look at this association. Diabetes mellitus (DM) is a group of metabolic diseases in which there is increase in blood sugar levels for long period [1]. Symptoms of increasing blood sugar include increased thirst with frequent urination, and increased hunger. If symptoms left untreated, diabetes can cause many complications [2]. Diabetes is due to either reduction of insulin production from pancreas or in-response of body cells properly to the insulin production [3].

Some studies found linkage between “ABO” blood group and the risk of type 2 diabetes mellitus (DM), but conflicting of results were obtained. Globally 422 million adults are estimated to have diabetes, and type 2 diabetes comprise about 85-90% of the disease. Increase of prevalence of DM reflect of increase in risk factors for type 2 DM notably greater longevity and being over weigh or obese. Type 2 is more common in developed country. 1.5 million Death was estimated by WHO in 2012, making it the 8th leading cause of death [4].

Bener and Yousaftzai in 2012 investigated the association between the “ABO” blood types and DM in Qatar. Their study was conducted among 1633 diabetic patients and 1650 controls. They found that, blood type “B” was significantly common (25.7% vs. 20.4%; \(P < 0.001\)) and blood group “O” was significantly less common in diabetic patients compared to healthy non-diabetic population (38.5% vs. 45.4%; \(P < 0.001\)) [5].

Recent study in 2016 done by S.A. MEO, et al from King Fahd Medical City, Riyadh, Saudi Arabia by meta-analysis, they identified 47 research documents in a data based search including ISI -Web of Science, EMBASE and Pub Med. The result showed that blood group “B” was associated with type 2 DM while blood group “O” has the least association with type 2 DM. Blood group “A” and “AB” were equally distributed in both diabetic and non-diabetic population [6].

In addition, Qureshi and Bhatti in 2003 from Pakistan found that: B blood group was more common
among type 2 DM (70 patients) than that of control, 35.71% Vs 22.14% [7].

Moinzadeh et al evaluated 130 diabetic patients in Iran in 2012. They observed that blood group “B +ve” was more frequent in diabetic patients (30.8%) when compared to control group 24.9%, but statistically was not significant (P = 0.746) [8].

However, Sharma et al did not find an association with “ABO” blood groups with type 2 DM [9].

MATERIALS AND METHODS

This case control study was conducted in Khartoum state (Sudan) a period from March to May 2017. The study population included 200 patients with type 2 diabetic (100 male and 100 female), compared with 200 healthy unrelated individuals as control, were matched according to age and gender.

2.5 ml of venous blood sample for grouping was collected from patients in EDTA container after sterilization with 70% alcohol at the site of venous puncture. Direct blood group test was performed using commercial antisera.

STATISTICAL ANALYSIS

All data was entered and analyzed using statistical analysis soft were SPSS (statistical package for social sciences) version 21. Statistical analysis included descriptive statistic of mean, standard deviation. Odds ratio (OR) with a confidence interval (CI) of 95% was calculated. The paerson’s chi-square test was used to compare the distribution of ABO between diabetic patients and control. P-value less than 0.05 were considered as statistically significant.

RESULTS

200 diabetic patients (100 male and 100 female) and other 200 non diabetic individual (100 male and 100 female) were included in this study. Frequency of Blood group B was significantly more common in diabetic patients than control (30.5 % vs. 17.5 %) {Odds ratio (OR) 2.069, 95% confidence interval (CI) 1.29-3.32, p value =0.002}, whereas blood group O was significantly more common in healthy population compared to diabetic population (52.5 % vs. 38 %) {Odds ratio (OR) 0.57, 95% confidence interval (CI) 0.38-0.84, p value =0.003}.

Blood group AB was the least frequency in case and control, but more frequent in control, with statically insignificantly (3.5 % vs. 6.5 % P = 0.062). Blood group A, statistically has similar distribution in diabetic population and healthy population (27.5 % vs.23.5 % P= 0.60), Table (1).

Statistical analysis showed that there was insignificant difference in all blood groups among diabetic patient between male and female: A, B, AB, and O [P value = 0.650, 0.070, 0.082 and 0.068] respectively, Table (2).

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Diabetic (NO = 200(%)</th>
<th>Healthy individuals (NO = 200(%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>55 (27.5)</td>
<td>47 (23.5)</td>
<td>0.60</td>
</tr>
<tr>
<td>B</td>
<td>61 (30.5)</td>
<td>35 (17.5)</td>
<td>0.004</td>
</tr>
<tr>
<td>AB</td>
<td>7 (3.5)</td>
<td>13 (6.5)</td>
<td>0.062</td>
</tr>
<tr>
<td>O</td>
<td>76 (38.0)</td>
<td>105 (52.5)</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Chi-square test was used to calculate P value
P value less than 0.05 considered significant

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Male (NO = 100(%)</th>
<th>Females (NO = 100(%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24 (43.6)</td>
<td>31 (56.4)</td>
<td>0.650</td>
</tr>
<tr>
<td>B</td>
<td>28 (45.9)</td>
<td>33 (54.1)</td>
<td>0.070</td>
</tr>
<tr>
<td>AB</td>
<td>4 (57.1)</td>
<td>3 (42.9)</td>
<td>0.082</td>
</tr>
<tr>
<td>O</td>
<td>44 (57.9)</td>
<td>32 (42.9)</td>
<td>0.068</td>
</tr>
</tbody>
</table>

Chi-square test was used to calculate P value
P value less than 0.05 considered significant

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DISCUSSION

In this study, comparison of blood groups frequency between diabetic and healthy population was carried out. We found that the frequency of blood group B was significantly higher among diabetic patients when compared with non-diabetic population and no significant difference between A and AB but there is negative association between diabetes and blood group O, this result relatively similar to meta-analysis from 47 research done by S.A. MEO, et al in Saudi Arabia [6].

Also Study from Qatar reported similar findings of higher frequency of blood group B among diabetic patients (25.7% vs. 20.4%; P < 0.001) [5]. In addition, Qureshi and Bhatti in 2003 from Pakistan found that: B blood group was more common among type 2 DM (70 patients) than that of control, 35.71% Vs 22.14%. [7].

Muhammad Kamil from Malaysia found that B blood group was in highest percentage among 70 patients with DM type 2 (35.71%) when compared to controls (22.52%), but statistically insignificant (P=0.423) [10], insignificant in statistic may relate to their low sample size.

But disagreement to this result was appeared in a study conducted in Pakistan showed that blood group AB was more frequent in diabetes than blood group A and B [11].

Also Andersen and Lauritzen studied 992 diabetics in Denmark. They found blood group O increased significantly among male diabetics when compared with controls, and also there was an increase of blood group O in females which was not statistically significant [12].

The possible explanation of conflicting results regarding the association between ABO blood groups and DM could be racial and geographical variations which may play role in the genetic expression of the disease. Also known that the frequency of ABO blood group vary across different populations.

Unfortunately no published data in Sudan was found to be compared with this result. According to our finding Blood group B individual showed carefully regulate their life style to prevent the occurrence of type 2 diabetes, because they more susceptible to the disease than other individual.
Large studies in different ethnic groups are needed to confirm these results with large sample size.

CONCLUSION

Regarding this results Blood group “B” is seems to be risk factor for type 2 DM While Blood group “A” and “AB” has no association with the disease, but blood group O appears to be protective from DM.

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REFERENCES