

ASSOCIATION OF ABO BLOOD GROUPS WITH DIABETES MELLITUS

Dharmendra Dodiya*, Anup Patel **, J.M.Jadeja***

*Associate Professor, Dep. of Physiology, GMERS Medical College, Gandhinagar

**Assistant Professor, Dep. of Physiology, GMERS Medical College, Sola Ahmedabad

***Professor & Head, Dep. Of Physiology, B.J.Medical College, Ahmedabad

Abstracts: Background & objectives – Diabetes mellitus(DM) is multifactorial disease, aetiology of diabetes is complex and involve genetic aspect, Blood group antigens are also hereditary determined and plays a vital role in to understand genetics, inheritance pattern, and disease susceptibility. The rationale behind this study was that there might be an association between the ABO blood group and diabetes mellitus and based on result we can identify the susceptible and adopt some preventive measures to decrease the burden of disease in society. **Materials and Methods**—a cross sectional study was performed on 120 patients suffering from diabetes mellitus had taken detailed history, informed consent and ABO Blood group collected from database, against randomly selected 660 people in the control group who were registered blood donors, not suffering from diabetes mellitus in blood bank of government hospital to find out prevalence of blood group in local population. Appropriate statistical test applied on collected data. **Result**— odds ratio showed there was high relative risk in Blood group B as compare to blood group O & A, however chi-square test does not show there is significant association between ABO Blood group and diabetes mellitus. **Interpretation & conclusion.** – from this study we can conclude that Blood group B persons having high relative risk for developing DM, compared to other ABO blood groups, however large scale study required to find out further association

Key Words: Diabetes Mellitus, ABO Blood Group, Association, Inheritance

Author for correspondence: Dr. Dharmendra.M.Dodiya, Associate professor, Department of Physiology, GMERS Medical College, Gandhinagar, Sector-12, opp. Pathikashram, Gujarat - 382412
e- mail: drdharmesh7@gmail.com

Introduction:

Diabetes mellitus (DM) is a syndrome characterized by hyperglycemia resulting from defects of insulin secretion and/or increased cellular resistance to insulin¹. Diabetes mellitus is a multi-factorial disease. The etiology of diabetes mellitus is complex and involves inter-actions of genetic, immunological and environmental factors². Human chromosome 1q21-q23 showed associated linkage to type-2 diabetes mellitus³. The phenotypic "ABO" blood groups are inherited antigenic substances which are found on the surface of red blood cells. The ABO blood group genes are mapped at 9q34.2 region in which genetic alteration is common⁴. The rationale behind this study was that there might be an association between the ABO blood group and diabetes mellitus. The major human blood group system is ABO and the incidence of ABO groups differs markedly in different races, ethnic groups, and socioeconomic groups in different parts of the world⁵. Blood group antigens are hereditary determined and plays a vital role in understanding genetics, inheritance

pattern, and disease susceptibility. The absence and presence of blood group antigens has been associated with various diseases. It was reported that there are various associations between particular ABO phenotypes and an increased susceptibility to disease⁶.

DM and blood groups are interrelated because of the wide genetic immunologic basis in both⁷. It was reported that the presence of a family history of diabetes resulted in an early onset of the disease to the offspring. These study findings and hypothesis have highlighted the importance of identifying the susceptibility to DM and adopt possible preventive measures to decrease the prevalence in general population.

The World Health Organization (WHO) has projected that the global prevalence of type 2 diabetes mellitus will be more than double from 135 millions in 1995 to 300 millions by 2025.3⁸. Prevalence of Diabetes in the world is 5.1 % in 2003 and by 2025 is around 6.5%. IGT prevalence in the world is 8.2 % in 2003 and

projected to be 9.0% in 2025, Age group 20-79 years⁹.

Studies conducted several decades ago suggested a link between inherited human blood group antigens and the risk of various malignancies, including pancreatic cancer¹⁰⁻¹³.

Material and Methods:

An approval from institutional committee was obtained, Informed consent was taken from all the subjects and study was carried out in accordance with the world medical association declaration of Helsinki.

This was a case control study. Total 120 Patients with known case of Diabetes Mellitus (DM) were recruited from one of the reputed hospital of Gujarat state during year 2009. After taking permission from institutional ethics committee, informed consent in vernacular language and detailed history was carried out for DM. ABO blood group of patients were identified from database of preoperative major profile blood investigations done by central pathology laboratory of hospital. We randomly selected 660 people in the control group who were registered blood donors, free from DM in blood bank of government hospital of Gujarat state to find out prevalence of blood group in local population. ABO Blood group of the recruited subjects was taken from the database of the Blood Bank, government hospital of the Gujarat state. Exclusion criteria were patients' age less than 20 years.

Statistical analysis of data -

Data was analysed using SPSS software version 13. Data was expressed as Mean and percentage. Chi-square test was applied to find out difference of statistical significance. P value < 0.05 was considered statistically significant. Sample size was calculated using Power and Sample Size Calculations software for independent case control study

Table:1 Distribution of ABO Blood group in patients suffering from DM (n=120)

| Blood group | No. of DM patients (%) |
|-------------|------------------------|
| O | 36 (30%) |
| A | 29 (24.16%) |
| B | 42 (35%) |

| | |
|-------|-------------|
| AB | 13 (10.83%) |
| TOTAL | 120 |

Table -1 shows overall excess of DM patients having blood group B followed by blood group O

Table:2 : 1 Distribution of ABO Blood group in Control group (n=660)

| Blood group | Total no. of control (%) |
|-------------|--------------------------|
| O | 207 (31.36%) |
| A | 161 (24.39%) |
| B | 224 (33.93%) |
| AB | 68 (10.30%) |
| TOTAL | 660 |

Table 2 shows prevalence of blood group in general population

Table 3 - Distribution of ABO blood group among cases and control

| ABO Blood group | Study group (DM) | Control group | P value |
|-----------------|------------------|---------------|------------------------------------|
| O | 36 | 207 | Chisquare Test p value >0.05 |
| A | 29 | 161 | |
| B | 42 | 224 | |
| AB | 13 | 68 | |

Result:

After analysing the collected data we found that in our study on applying Chi-square test, p value shows >0.05, so no statistical significant association is seen between cases and control in relation to blood group, however by using odd ratio we found high relative risk with patients having blood group B, as odd ratio found >1 in B type of ABO Blood group, compared to other blood group.

Discussion:

Gujarat is as capital of the silent killer disease diabetes in India but many people in the state are suffering from the disease without actually knowing it. 10 to 12 per cent adult population in the state have suffering from diabetes. In urban areas, the incidence is as high as 16 to 18 per cent.

The problem is getting more serious by the day as more and more young people are being diagnosed with the disease¹⁴.

Previously some studies have carried out in different parts of the world to find out association of ABO Blood group with DM. ABener et al did study in Qatar population and suggested that ABO antigens are associated with DM. DM is more common in individuals with blood group B¹⁵.

Qureshi et al did study in Pakistani population and concluded that the frequency of blood groups B and O is significantly higher and lower respectively in the diabetes mellitus patients as compared to the general population¹⁶. Studies done by Mohammad kamil et al in Malaysian population suggest that there was a negative association between ABO blood groups A and O with DM type 2, with A and O group having less chances of diabetes¹⁷. However study done by Shyamal kole in madhya pradesh population suggested that there is no association between the ABO blood types and diabetes mellitus¹⁸.

Table -4 shows result of the different studies and emphasising type of ABO Blood group associated with DM

| Name of study | Type of ABO Blood group highly associated with DM | *Interpretation (in relation to ABO Blood group) |
|---------------|---|--|
| A Bener et al | B | A having lower frequency |
| Qureshi et al | B | O having lower frequency |
| M kamil et al | - | A & O having negative association |
| Shyamal Kole | - | No Such Association found |

| | | |
|----------------|---|-------------------------------------|
| D Dodiya et al | - | High relative risk in blood group B |
|----------------|---|-------------------------------------|

Conclusion:

Based on this study we conclude that persons having blood group B have high relative risk for DM compared to other ABO blood groups, however on applying chi-square test there is no significant association was found between DM & ABO Blood group. Based on above findings we will develop preventive strategies by early diagnosis and prevent lethal complications of DM. The possible explanation of conflicting results regarding this study compared to other mentioned study could be racial and geographical variations playing role in the genetic expression of the disease as well sample size. Large studies in other ethnic groups and similar population are needed to confirm these results and to find out association. Studies done in Gujarat by D Dodiya et al and in Madhya Pradesh by Shyamal Kole did not find significant association while studies performed in Qatar, Malaysia and Pakistan shows significant association of ABO Blood group with DM.

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