

Is Blood Groups are Risk Factor for Type 2 Diabetes Mellitus?

Dr. B. V. Sudheer M.D.¹, Dr. Shaik Ahamed, MD.²

^{1,2} Faculty member in Department of Medicine, Guntur Medical College, Guntur, A.P, India.

¹ Regional Public Health Laboratory, I.P.M, Guntur, A.P. India

Abstract: No confirmatory studies have been performed in India to look whether the blood group is a risk factor for development of Type 2 Diabetes mellitus. We studied ABO blood groups in Type2 Diabetes Mellitus who are having parental background. In our study the results showing that B and O Blood groups are more associated with the parental History of Diabetes. B and O groups are more associated with the Females with the parental History and A and O groups are more associated with the Males having parental History. But it is not clear why there are associations between blood group type and diabetes.

Keywords: D.M{Diabetes mellitus} ,Blood Group A,B, AB, O,

1. Patients and Methodology

It was a prospective study conducted in 105 patients with Type 2 Diabetes mellitus. We took consent from the study subjects prior to obtaining the information about age of completed years, gender, age of onset of Diabetes and family history of known Diabetes. The age of onset of Diabetes above 30yrs were taken for study. Blood samples were collected from them with consent. The samples were tested for ABO blood groups.

2. Results

The results are analyzed and among the 105 patients examined 45(42.85%) patients are giving the history of parental background, either the mother or father or both parents are having adult onset of Diabetes mellitus.

Table 1

Type 2 Diabetes Mellitus (105)							
DM with Parental History of DM (45)				DM without having Parental history of DM (60)			
A	B	O	AB	A	B	O	AB
10	17	17	1	16	11	28	5

Table 2: Blood Groups distribution In DM Type2 with Parental History of DM

Blood Groups	Number of Patients	Percentage %
A	10	22.22%
B	17	37.77%
O	17	37.77%
AB	1	2.22%
Total	45	

In the study the Patients with blood group B and O is having 37.77% each are having the parental History of adult onset Diabetes mellitus. Whereas patients with Blood group A is having 22.22% and Blood group AB is having 2.22% the parental history of Type2 DM.

Table 3: Blood Groups distribution in Gender wise in Patients of DM Type2 with Parental History of DM

Blood group	Male	%	Female	%
A	8	17.77%	2	4.44%
B	6	13.33%	11	24.44%
O	8	17.77%	9	20%
AB	1	2.22%	0	0%
Total	23	51%	22	48.88%

In the study among the 45 patients 23 (51%) are Male and 22(48.88%) are female. Among the Male Blood group A & O (17.77%each) and in Female blood group B (24.44%) and Blood group O (20%) having the parental History of Diabetes.

3. Discussion

Type 2 Diabetes mellitus is a polygenic disorder, caused by a cluster of susceptibility genes. These genes may be present without the phenotypic manifestations or the disease may be seen in the absence of these genes. It is also possible that these genes vary in various ethnic groups. The genetic etiology is clear in a group of monogenic type 2 Diabetes. Here the gene is clearly identifiable and the phenotypic presentation and treatment approaches well elucidated. These genes operate by producing Insulin resistance or B-cell secretary defect³

No diseases are known to result from the lack of expression of ABO blood group antigens, but the susceptibility to a number of diseases has been interrelated to a person's ABO phenotype. Such correlation remain conflicting and include the observation blood group 'A' persons are more frequently affected with coronary artery disease, venous thrombosis

and atherosclerosis, while 'O' group people are protected against these diseases^(5,6)

Evidence for a genetic basis for type2 DM comes from a clear familial aggregation, but it does not segregate in a classic Median fashion. About 10% of patients with Type 2 DM have a similarly affected sibling. The concordance rate for identical twins is variously estimated to be 33-90 % (17-37% in non-Identical twins) but the interpretation of this is controversial as part of explanation for high concordance may be environmental rather than genetic.

Unlike Type1, Type2 DM is not associated with genes in the HLA region. So for 19 gene variants have been described and validated as being associated with Type 2 DM. Of these, the strongest is TCF7L2.

Both insulin resistance and B- cell dysfunction are early features of glucose intolerance and there has been much debate as to whether one is the primary defect and precedes the other. The contribution of insulin resistance and B-cell dysfunction varies considerably between the patients, as well as during the course of the disease. Usually, there is a decline in both insulin sensitivity and insulin secretion in patients who progress from IGT to diabetes and undoubtedly environmental and genetic factors contribute to this process.

Though some risk factors for Type 2 diabetes are well established such as **Obesity, Physical Inactivity, diet** . But Researchers from France explore the possibility that a person's risk of developing type 2 diabetes may be influenced by their blood type.⁸

About 80% of the people with type 2 DM are obese. The risk of developing DM increases progressively as the BMI increases. A BMI >35kg/sq.meter increases the risk of Type 2 DM over 10year period by 80 fold, as compared to those with a BMI of less than 22 kg/meter sq.

BMI is not an accurate reflection of fat mass or its distribution particularly in Asian people. A simple waist circumference may be better. The central fat deposition has a much higher risk for development of DM compared to gluteofemoral deposition.

Physical inactivity is also a risk factor for DM. Low level of physical exercise predict the development of type 2 DM regardless of other risk factors.

Diet containing large quantities of soft drinks, burgers, sausages and low fiber diet explained 5.7% of insulin resistance as assessed by the HOMA model.

Guy Fagherazz.PhD (Parries-South University Villejuif. France) and his colleagues studied to investigate a relationship between blood type and type2 DM risk. They found there was no difference overall in diabetes risk by Rhesus-group positive or negative .When compared with O-negative, the highest risk was seen in the women with blood type B positive. Types AB positive, A positive and A negative also associated with greater risk compared with O-negative.(Mediscap Medical News December 19, 2014). It

is not clear why there are associations between blood type and diabetes, but they list three possibilities.

- 1)The Human ABO locus might influence endothelial or inflammation markers such as the factor VIII/Von Will brand factor complex, which is present in higher levels in non-O individuals.
- 2)There may be relationship between blood groups and levels of plasma soluble intercellular adhesion molecule 1 (sICAM-1) and /or tumor necrosis factor receptor 2(TNF-R2).both of which have been linked to an increased type 2 diabetes risk.
- 3)A recent paper suggested that blood group “ is one of the genetically determined host factors that modulate the composition of the intestinal micro biota, which participates in the metabolism by affecting the energy balance glucose metabolism , and low grade inflammation” the researchers observe.

4. Conclusion

The evolution of the Type 2 Diabetes in a dramatic way in the developing countries as epidemic made to find new risk factors. In our study the results showing that B and O Blood groups are more associated with the parental History of Diabetes. B and O groups are more associated with the Females with the parental History and A and O groups are more associated with the Males having parental History. But it is not clear why there are associations between blood type and diabetes. We may conclude that blood group might be a risk factor and it can be helpful for the evaluation of the disease.

References

- [1] API Text book of Medicine 9th edition 2012 , Epidemiology and basic considerations of Diabetes: 321-323
- [2] Ramachandran A, MaRC, Snehalatha C. Current scenario of Diabetes in India. J. Diabetes 2009; 1:18-28.
- [3] Abate N, Chandalia M, SalijaPatel, ENPPIK121Q polymorphism and genetic susceptibility to type 2 Diabetes. Diabetes 2005, 54; 1207-13.
- [4] Daniels G. 2nd ed.oxford, UK: Blackwell Scientific; 2002.Human blood groups.
- [5] KhanM.I. Micheal S, Akhtar F, Naveed A, Ahmaed A & Qamar R. Association of ABO blood groups with glaucoma in the Pakisthani Population. Canadian journal of ophthalmology 2009, 44:582-586.29
- [6] Alam M.ABO and Rhesus blood groups in potential blood donors at Skardu (Northern Areas) .Pakistan Journal of pathology 2005; 16: 94-97.30.
- [7] Guy Fagherazz.PhD (Parries-South University Villejuif. France) and his colleagues published a report in Diabetologia Published online December 18, 2014.
- [8] Medical News Today (MNT) updated 22nd December 2014 at 12 am PST.
- [9] American Diabetic Association. The diagnosis and classification of Diabetes mellitus. Diabetes care 2004.27.s5-10
- [10] Harris M,Hadden WC, Knowles WC,Bennett PH. Prevalence of diabetes and impaired glucose tolerance and plasma glucose levels in aged 20 – 74. Diabetes 1987 , 36..523-34
- [11] King.H.Aubert RE, Herman W.Global burden of diabetes 1995-2025. Diabetic care 1998-21: 1414-31
- [12] Adibah H .Idris MN. Osman Apperception and behavior of diabetic patients on Blood glucose maintenance.Int J.Diabetes developing c71-4.