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Research Article

Study of Association between ABO Blood Groups and Diabetes Mellitus

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Abstract: The objective of the study was to determine the relationship between ABO blood groups and diabetes mellitus in the population of Jodhpur city of Rajasthan State [India]. The present cross sectional study analyzes ABO blood group among 400 subjects of every age taken randomly from the local population of Jodhpur city in the duration of January to may 2013. Out of 400subjects, 200 were normal healthy (97 male and 103 female) students of Dr. S.N. Medical College, Jodhpur and remaining 200 were DM patients [53 type 1(Insulin dependent) &147 Type 2 (Non insulin dependent)] attending the OPD of MDM & Umaid Hospital, Jodhpur. ABO blood groups of all subjects were determined by slide agglutination method. Data were analyzed by 'one sample chi square test'. The results obtained in this study indicated that there was no significant difference in the frequency of ABO blood groups in Controls and Diabetic Patients of both Type I & II in all studied subjects [males, females and subjects irrespective of gender]. In our study, frequency of ABO blood groups observed was in an order of B > O > A > AB. We observed this order in both types [I & II] of Diabetic patients. We concluded that no association exists between any of the blood group and any type of DM. Extensive study is needed to establish the correlation.
Keywords: ABO blood groups, Diabetes mellitus, Jodhpur

INTRODUCTION

Diabetes Mellitus (DM) describes a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion or insulin action or both (WHO consultation 1999) [1].

DM is generally divided as insulin-dependent diabetes mellitus (IDDM or type I), characterized by the body's failure to produce insulin and requires the person to inject insulin and non-insulin-dependent diabetes mellitus (NIDDM or type 2), characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency[2]. The number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025 [3]. The major human blood group system is ABO. Since their discovery by Landsteiner in 1900 [4], many researchers have made attempts to determine the significance of particular ABO Phenotype for susceptibility to disease. Certain diseases show a strong association with the ABO Blood groups, notably peptic ulcer is much higher in blood group 'O' [5], where as cancer of Stomach [6], tumors of salivary glands [7] are more frequent in blood group 'A' individuals. Many reports have appeared in recent years suggesting an association between blood groups and DM. McConnell *et al.* studied 1333 diabetic patients and concluded increase frequency of A blood group among these diabetic patients [8]. Tedeschi and cavazzuti from Italy showed an increased frequency of blood group B among diabetics [9]. Sidhu *et al.* and Shyamal koley suggested that there is no association between the distribution of the ABO blood types and diabetes mellitus [10-11]. Investigations in different countries showed varying findings regarding the susceptible of blood group as risk factor for DM in different population. Since DM is a serious complication of various organs such as kidney, neuron, eye, heart etc., the current study was carried out to find the association between different ABO blood groups and DM in local population of Jodhpur city.

METHODS

This cross sectional study was carried out on total 200 diabetic patients attending Diabetic clinic & outdoor of Mathura Das Memorial (MDM) & Umaid Hospital attached to Dr. S.N. Medical College, Jodhpur, India. 53 type 1(Insulin dependent) & 147 Type 2 (Non insulin dependent) diabetic patients were randomly selected for this study. To determine the distribution of ABO blood groups in the population of Jodhpur City,

200 apparently healthy blood donors and medical students [97 males and 103 females] were selected to act as a control group. The study protocol was approved by the ethical review committee of Dr. S.N. Medical College, Jodhpur. The risk and benefit of the study was explained to all subjects and informed written consent was obtained. After a thorough clinical examination of each subject, the information was recorded in a data schedule. Standard Slide Agglutination Test for the determination of ABO blood groups was used. Data thus obtained were analyzed statistically to determine any association between DM and different ABO blood groups. Data were expressed as percent and absolute number of frequency.

'One Sample Chi-Square test' was further applied to determine whether any significant association exists between the frequency of a blood group in DM patients (observed) and in control (expected). It has been hypothesized that frequency of blood groups should be same (1:1) in both DM patients and in controls. Chi-Square statistic and probability were determined by Epi-Info Computer software at 95% confidence limit.

RESULTS

The result of this study showed that the most frequent blood group in Jodhpur city was found to be group B followed by O, A and AB in both males, females and in general population (Table I). Highest prevalence of DM was found in blood groups B then followed by O, A and AB in both males, females and in general population. Table 1 also shows no comparison occur between diabetic & control in males, females and total subjects irrespective of gender belonging to different blood groups.

Table 2 shows the results of One Sample Chi-Square test. No significant association was found between types of blood groups and DM. In our study frequency of ABO blood groups was in the order of B > O > A > AB. We observed the order in Diabetic patients of both type I & II.

Table 1: Percent Distribution of ABO Blood Groups in DM patients (total n= 400)

Blood groups	Male (n=197)			Female (n=203)			Total (n=400)		
	DM (100)		Control	DM (100)		Control	DM (200)		Control
	Type I	Type II		Type I	Type II		Type I	Type II	
	(n=23)	(n=77)	(n=97)	(n=30)	(n=70)	(n=103)	(n=53)	(n=147)	(n=200)
A	30.44	19.48	20.70	20.00	20.00	13.60	24.53	19.72	18.00
B	34.78	41.56	39.17	40.00	35.71	45.60	37.74	38.78	42.50
AB	8.70	9.90	6.18	10.00	10.00	10.80	9.43	9.52	8.50
O	26.08	29.87	31.95	30.00	34.29	30.00	28.30	31.98	31.00

Table 2: One Sample Chi-Square table for association of blood group frequency with DM

		BLOOD GROUPS				P-Value
		A	B	AB	O	
Males	Expected Frequency of DM Patients	23	39	6	32	0.6041
	Observed Frequency of DM Patients	22	40	9	29	
Females	Expected Frequency of DM Patients	13	46	11	30	0.1156
	Observed Frequency of DM Patients	20	37	10	33	
Both Sexes	Expected Frequency of DM Patients	36	85	17	62	0.5745
	Observed Frequency of DM Patients	42	77	19	62	

DISCUSSION

The purpose of this study was to find out the association between different ABO blood groups and DM. Results of this study showed no significant association between Blood Groups and DM. These findings are consistent with the findings of several investigators [10-12].

Zeytinoghlu I and Maher showed no significant difference between controls and patients with diabetes mellitus [12,13]. 190 patients with diabetes mellitus were tested for several genetic erythrocyte and serum protein markers, and compared with healthy controls by Dr. K Berg *et al.* and did not find an association between diabetes mellitus and the ABO system, as reported in earlier literature [14]. But Bibawi and Khatwa from Egypt found increased incidence of Group A and AB and a correspondingly lower incidence of B and O blood group in diabetes [15].

On the other hand, several investigators observed varying results. Anderson J and Lauritzen E found significant excess of group O among male diabetics. In diabetics female too, there was excess of group O but not significant [16]. Jolly JG and Sarup BM *et al.* found significant preponderance of group O among diabetic

patient [17]. Again W.E. Jassim found significantly higher occurrence of blood group O than other groups in male and female patients in Baghdad, Iraq [18]. Different clinical studies have shown that individuals of the O phenotype blood group are more susceptible to Diabetes mellitus diseases.

In Tokyo Naoto Egawa *et al.* found that compared with the non-DM group, the DM group had a higher frequency of blood group B [19]. It is similar to the observation of Joseph A. Buckwalter and Henry *et al.* who analyzed high incidence of Group B among diabetic patients which were in contrast with other studies done in Iowa city & Basrah city [20, 21].

Yet another group of scientists found no difference between the different blood group frequencies in DM patients. In western Algerian population, 280 patients with type 2 diabetes mellitus and 271 healthy controls studied by Dali Sahi M *et al.* and they confirmed that there was no association between ABO/Rh blood group and diabetes mellitus [22].

Rahman M tested 3212 diabetics for ABO blood groups and compared their frequency with normal (8936) subjects. The data were analysed statistically to detect any possibility of an association between ABO blood groups and diabetes mellitus. No such association was apparent in the subjects studied [23]. Kapoor C *et al.* showed no statistically significant correlation in distribution of blood groups (ABO) and secretor status among diabetics as compared to controls [24]. Lamey PJ studied 55 patients with type I diabetics and 50 with type II diabetes & found no significant difference in distribution of ABO blood groups between those with type I and these with type II disease [25].

The association between ABO blood groups and DM is still unclear despite many studies referring to this topic. A burning question still remains - do the ABO antigens have any association with DM? No study has convincingly explained the mechanisms by which either A or B antigens could modify the risk of DM. More research is needed to resolve this problem.

CONCLUSION

Considering all these previous varying results from different part of globe, this study attempted to evaluate the association of ABO blood groups with DM in Jodhpur city of Rajasthan. Data on the association between ABO blood type distribution and Diabetes Mellitus from all over the world are conflicting and most of them show no concrete association. From our study we conclude that no association exists between any of the blood group and any type of DM.

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