

Research Article

Prevalence of ABO blood group in diabetic nephropathy in population of Punjab-Pakistan

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Abstract

The study was designed to find the association between ABO blood group and diabetic nephropathy (DN). This cross-sectional study was conducted at Endocrine Unit and Diabetes Management Centre, Services hospital of Lahore from January 2016 - July 2016. The studied population included 540 subjects that were divided into two groups i) diabetic nephropathic group (n=337) and ii) control group (n=203). Questionnaire was designed to gather information concerning risk factors. The type of blood group was determined by standard agglutination test. Data was evaluated on SPSS software (Version 13). Prevalence was determined by percentages. It has been concluded that DN was more prevalent in females (54.8%) as compared to males (45.1%). It was found that risk factors such as hypertension (44.2%), family history of renal disease (28.1%) and smoking (22.2%) were more prevalent among the diabetic nephropathic group. In the control group, percentage distribution of blood groups A, B, AB and O were found to be 9.35%, 46.7%, 11.8% and 32% respectively. While in the DN group percentage distribution of blood groups A, B, O and AB were found to be 2.96%, 44.5%, 2.67% and 49.8% respectively. In this cross sectional survey, it was found that blood group O was more prevalent in Diabetic Nephropathy group. While in Control group, blood group B was found to be more common. In the control subjects, Rh+ve factor prevalence was 92.6% and among the DN group it was 94.9%. Subjects having blood group O type had greater risk of progressing diabetic nephropathy in comparison with other blood types.

Keywords: ABO blood group; Diabetic nephropathy; Glycemic control; Risk factors; Rh factor

Introduction

In 2000, 177 million people in the world were affected with diabetes mellitus (DM). There are 4 million people in Pakistan having diabetes. It acts as a primary basis of illness and mortality rate.

It presents a terrific challenge to public fitness. There is an endemic proportion of it

worldwide and is also a cause of great socioeconomic problem in the developing countries. During the past two decades, there was a strong increase in the prevalence of diabetes which has caused an alarming situation. It is a primary cause of kidney disease and is also taken as a risk factor for cardiovascular disease (CVD). The

University of Washington estimates that 20-40% of people with diabetes will get diabetic nephropathy at some stage in their lives [1, 2].

According to the International Diabetes Federation (IDF), persons who were suffering from diabetes has been estimated about 1 in 11 adults and this ratio is estimated to reach 1 in 10 adults by the year 2040 [3]. In Pakistan, the prevalence of diabetes was found to be high statistically, extending from 7.6% to 11% by the year 2011 and is likely to increase to 15% in 2030. Among the countries with the prevalence of DM Pakistan lie at number 7 and will probably move to 4th position if the existing circumstances continues. High proportion of diabetes thus poses an enormous challenge in front of health care professionals and other policy makers in Pakistan [2].

Type 1 diabetes mellitus patients constituting 30-40% and patients with type II diabetes mellitus constituting 10-20% develop nephropathy. It may develop in several patients regardless of having good glycemic control. In contrast, prolonged duration of high level of glucose may not trigger nephropathy. These interpretations suggest that factors such as environmental and hereditary factors other than hyperglycemia, also contribute for the progress of diabetic nephropathy [4].

The current study was aimed to examine the blood groups distribution in DN patients in local population.

Materials and methods

Study Population

The cross-sectional study was conducted at Endocrine Unit and Diabetes Management Centre of Services hospital, Lahore. Before carrying out this study, research consent was taken from the ethical committee of Services hospital Lahore. The studied population consists of 540 samples which were further divided into two groups:

Control group (n=203) subjects

Diabetic nephropathic group (n=337) subjects

Sample size was calculated with the help of raosoft sample calculator with confidence level 95%, margin of error 3.86% and taking the expected percentage as 32% in subjects.

A structured questionnaire was designed. It was filled by each selected patient and information regarding gender, age, family history, hypertension, smoking status and other symptoms related to the disease were recorded. Diabetic nephropathy was defined as renal dysfunction with serum creatinine level >1.4 mg/dL in diabetic subjects. Rh factor and blood group were determined through antiserum A, B and D with the help of agglutination method.

Statistical analysis

Data was scrutinized using SPSS version 13.0 (ILO, Chicago). Correlation between blood groups and diabetic nephropathy was examined by means of the chi-square (X^2) test. Prevalence of blood group was determined with the help of acquired percentages.

Results

This cross-sectional study was done on 540 patients that were divided into two groups (i) Control group (ii) Diabetic Nephropathic group. Control group constitutes 203 subjects that include 104 (51.2%) males and 99 (48.7%) females. The diabetic nephropathic group comprised of 152 (45.1%) males and 185 (54.8%) females. In our study, smoking, hypertension and family history were the major risk factors shown in (Table 1). These risk factors are supposed to enhance the probability of development of diabetic nephropathy.

According to this research study, the percentage distribution of blood groups A, B, AB and O in control group were shown as, 19 (9.35%) subjects had blood group A, 95 (46.7%) subjects had blood group B,

subjects having blood group AB were 24 (11.8%) and subjects having blood group O were 65 (32.0%). In 337 diabetic nephropathic group, 10 (2.96%) subjects had blood group A, 150 (44.5%) subjects had blood group B, 9 (2.67%) subjects had blood group AB, 168 (49.8%) subjects had blood group O as shown in (Table 2).

The order of percentage distribution of ABO blood group in the control group was shown as B> O> AB> A while the percentage order for Rhesus factor was

Rh+ve factor > Rh-ve factor. In case of diabetic nephropathic group, the percentage distribution of ABO blood group was as follows: O> B> A> AB while the percentage order for Rhesus factor in patients was Rh+ve factor > Rh-ve factor shown in (Table 3). Blood group O was found to more prevalent among 337 diabetic nephropathic patients i.e 49.8%. This high frequency of blood type O demonstrates that it has significant relation with diabetic nephropathy.

Table 1. Frequency of risk factors in Diabetic Nephropathic group

Sr. No.	Risk Factors	Yes n (100%)	No n (100%)
1	Smoking	75 (22.2%)	60 (29.5%)
2	Family History	95 (28.1%)	55 (27.09%)
3	Hypertension	149 (44.2%)	57 (28.07%)

Table 2. Prevalence of blood groups in control and diabetic nephropathic group

Sr. No.	Blood Group	Control (n=203)	Diabetic Nephropathy (n=337)
1	A	19 (9.35%)	10 (2.96%)
2	B	95 (46.7%)	150 (44.5%)
3	AB	24 (11.8%)	9 (2.67%)
4	O	65 (32.0%)	168 (49.8%)

Table 3. Prevalence Percentage of Rh+ and Rh- among ABO blood groups

Sr. No.	Blood Group	Control (n=203)	Diabetic Nephropathy (n=337)
1	A+	14 (6.89%)	4 (1.18%)
2	A-	3 (1.47%)	1 (0.29%)
3	B+	86 (42.36%)	151 (44.8%)
4	B-	8 (3.94%)	—
5	AB+	20 (9.85%)	10 (2.96%)
6	AB-	3 (1.47%)	1 (0.29%)
7	O+	68 (33.4%)	170 (50.44%)
8	O-	1 (0.49%)	—

Discussion

In several regions of the world, definite distribution of ABO blood group was found. Even within the same country like in Pakistan slight differences have been seen. All the studies done in Punjab showed that blood type B was more prevalent [5]. But in Baluchistan and Sindh

blood group O is more prevalent in local population. In Pakistan, the incidence of Blood group O and B is more than 60% of the population. AB blood group is the least common [6].

Keeping in view the significance of blood group, the current research study was planned to assess the incidence of Rh factor

and ABO blood group in diabetic nephropathy subjects. The present study showed that the most prevailing blood group in diabetic nephropathic group was blood group O (49.8%) followed by B (44.5%), A (2.96%) and AB blood groups (2.67%).

A study was done from 150 medical case records of renal calculi subjects at Chettinad Hospital and Research Institute, Chennai, India. From the case records A, B, O and AB blood groups, Rh factor distribution in renal calculi subjects were collected and percentage distribution was evaluated. It gives an idea that O, B and Rh + ve individuals are more vulnerable for renal calculi [7].

Several evidences have shown that smoking is the crucial factor that triggers the development of diabetic nephropathy disease. In our study, incidence of smoking in 75 subjects was 22.2%. Another cross-sectional study performed in Punjab Institute of Cardiology shows the prevalence of smoking to be 58%. Appropriate Blood Pressure (ABP) in Diabetes Trial showed that 61% of enrollees were smokers. Inquiry of the risk factors showed that there is 1.6-fold increased risk of developing diabetic nephropathy among smokers [8].

In 50% of the patients suffering from diabetes, hypertension results in multiple increases in death rate. Diabetic nephropathy in the patients with diabetes and hypertension results in a 37-fold rise in mortality rate. It was estimated that the population suffering with diabetes will increase from 171-366 million by the year 2030. Approximately 70% of the patients suffering with diabetes have hypertension [9].

The incidence of diabetic nephropathy was increasing in developing countries and it was found to be closely related to ABO-Rh blood group relationship especially the O

positive blood type. In diabetic nephropathy, blood group O was the most prevalent, which is followed by blood group B.

Conclusion

Blood group O is most widespread in diabetic nephropathic subjects while blood type B prevalence was found to be high in control group. The association of Rh positive is found to be higher than Rh negative i.e. 94.9% and 5.04% respectively.

Authors' contributions

Conceived and designed the experiments: S Sharif, Contributed materials/ analysis/ tools: S Sharif & S Naz, Performed the experiments: Z Jamil, Analyzed the data: T Farasat, Wrote the paper: Z Jamil & S Sharif.

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