

Association of ABO blood group with CAD in patients undergoing CAG in Cardiology Department of Dhaka Medical College and Hospital

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Abstract

There are many reports regarding association between ABO and Rhesus blood groups and coronary artery disease. This study has been designed to see the association of ABO blood group with coronary artery disease in patient who were admitted in Cardiology Department of Dhaka Medical College and Hospital and undergoing coronary angiography. A total of 680 patients were studied in this retrospective study. ABO blood group, gender and standard cardiovascular risk factors were determined. In our study 17.5% of the study population were female with mean age of 49.94±10.37 years and 82.5% were male with a mean age 49.68±10.45 years. Most of the patients belonged to blood group B (33.4%). Our results demonstrated the prevalence of CAD in blood group B is much higher than other blood groups which is in contrast with other studies in few other countries including one study done on small groups of people in Bangladesh. Geographical distribution may explain the variation in results among countries.

Key word: ABO blood group, Coronary artery disease.

Introduction:

Many studies have shown the relationship between blood groups and different manifestations of cardiovascular disease, Most of them tried to show relationship between blood group and coronary artery disease. The incidence of coronary artery disease is high in South Asian people¹ and a high coronary mortality is observed among the muslims of Bangladesh and Pakistan, Gujrati Hindus and Panjabi Sikhs^{2,3} but there is no reliable population based data to support this.

Different clinical studies have shown that blood A phenotypes are more susceptible to coronary artery disease.^{4,5} Ischaemic heart disease is prevalent in blood group A phenotype in British male.⁶ Blood group A phenotype is more common in Hungarian patient with CAD.⁷ One study in Bangladesh has done on only 95 patients that showed blood group O phenotype is more commonly associated with CAD.⁸ Northwick Park Heart Study shows that in UK population, the incidence of CAD is significantly higher in patients with blood group AB phenotype.⁹

Our study is designed to investigate the correlation between CAD with ABO blood group phenotype who

had been admitted in Cardiology Department of Dhaka Medical College and Hospital undergoing coronary angiogram(CAG).

Materials and Methods:

Our study population consisted of patients admitted for CAG at Dhaka Medical College Cardiology Department and was performed between September 2009 to December 2012. This study included consecutive patient (n=680) who under went CAG. All this patient undergone CAG and cardiovascular risk factors and blood groups data were collected from preformed data sheet. Approval was taken from Hospital Ethical Committee.

ABO blood groups were determined by standard agglutination techniques. Diabetes mellitus was defined in the presence of a documentation of an abnormal fasting blood glucose or glucose tolerance test, based on the World Health Organization criteria.¹⁰ Arterial hypertension was defined as a systemic systolic blood pressure of 140 mm of Hg or greater and/or a diastolic blood pressure of 90 mmHg or greater, on at least 2 separate occasions and patients were currently on antihypertensive medications.¹¹ Dyslipidemia was defined as a documented total cholesterol concentration >200 mg/dL, high density

lipoprotein (HDL) <40 mg/dL, low density lipoprotein (LDL) >130 mg/dL, and triglyceride level >150 mg/dL.¹²

Results:

Among 680 participants included in the analysis 119 participants were female (17.5%) with the mean age of 49.94±10.37 years ,while 561 participants were male (82.5%) with mean age of 49.68±10.45 years. In this study, 27.9% of the participants who underwent CAG belonged to blood group O, 30.9% to group A, 33.4% to group B and 7.8% to group AB.

Table 1 summarizes the patient's risk factors and their distribution according to different ABO blood groups. Analysis of the distribution of major cardiovascular risk factors in different ABO blood groups did not show any

significant difference between any of blood groups. However distribution of blood groups between male and female showed differences, blood group A(87.6% vs12.4%), group B (78% vs 22%) , group AB (77.4% vs 22.6%) and group O (83.7% vs 16.3%) .

We also assumed that some blood groups might be more prone to cardiovascular risk factors according to previous studies; therefore, we analyzed each solitary blood group specifically to detect a significant difference. Though diabetes mellitus and dyslipidemia were more predominant in 'AB' blood group in comparison to 'non AB' blood group, this was not significant (Table-II). Hypertension was predominant in 'B' blood group compared to 'non B' blood group but this was also found non significant (Table-II).

Table-1

Distribution of risk factors among patients who underwent CAD according to their ABO blood group

Blood group	O N (%)	A N (%)	B N (%)	AB N (%)	Over all	
	190 (27.9)	210 (30.9)	227 (33.4)	53 (7.8)		
Gender						
Male	159 (83.7)	184 (87.6)	177 (78.0)	41 (77.4)	M* 82.5%	P=0.042
Female	31 (16.3)	26 (12.4)	50 (22.0)	12 (22.6)	F** 17.5%	
Age	49.62±9.79	49.41±10.65	50.13±10.64	49.62±11.11	49.73±10.43	
Smoking	69 (36.3)	74 (35.2)	73 (32.2)	19 (35.8)	235 (34.6)	NS(p=0.13)
Hypertension	98 (51.6)	100 (47.6)	123 (54.2)	22 (41.5)	343 (50.4)	NS(p=0.08)
Diabetes	51 (26.8)	46 (21.9)	62 (27.3)	15 (28.3)	174 (25.6)	NS(p=0.18)
Dyslipidaemia	136 (71.6)	155 (73.8)	167 (73.6)	42 (79.2)	500 (73.5)	NS(p=0.09)
Family history of premature CAD	18 (9.5)	10 (4.8)	23 (10.1)	3 (5.7)	54 (7.9)	NS(p=0.23)

*Male , **Female

Table-II

Distribution of risk factors among patients who underwent CAG within each specific Blood Group

	Hypertension	Diabetes Mellitus	Dyslipidaemia
O blood group	51.6%	26.8%	71.6%
Others	50.0%	25.1%	74.3%
	P=NS(p=0.15)	P=NS(p=0.064)	P=NS(p=0.17)
A blood group	47.6%	21.9%	73.8%
Others	51.7%	27.2%	73.4%
	P=NS(p=0.23)	P=NS(p=0.19)	P=NS(p=0.20)
B blood group	54.2%	27.3%	73.6%
Others	48.6%	24.7%	73.5%
	P=NS(p=0.08)	P=NS(p=0.07)	P=NS (p=0.12)
AB blood group	41.5%	28.3%	79.2%
Others	51.2%	25.4%	73.0%
	P=NS(p=0.054)	P=NS(p=0.34)	P=NS(p=0.10)

Discussion:

The association between ABO blood groups and the development of atherosclerosis is still unclear despite several studies addressing this topic. We attempted to evaluate the impact of ABO blood groups in a large population of patients undergoing CAG in whom major coronary risk factors were known. The results of the present study do not seem to claim a links between blood group phenotype as a risk factor for coronary artery disease. The results obtained in this study show the prevalence of CAD in blood group B is higher. We believe the blood group B patients, in addition to a greater risk for cardiovascular disease, had other high risk factors but their (risk factors) relation with blood groups is not statistically significant. Although there are similar surveys supporting our study,¹³ there are reports with different results from Whincup et al,¹⁴ from European countries,¹⁵⁻²³ and from the United States.²⁴ A higher frequency of A and B groups and a paucity of group O patients was found in those with prior MI in a South African case-controlled study.²⁵ In the Hoorn study²⁶, non-O blood group was associated with a 2-fold increased cardiovascular mortality compared with blood group O. In another study by Amirzadegan et al,²⁷ blood groups in patients who had undergone CABG was compared with data derived from the blood transfusion organization of Iran and concluded that the blood group could not serve as a risk factor for CAD. It has been suggested that atherogenic constituents in clarified butter, commonly used in cooking, constitute a possible cause of the high CAD risk among Asians,²⁸ and is the basis for advising Asians to reduce saturated fat intake on a mass scale, to lower average plasma cholesterol. In our study, hyperlipidaemia in patients with B blood group was considerably more than patients of other blood groups. The relationship between ABO blood phenotype and the total serum cholesterol level has remained controversial. Some surveys claim cholesterol levels were significantly elevated in the blood group A compared to non-A group.^{29,30} Alternatively, other studies disapprove any relationship between lipid serum level changes and the phenotype B group.³¹ We think that environmental factors could be more important than genetic factors as the stimulus of cardiovascular diseases. Our results obtained in blood group AB are less conclusive. The number of individuals with phenotype AB included in the study was only 7.8%. More work is needed regarding blood group AB because this is the least common blood group in the in Bangladeshi population and was the least well represented in our study.

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