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Study of Association of ABO Blood Group Antigens with Coronary Artery Disease.

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ABSTRACT

Background: Although almost 400 blood group antigens have been reported, the ABO and Rh have been recognized as the major clinically significant blood group antigens. Research on ABO group system has been of immense interest, due to its medical importance in different diseases Aim: To study the relationship between type of ABO blood group and incidence of coronary artery disease. **Methods:** This study was conducted in the Department of Cardiology and Medicine, Government Rajaji Hospital Madurai. Patients admitted with clinical features of acute myocardial infarction confirmed by ECG and patients admitted with angina pectoris clinically were included. Detailed history, general examination, cardiovascular examination and relevant investigations were done in all patients. **Results:** Incidence of coronary Artery disease is predominant in 'A' group. Incidence of Arrhythmias are more in 'A' group. Complications like LV clot and LV dysfunction do not have relationship with blood group. **Conclusion:** Type of ABO blood group seems to have an impact on the risk of coronary artery involvement and the type of blood group effects on severity of CAD. Incidence of coronary Artery disease is predominant in 'A' group.

Keywords: ABO blood group, ischemic heart disease, association

INTRODUCTION

Coronary artery disease also known as ischemic heart disease is a common cause of death in the adults. It may present as sudden death, but more usually causes angina pectoris, myocardial infarction (heart attack), or heart failure. It can also lead to the change of heart rhythm. Factors associated with an increased risk of developing coronary artery disease include diabetes, cigarette smoking, high blood pressure, obesity, and a raised concentration of cholesterol in the blood.[1] Compared to other illnesses, ischemic heart disease causes more deaths and disabilities and incurs greater economic costs in our modern world. Ischemic heart disease is the common, serious, chronic and life-threatening disease in the United States, where more than 12 million people have ischemic heart disease, more than 6 million have angina pectoris, and more than 7 million have a sustained myocardial infarction.[2]

The ABO blood group system consists of three main alleles [two co-dominant (A and B) and one recessive (O)].[3,4] The A and B alleles of the ABO locus encode A and B glycosyltransferase activities, which convert precursor H antigen into either A or B determinants, the A and B antigens having an extra saccharide unit to the O unit (N-acetylgalactosamine and galactose, respectively). Group O individuals lack such transferase enzymes and express basic unchanged H-antigen.[5] Notably, the ABO antigens are expressed not only on the surface of red blood cells but also on a variety of human cells and tissues, including epithelia, platelets, vascular endothelia and neurons.[6]

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AIM

To study the relationship between type of ABO blood group and incidence of coronary artery disease.

MATERIALS AND METHODS

This study was conducted in the Department of Cardiology and Medicine, Government Rajaji Hospital Madurai. The patients for the study were taken from those admitted as inpatients or those attending outpatient departments of Medicine and cardiology.

Inclusion Criteria

Patients admitted with clinical features of acute myocardial infarction with ECG confirmation, patients admitted with angina pectoris clinically also ECG wise and patients getting drugs for IHD from the department of medicine-cardiology.

Exclusion Criteria

Those patients having congenital heart disease, and rheumatic heart disease were excluded from the study.

Detailed history, general examination, cardiovascular examination were done in all patients. Relevant investigations were done. NYHA and Killips classification were used to assess the severity of myocardial infarction.

RESULTS

Our study group consisted of Males 84% (97 patients) and females 16% (18 patients). This shows male dominance in the prevalence of coronary artery disease.

Age group of patients ranged from 28yrs to 75 yrs. Majority of patients were in the age group above 50 & they contributed 64% of the total. Prevalence of young ischemic heart disease patients was 11% that is 13 patients out of 75.

Myocardial infarction forms the major part of our study group. They contribute 74% of the total with 86 patients. Other patients included were clinical angina 15.6%, asymptomatic but with ECG evidence of IHD 5% & symptomatic but normal ECG 5 patients.

In the total of 115 patients, 40 patients were of 'B' group among that 36 were males & females 4. Group B is the common blood group in our part of the country. Next was the 'O' group which constituted 37 patients in total. 'A' group and 'AB' group contributed 28 and 10 patients respectively.

Anterior and inferior wall myocardial infarction were common in 4 group of patients. The clot was found in only one patient who belonged to A group with diabetes mellitus as the risk factor in post menopausal stage. Her ejection fraction was 34%. In O group 2 patients had the ejection fraction less than 40.

Presentation with Killip class I was seen in 49%patients, class II in 32% of patients. 8 patients were with Killip class IV among 8 patients, 2 patients expired belonging to 'A' group, and one belonging to the 'O' group.

The incidence of arrhythmia is more common in anterior wall myocardial infarction. It is mainly seen in A and B group individuals, and it was more commonly seen in A group of patients than in the B group.

Incidence of LV clot was more common in 'O' group patients followed by B group patients. They contributed 37% and 32% of patients respectively in the total of 18 patients.

LV clot is more common in anterior wall contributing to 83%. It is seen in 17% of inferior wall MI patients. Presence of LV clot increases the risk of stroke due to embolism.

Ejection fraction of less than 40% was seen in 37.5% (15 patients) B group and 27% (10 cases) of O group.

Table 1: Acute Coronary Syndrome

Acute Coronary Syndrome	Number of patients	Percentage
Myocardial infarction	86	74%
Clinical Angina	18	15.6%
Asymptomatic but with ECG evidence of IHD	6	5%

Table 2: Blood Group And Region Of Infarct

Region Of Infarct	A	AB	B	O
Anterior wall MI	2	1	1	1
Inferior wall MI	3	1	1	1

Table 3: Analysis Of Myocardical Infarction

Type of infarction	A1+ve	B+ve	A1B+ve	O+ve
Anterior wall MI	11	1	5	19
Inferior wall MI	9	11	4	10

Table 4: Clinical presentation with Killip's class.

Killips Class	Number of patients	%
Class I	44	49%
Class II	28	34%
Class III	6	9%
Class IV	8	8%

Table 5: Incidence Of Arrhythmias

Arrhythmias	A1	B	AB	O
Anterior wall MI	4	1	Nil	Nil
Inferior wall MI	2	1	Nil	Nil

Table 6: LV Clot In Relation To Blood Group

Blood group	LV clot	%
'A' group	4	21%
'B' group	6	32%
AB group	2	10%
'O' group	7	37%

Table 7: LV clot in relation to nature of infarction

Region of infarction	LV clot	%
Anterior wall MI	15	84%
Inferior wall MI	3	16%

DISCUSSION

The association between ABO blood groups and the development of atherosclerosis is still unclear despite several studies addressing this topic. There is a very distinct difference among the blood types with regard to the incidence of heart disease. Platt et al studied correlation between blood group and cardiac infarction in two different age groups. The patients were divided into two groups: those who were older than 65 years and younger. The

predominance of blood group A in patients with cardiac infarction was highly significant in both age groups (p less than 0.005).[7]

Sari et al. (2008) reported that the distribution of ABO blood groups in patients with MI was quite similar to that in control group and that of general Turkish population, which supports the idea that ABO blood group might not be significantly associated with the development of MI.[8] Biancari et al. (2002) found a very similar frequency of ABO blood groups among patients undergoing coronary artery bypass graft (CABG) surgery compared to the general population, suggesting that ABO blood groups have no impact on the development of coronary artery disease.[9]

A result of cross sectional study in India about association between ABO blood group and Myocardial Infarction (MI) in Jodhpur city was significant association between B blood group and MI.[10] Other Indian study in Bengal show significant association between O blood group and IHD.[11] In Britain, higher incidence of IHD in towns with high prevalence of blood group O was observed.[12]

CONCLUSION

ABO blood group seems to have an impact on the risk of coronary artery involvement and the type of blood group effects on severity of CAD. Incidence of coronary Artery disease is predominant in 'A' group. Complications like LV clot and LV dysfunction do not have relationship with blood group. Controversies between the association of blood group and CAD can be due to several confounding factors such as diabetes mellitus, hypertension and smoking. Other important factor is of race and genetics which may have different impact on relationship between blood groups and coronary artery involvement among Asian and European population. In addition, socioeconomic condition, environmental and life style may have some effect on correlation of ABO blood group and CAD.

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