Research Article

Study of association of ABO blood group with ischemic heart disease

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Abstract

Background: Increasing use of blood group distribution in the study of diseases has prompted us to use this technique in an attempt to assess the role of genetic factor in development of ischemic heart disease (IHD).

Objectives: To see whether ABO blood group has an independent association with IHD besides other factors such as age, sex, religion, smoking, alcohol, occupation, hypertension, DM, and family history of myocardial infarction.

Materials and Methods: This study includes 410 subjects with history of chest pain. The presence of IHD is ruled out by Rose questionnaire followed by ECG and blood grouping.

Results: The incidence of IHD was three times more among blood group A and B subjects as compared to blood group O subjects.

Conclusion: Significant association of ABO blood group and IHD is present.

KEY WORDS: ABO blood group, ischemic heart disease, association

Introduction

The blood group represents a system of antigenic determinants found on the surface of blood cells. ABO blood group was the first system to be described and remains most significant in transfusion medicine. The blood group antigens play a critical role in susceptibility to many infections. Landsteiner discovered three blood groups A, B, and O in 1900. Identification AB was done in 1902 by decastello and Struli.[2] In humans, 26 blood Group systems with 228 antigens have been Identified.[3] The genes for A and B blood group found on chromosome 9p and expressed in Mandalian co-dominant manner suggested by Epstein and Outenberg 1905.[4] There exist racial and community differences in the distribution of blood groups in different country.[5] First time the correlation between the blood groups and diseases was given in the year 1953.[6] The elevated F VIII and VWF are important prevalent risk factor for both ischemic diseases and venous thromboembolism.[7] Genes other then F VIII gene (Xq 28) and VWF gene (12P12) exert major quantitative effect on plasma FVIII and VWF levels.[8] FVIII and VWF levels were 25% lower in blood Group O individual.[9] The influence of hereditary Factors is difficult to recognize. The blood group studies are now being used to assess the role of such factors. The blood groups were excellent examples of genetic polymorphism.[10] The different blood groups react differently to environmental stimuli, thereby different blood groups should have different susceptibility to human diseases. Many blood group studies have been done in IHD; the results have so far been inconclusive. These inconclusive reports lead us to conduct a study to find out association of ABO blood group distribution and ischemic heart disease (IHD).

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Materials and Methods

This study was undertaken in Government Medical College, Jammu. This study was done on 410 subjects; they were selected from Medicine Outpatient Department of Government Medical College, Jammu. All subjects were personally interviewed to screen them for general information such as age, sex, occupation, and others. The Rose questionnaire[11] recommended by WHO was to be filled in by all the subjects under study in their local language for the presence or absence of IHD, history of DM, HT, and family history of IHD. General physical, CVS and respiratory system examination was done. Blood grouping of all the subjects were done by rapid slide test.

Diagnosis criteria

Rose questionnaire: It includes information on symptoms such as pain or heart attack or any pain lasting for half an hour or more.

ECG: The person responding to Rose questionnaire were subjected to ECG recording and a case of myocardial infarction (MI) and angina reported.

HT: As per JNC classification.

BMI = wt (kg)/Ht (mt)^2 obesity defined as BMI of 30 or more for males and 28.6 or more for females.

Statistical Analysis

Data were compiled and tabulated by using standard appropriate statistical technique, which includes Chi square test and $P < 0.05$ was considered statistically significant.

Results

The relationship between religion and sex-wise distribution among person suffering from angina and MI was not statistically significant. Incidences of MI and angina occur more commonly among subjects over40 years of age. The relationship between age and IHD was statistically highly significant, whereas the relationship between obesity, diabetes mellitus, and physical activity with IHD was not statistically significant. Table 1 shows the prevalence of MI (34.51%) and angina (15.78%) was highest in those who were nonsmokers as compared to smoker. The nonsmokers had strong association with IHD and this relationship was statistically highly significant.

As exhibited in Table2, the blood group B is predominant among MI subjects (38.49%), followed by 'A' (32.74%), AB (17.25%), and the lowest number of subjects with blood group 'O' (11.50%). Angina was most common among blood group 'A' (37.59%) subjects, followed by blood group B (31.57%), AB (17.29%), and the lowest percentage is seen in blood group 'O' (13.53%). The controls have the highest number of 'O' blood group subjects (41.17%). The occurrence of IHD was more prevalent among A, B, AB than O blood group subjects. Blood group 'B' subjects were more prone to MI and blood group 'A' subjects to angina. The blood group O subjects had least tendency to develop IHD. The males and females were divided into four age groups 20–30 years, 31–40 years, 41–50 years, and >50 years of age.

Highest number of males with MI were in the age group of 31–40 and 41–50 years. Whereas angina in males is most common in the age group of 20–30 years of life. Occurrence of MI in females is common in the age group of 20–30 and 31–40 years, whereas angina in 31–40 years of life.

Higher percentage (54.42%) of patients suffering from MI had HT and 40.60% of Pt with angina had HT. There is no case of HT reported in control group. Findings are statistically highly significant.

It is evident from Tables 5 and 6 that in this study the proportion of MI increases from lowest i.e. 9.02% among patient in agriculture and labor occupation to 14.28% and 32.33% among those doing no occupation and those doing business, respectively. The highest proportions (43.36%) of MI cases were seen among those who were in service. In case of angina, reverse trends was observed, whereas females doing household work (60.21%) as compared to those in services (36.55%) and those females doing no work (3.22%). These observations were found to be statistically significant.

Discussion

This study reveals that the subjects with blood group A and B had a highest probability of IHD and blood group O subjects had a least chance ($P = 0.00010$ highly significant). These findings are in accordance with Gertler and White[12] who reported excess off blood group A and B over group O, in a series of 81 cases of myocardial infarcation. Allan and Dawson[13] observed that there are significantly less number of IHD with blood group O. Contrary to present observation, Oliver and Cumming[14] and Neuman et al.[15] found no significant relationship between blood groups and IHD.

Ischemic Heart Disease and Risk Factor

Age It is one of the nonmodifiable risk factor for coronary artery disease and peak incidence is attained between 51 and 60 years.[16] The overall prevalence of IHD is highest among subjects with age less than 40 years. In this study, the mean age of occurrence of MI was 38.87 years and 31.62 for angina, which is similar to the findings by Shah.[17] MI was more common among blood group A people and they have tendency to have it early in life[18] as compared to O blood group subjects. Postmenopausal women appeared to have lower risk of MI; it is consistent with study of Allan and Dawson.[13] Donnell et al.[19] found low plasma level of factor VIII and VWF; low levels have been recognized as a cause of bleeding. Whereas increased levels may represent an important and prevalent risk factor for both IHD and venous thromboembolism. The ABO blood group focused on chromosome 9q34 and

Table 1: Association of smoking with IHD

Personal habit of smoking	MI	Angina	Control	Total
Present	78 (34.51%)	21 (15.78%)	12 (23.52%)	111 (27.07%)
Absent	148 (65.48%)	112 (84.21%)	39 (76.47%)	299 (72.92%)
Total	226	133	51	410

$\chi^2 = 15.24$; $P = 0.00049$ highly significant.

Table 2: Blood group distribution among IHD and control subjects

Blood group	MI	Angina	Control	Total
A	74 (32.745%)	50 (37.59%)	8 (15.685%)	132 (32.19%)
B	87 (38.49%)	42 (31.57%)	16 (31.37%)	145 (35.36%)
AB	39 (17.25%)	23 (17.29%)	6 (11.76%)	68 (16.58%)
O	26 (11.50%)	18 (13.53%)	21 (41.17%)	65 (15.85%)
Total	226	133	51	410

$\chi^2 = 31.53$; $P = 0.0001$ highly significant.

Table 3: Relation of blood pressure with IHD cases and controls

B.P	MI	Angina	Control	Total
NR & Pre-HT	103 (45.57%)	79 (59.39%)	51 (100%)	233 (56.82%)
HT	123 (54.42%)	54 (40360%)	Nil	177 (43.17%)
Total	226	133	51	410

$\chi^2 = 50.77$; $P = 0.0000$ highly significant.

Table 4: Association of alcohol intake with IHD

Personal habits of drinking alcohol	MI	Angina	Control	Total
Present	54 (23.89%)	20 (15.03%)	3 (5.88%)	77 (18.78%)
Absent	172 (76.1%)	113 (84.96%)	48 (94.11%)	333 (81.21%)
Total	226	133	51	410

$\chi^2 = 10.66$; $P = 0.0048$ highly significant.

Table 5: Correlation of occupation with IHD among males

Occupation	MI	Angina	Control	Total
Agriculture	12 (9.02%)	31 (44.28%)	4 (13.33%)	47 (20.17%)
Service	59 (43.36%)	20 (28.57%)	12 (40.00%)	91 (39.05%)
Business	43 (32.33%)	15 (21.42%)	7 (23.33%)	65 (27.89%)
No occupation	19 (14.28%)	4 (5.71%)	7 (23.33%)	30 (12.87%)
Total	133	70	30	233

$\chi^2 = 39.76$; $P = 0.000001$ highly significant

Table 6: Correlation of occupation with IHD among females

Occupation	MI	Angina	Control	Total
Household	56 (60.21%)	46 (73.01%)	9 (42.85%)	111 (62.71%)
Service	34 (36.55%)	12 (19.04%)	10 (47.61%)	56 (31.63%)
No work	3 (3.22%)	5 (7.93%)	2 (9.52%)	10
Total	93	63	21	177

$\chi^2 = 10.15$; $P = 0.03$ significant.

exerts a major quantitative effect on plasma F VIII – WVF complex levels. The levels of FVIII and WVF were 25% lower in blood group O individuals than in blood group A, B, AB. The blood group O has protective role against IHD.

Sex: IHD is common among men as compared to women.[20]

Hypertension It has been traditionally regarded as a one of the main risk factors for coronary artery disease both in older as well as younger individuals.[21–24]

Diabetes mellitus: Our results were similar to study of British Regional Heart study 1985;[23,25] they dismissed DM as a significant risk factor for IHD.

Smoking: Framingham heart study[26] has termed smoking as a major risk factor for IHD, as it lowers HDL cholesterol and fibrinogen, aggregates platelets and decreases oxygen-carrying capacity of blood.[27] In this study, IHD is more common among nonsmoker.

Alcohol: Majority of patients were alcoholic.

Obesity: Shah[17] found no positive correlation between obesity and CAD.

Family history of IHD: The influence of hereditary over a disease is difficult to recognize blood group studies are now being used to assess the role of such factor. Fisher[10] 1930 showed that blood groups are excellent examples of genetic polymorphism: different susceptibility to human diseases. In this study, strong association was found between the presence of family history of IHD and occurrence of IHD.

Conclusion

The differentiation of role of genetic from environmental factors becomes an important issue, as environmental influence may be modified. The increasing use of blood group distribution in the study of disease has prompted us to use this technique in an attempt to assess the role of genetic factors in the development of IHD.

In depth, analysis of blood groups was done in order to establish any significant co-relation of blood groups to IHD. The subjects underwent general physical examination after administration of Rose questionnaire, and ECG was also done for all the subjects who were having Rose questionnaire positive.

Following conclusions were drawn:

This study reveals that highest incidence of MI was seen among subjects with blood group B, where as angina was common among blood group A subjects. When a sex-wise distribution was done, it was observed that males with blood group B and females with blood group A had a higher prevalence of MI, whereas angina was more common among blood group A subjects of both sexes. The incidence of IHD was three times more among blood group A and B subjects as compared to blood group O and AB subjects and occurrence was higher among subjects with age less than 40 years mean age with MI 38.89 + 9.64 years and 37.62 + 9.26 years. IHD is more common among men as compared to women. The ratio of males to females with MI was 1.4:1 and angina was 1:1. The mean BMI of subjects ranged 13–52 with mean value of 25.4 (SD 4.79). The relation of obesity and diabetes mellitus with IHD is statistically insignificant (P =– 0.07). Alcohol, HT, and presence of history of MI had a strong association with IHD. 54% of subjects with MI had HT and 40% subjects with angina had a HT. IHD was more common among men who pursued occupation with sedentary of life style. Whereas 62.21% females engaged in household work had MI and 73.01% had angina.

This study was aimed to find out association of ABO blood group distribution with IHD. The blood group A and B subjects had more prevalence of IHD followed by AB blood group subjects and least in O' blood group subjects.

IHD can be prevented in subjects with these two blood groups by regular exercise, decreasing body weight, and adapting healthy dietary habits. Obesity needs to be controlled from childhood.

Psychological factors including depression, anger, etc can be avoided and mental relaxation should be adopted by practicing Yoga to overawe IHD.

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