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ASSOCIATION OF THE ABO BLOOD GROUPS WITH DIAGNOSED CASES OF ISCHAEMIC HEART DISEASE

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Abstract:

Objective: *The main purpose of this study was to observe the association of the ABO Blood groups with diagnosed cases of Ischaemic Heart Disease with a more vigorous attempt to find coronary artery risk factor in predisposed blood groups and to evaluate the patients for coronary artery disease in predisposed blood group who are presenting with chest pain with normal E.C.G specially with predisposing coronary artery disease risk factors and/ or positive family history.*

Material & Methods: *Study Design: Simple descriptive study. Study Setting: This study was conducted in the department of Cardiology Liaquat University Hospital at Hyderabad. Sample Size: Two Hundred One Patients. Duration of Study: Six Months, from September 2009 to February 2010. Sample Technique: Convenience.*

Results & Conclusion: *The results obtained show that in 201 patients included in this study, the prevalence of IHD in blood group A is higher than in all other ABO groups. This study was conducted to assess the association of ABO blood group with IHD. It is found that blood group A+ is more associated with Ischaemic Heart Disease in our setup. This finding is also supported by the studies conducted in other parts of the world. This study also found that Dyslipidaemia is more common in blood group A+ individuals as compared to Hypertension and Diabetes Mellitus. The findings of our study indicate additional screening in the patients of predisposed blood group for IHD and its risk factors and can help the public and patients. The observations of the study also suggests for further research regarding molecular and genetic basis of association in IHD and ABO blood groups, especially in blood group A+.*

Key words: *Association of ABO Blood Groups, Diagnosed Cases, Ischaemic Heart Disease*

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INTRODUCTION:

Ischaemic Heart Disease is a major public health problem and the most important cause of premature death in the developed as well as developing countries. The clinical manifestations of Ischaemic Heart Disease include angina pectoris (stable and unstable), acute myocardial infarction, heart failure, arrhythmias and sudden cardiac death. The symptoms caused by heart disease result most commonly from myocardial Ischaemia, (Ischaemia refer to lack of oxygen due to inadequate perfusion). Ischaemic Heart Diseases are conditions of diverse aetiology all having in common disturbance of cardiac function due to an imbalance between oxygen supply and demand. The most common cause is atherosclerotic disease of coronary arteries; also arterial thrombi, spasm, and rarely coronary emboli as well as by ostial narrowing due to luetic aortitis. IHD is defined as myocardial impairment due to an imbalance between coronary blood flow and myocardial requirements caused by changes in the coronary circulation. IHD comprises acute and temporary as well as chronic conditions, and may be due to functional changes or organic disease. Ischaemia due to non-coronary haemodynamic changes such as aortic stenosis is excluded. The term "IHD" is synonymous with the term “coronary heart disease”. Other terms are no longer favored[1]. There are evidences to suggest that over the past 3 decades in Pakistan the incidence of coronary heart disease (CHD) has increased [2]. It has been observed that CHD occurs at an earlier age in the Pakistani population and the gender gap is narrower compared to women who reside in the more developed countries. The effect of urbanization is apparent in the studies of immigrant Asians from the Indian subcontinent in Western Europe and North America in whom the incidence and severity of CHD is higher than the native population[3]. Asian women in particular have severe forms of CHD[4,5]. In Pakistan changing lifestyles of lower middle class urban communities may be the operative factor in the observed increase in the incidence of CHD in Pakistan. The aetiology of the CHD is not known, however the risk factors have a strong statistical correlation with the development of CHD and it has been shown that the modification of the risk factors leads to a reduction in this risk. Recently a long-term population-based study has shown a strong correlation of the incidence of CHD with prevalence of risk factors indicating that majority of the incidence of CHD in a population could be explained by the prevalence of the risk factors. Thus by using data on the prevalence of risk factors in a community, it is possible to project the future burden of CHD in a population. A community-based population study in Pakistan was undertaken by the National Institute of Cardiovascular Disease and it was found that while comparing two communities, one semi- rural and the other urban, the targeted communities were not representative of the entire Pakistani population. The overall prevalence of Ischaemic Heart Diseases in men was 2.3% in the rural and 4.7% in the urban populations and corresponding values for women over 25 years were 1.1% and 2.0%. The prevalence of Hypertension was 16.3% in men and 20.4% in women in the rural community and 15.9% in men and 16.7% in women in the urban community. A recent study of 3 urban communities around Karachi has shown that the prevalence of Hypertension was 19.9% in men over 18 years and 20.9% in women so it appears that the prevalence has risen. Comparison of hospital-based studies shows that the incidence of CHD among hospital admissions with heart ailments has increased dramatically from 1.7% in 1944–48 to 17.9% in 1958 to 41.8% in 1967 to 75.8% in men and 51.8% in women in 1981[6]. The demographic and risk factor profile of a homogeneous population can be used to plan national preventive interventions but this cannot be done for the non-homogeneous population such as Pakistan. As industrialization proceeds in Pakistan, the rural communities will increasingly become urbanized and with employment their purchasing power will increase which may adversely change their lifestyles. This change, we hypothesize, can be detected by comparing the risk-factor profile of the entire nation against the community under change[7]. Karl Landsteiner, an Austrian scientist discovered that the RBCs of some individuals were agglutinated by the serum from other individuals. He noted the patterns of agglutination and showed that blood could be divided into groups. The four basic ABO phenotypes are O, A, B, and AB. After it was found that blood group A RBCs reacted differently to a particular antibody (later called anti-A1), the blood group was divided into two phenotypes, A1 and A2[8]. Many reports have appeared in recent years suggesting an association between blood groups and various manifestations of heart disease. Clinical studies have shown that individuals of the A phenotype blood group are more susceptible to cardiovascular diseases. The incidence of Ischaemic Heart Disease is higher in patients with blood group A[9]. Likewise, in the Hungarian population, again blood group A is more common in patients with CHD. This is contrasted by the Northwick Park Heart Study which showed that, in the investigated UK population, the incidence of ischaemic heart disease is significantly higher in patients with blood group phenotype AB than in those with groups O, A or B. Study was designed to investigate the correlation of ABO blood

groups and CHD in the South Asian population, as the distribution of ABO blood groups in South Asia is different from the one in Europe, Middle East, North Africa, USA, and Australia. ABO blood group and more recently high von Willebrand factor (VWF) and factor (F)VIII levels have been associated with thrombotic disease. An excess of non-O blood group has long been recognized in patients with Ischaemic Heart Disease and venous thrombosis. It has been demonstrated that non- O blood group, high VWF levels and high FVIII levels all increased the risk of deep vein thrombosis [10].

The main purpose of this study was to observe the association of the ABO Blood groups with diagnosed cases of Ischaemic Heart Disease with a more vigorous attempt to find coronary artery risk factor in predisposed blood groups and to evaluate the patients for coronary artery disease in predisposed blood group who are presenting with chest pain with normal E.C.G specially with predisposing coronary artery disease risk factors and/ or positive family history.

MATERIAL AND METHODS:

Study Design: Simple descriptive study. Study Setting: This study was conducted in the department of Cardiology Liaquat University Hospital at Hyderabad. Sample Size: Two Hundred One Patients. Duration of Study: Six Months, from September 2009 to February 2010. Sample Technique: Convenience.

Inclusion Criteria: Subjects were selected by following inclusion criteria.

1. All male and female patients diagnosed as Ischaemic Heart Disease on the basis of History, E.C.G and Echocardiography and Cardiac Biomarkers where applicable.
2. Age above 30 years.

Exclusion Criteria: All individuals with normal ECG and echocardiography were excluded.

Data Collection Procedure

All patients meeting the inclusion criteria were selected through proforma and an informed consent was taken. All patients were underwent careful history, physical examination, laboratory investigation (e.g. Blood CP, urea, creatinine FBS, RBS, Serum electrolyte, Blood grouping and Lipid Profile), E.CG. CXR, Echocardiography and Cardiac Biomarkers where applicable. Bloods were drawn from Fasting Patients for assay of Glucose and Cholesterol levels by standard laboratory methods.

Data Analysis

Data was entered and analyzed by SPSS Version 10 on Computer descriptive Synopsis Statistics.Percentage and frequencies were calculated for risk. Mean plus Standard deviation (SD) were calculated. Chi-square was used to compare the qualitative out come with level of significance 0.5. Student T-test was used to compare the numeric outcome.

RESULTS:

Total number of patients enrolled were 224 out of which 23 were excluded (13 were discharged on request, 06 had incomplete investigations, 03 were below the age of 30 years, and 01 was already studied and presented with second MI during this study period). The remaining 201 patients which matched the inclusion criteria were studied. Results are as follows:

The mean age of the patients were 53.2 years, standard deviation was 10.9 year. Ranged 55 years. Minimum age distribution was 30 years and maximum age distribution was 85 years. Total no of patient's 201 out of which 162 (80.6%) male and 39 (19.4%) female. Out of 201 patients, 169 (84.1%) had history of chest pain and 32 (15.9%) suffered no chest pain. In this study 191 (95%) had no history of palpitations and only 10 (5%) had history of palpitations. It was found that 140 (69.7%) had no history of shortness of breath but 61 (30.3%) patients had history of shortness of breath. Out of 201 patients, 200 (99.5) had no history of shock and only 1 (0.5%) had history of shock. It was found that 199 (99%) had no history of Loss of Consciousness and only 2 (1%) patients had history of Loss of Consciousness. In this study, 116 (57.7%) had no history of hypertension but Eighty five (42.3%) patients had positive history of hypertension. One fifty nine (79.1%) had not revealed history of Diabetes Mellitus but forty two (20.9%) patients had history of Diabetes Mellitus. Out of 201 patients 112 (55.7%) were smokers and 89 (44.3%) were non-smokers. Out of 201 patients, 198 (98.5%) gave no any history of Dyslipidaemia but only 3 (1.5%) had history of Dyslipidaemia. One forty one (70.1%) had not given past history of IHD but sixty (29.9%) had past history IHD. In our study, one eighty three (91%) had not revealed family history of hypertension but only eighteen (9%) had positive family history of hypertension. Out of 201 patients, 158 (78.6%) had not given family history of IHD but 43 (21.4%) had positive family history of IHD. Out of 201 patients, one ninety two (95.5%) patient's not revealed family history of Diabetes Mellitus but nine (4.5%) patients gave family history of Diabetes

Mellitus. Out of 201 patients, 200 (99.5%) had no family history of Dyslipidaemia and only one (0.5%) patient had family history of Dyslipidaemia. Out of 201 patients cardiac enzymes were elevated in one fifty two (75.6%) and in forty nine (24.4%) patients the cardiac enzymes were normal. The Trop-T was done where applicable in ninety three patients out of which seventy eight (83.9%) patients showed positive results and in fifteen (16.1%) patients it was negative (but they were known old ischaemic patients). In this study out of 201 patients 175 (87%) patients had some form of abnormal lipid profile levels and 26 (13%) had showed normal lipid profile levels. In this study of 201 patients we found 178 (88.6%) patients had normal chest X-Ray and 23 (11.4%) had abnormal Chest X-Ray. Out of 201 patients we found 197 (98%) patients showing abnormal ECG changes and only 04 (02%) presented with nonspecific ST-T changes. Out of 201 patients we found 189 (94%) patients showing abnormal echocardiographic findings with RWMA while only 12 (06%) showed normal LV function with no RWMA. And in this study of 201 patients all undergone for blood grouping, and we observed that, sixty six (32.8%) were A+ , 04 (02%) were A- , 61 (30.3%) were O+ , 01 (0.5%) was O-, 45 (22.4%) were B+ , 04 (02%) were B- and 19 (9.5%) were AB+ and 01 (0.5%) was AB- . Association of ABO blood group with IHD were analyzed using Chi-squire at the p=0.023 , which shows a positive association of group A with onset of IHD .In 66 patients with blood group A+ , an abnormal lipid profile (Dyslipidaemia) was present in 56 (84.8%) patients, Hypertension was present in 27 (40.9%) and Diabetes Mellitus was present in 16 (24.2%) patients. These findings of our study also indicate that Dyslipidaemia is more common with blood group A+.

Table 1: Basic characteristics of patients n=201

Basic characteristics	Frequency (%)
Age (Mean±SD)	53.23±10.90 years
Gender	
Male	162(80.6%)
Female	39(19.4%)
Diabetes mellitus	
YES	42(20.9%)
NO	159(79.1%)
Dyslipidemia	
YES	03(01.5%)
NO	198(98.5%)

Table 2: Family history of patients n=201

Family history	Frequency (%)
Family History of HTN	
YES	18(9.0%)
NO	183(91.0%)
Past History of IHD/MI	
YES	60(29.9%)
NO	141(70.1%)
Family History of DM	
YES	09(04.5%)
NO	192(95.5%)
Family History of IHD	
YES	43(21.4%)
NO	158(78.6%)
Family History of Dyslipidaemia	
YES	01(0.5%)
NO	200(99.5%)

Table 3: Patients distribution according to cardiac enzyme and trop T n=201

cardiac enzyme and trop T	Frequency (%)
Cardiac enzyme	
Elevated	152(75.6%)
Not elevated	49(24.4%)
Trop-T	
Positive	78(83.9%)
Negative	15(16.1%)

Table 4: Patients distribution according to Lipid profile n=201

	Frequency	Percent
Normal	26	13.0%
Abnormal	175	87.0%
Total	201	100.0%

Table 5: Blood Groups of the patients n=201

	Frequency	Percent
A+	66	32.8%
A-	4	2.0%
B+	45	22.4%
B-	4	2.0%
O+	61	30.3%
O-	1	0.5%
AB+	19	9.5%
AB-	1	0.5%
Total	201	100.0%

Table 6: Three Major Coronary Risk Factors in 66 Patients of Blood group A+

	DM	HTN	Lipid Profile
Present	16 (24.2%)	27 (40.9%)	56 (84.8%)
Absent	50 (75.8%)	39 (59.1%)	10 (15.2%)
Total	66/ 201	66/ 201	66/ 201

Table 7: Patients distribution according to Echocardiography n=201

	Frequency	Percent
Normal	12	6.0%
Abnormal	189	94.0%
Total	201	100.0%

DISCUSSION:

The results obtained show that in 201 patients included in this study, the prevalence of IHD in blood group A is higher than in all other ABO groups, this is in accordance with a study by Whincup et al[9] and some other studies as well[11]. It was revealed in this study that patients having IHD were had age mean of (53.2 years) male were (80.6%) and female were (19.4%), which shows higher incidence of IHD in males, which is similar to other studies as well. Among patients, with blood group A+, the percentage was (32.8%) with P value = 0.023. whereas patients with blood group O+ were (30.3%) and B+ were (22.4%). This indicates that blood group A+ is more associated with Ischaemic heart disease. This finding of our study is also supported by the studies done elsewhere in the world [9,11,12]. Some studies regarding the major cardiovascular risk factor association with ABO blood groups was also done in the world, according to a study done at King Edward Medical University Lahore[13] there is no any relationship of risk factors with ABO blood groups but a study done by Abdollahi in Iran[14] suggest that family history of CAD is associated with ABO blood groups. Some studies (in world literature) however also suggest the association of Dyslipidaemia[15-17]. Hypertension[16,18] and Diabetes[19-21] with ABO groups. In our study, we analyzed Diabetes Mellitus, Hypertension and Dyslipidaemia in high prevalent blood group A+ and found that Dyslipidaemia was present in (84.4%) patients, whereas HTN was present in (40.9%) patients and DM was present in (24.2%) patients, suggesting that Dyslipidaemia to be more common in blood group A+ as compared to Hypertension and Diabetes Mellitus. In this study of 201 patients, other risk factors of IHD were also assessed. It was found that patients having Hypertension were (42.3%) and patients with positive family history of HTN were (09%). In this study, 20.9% of patients had positive H/o Diabetes and only (04.5%) had positive family H/o D.M, history of Dyslipidaemia was present in only (1.5%) patients, family history of Dyslipidaemia was present only in (0.5%) patient, but abnormal lipid profile (Dyslipidaemia) was found in (87%) patients. The history of smoking was present in (55.7%) patients, which also suggests the association of these risk factors to IHD, and is in accordance with other studies as well [15, 163, 22, 23]. Out of 201 patients cardiac enzymes were elevated in (75.6%) and in (24.4%) patients the cardiac enzymes were normal. Trop-T was done where applicable in ninety three patients out of which (83.9%) patients showed positive results and in (16.1%) patients it was negative (but they were known old ischaemic patients). In this study of 201 patients we found 88.6% patients had normal chest X-Ray and (11.4%) had abnormal Chest X-Ray. Out of 201 patients we found (98%) patients showing abnormal ECG changes and only (02%) presented with non specific ST-T changes (and these four (02%) patients revealed abnormal cardiac biomarkers and / or echocardiographic findings. Out of 201 patients we found (94%) patients showing abnormal Echocardiographic findings with RWMA while only (06%) showed normal LV function with no RWMA

(and these 12 (06%) patients either revealed abnormal ECG or abnormal cardiac biomarkers).

CONCLUSIONS:

This study was conducted to assess the association of ABO blood group with IHD. It is found that blood group A+ is more associated with Ischaemic Heart Disease in our setup. This finding is also supported by the studies conducted in other parts of the world. This study also found that Dyslipidaemia is more common in blood group A+ individuals as compared to Hypertension and Diabetes Mellitus. The findings of our study indicate additional screening in the patients of predisposed blood group for IHD and its risk factors and can help the public and patients. The observations of the study also suggests for further research regarding molecular and genetic basis of association in IHD and ABO blood groups, especially in blood group A+.

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