

ABO BLOOD GROUPS AND SERUM LIPIDS IN PATIENTS WITH ISCHAEMIC HEART DISEASE

Israr Ahmed Akhund, Anwar Ali Akhund, Irshad Ali Alvi, Hafeezullah & Ahmed Kamal Ansari

To assess the association of Blood Groups with Serum Lipids in patients with ischaemic heart disease, two hundred patients were reviewed. Patients belonging to blood group A had higher mean serum cholesterol levels ($p < 0.01$) than those belonging to Groups O, B and AB. Slightly higher than upper normal values of serum cholesterol were also seen in group A healthy control. Statistical analysis revealed that the blood group A was an independent risk factor for the development of Ischaemic heart disease.

INTRODUCTION

Several recent reports^{12,3} have demonstrated the predominance of blood group A in patients with ischaemic heart disease, suggesting a possible association between blood type A and atherosclerosis. The other studies have shown higher serum cholesterol levels in patients of this blood group^{4,5,6}. There is, also a significant relationship between triglyceride levels and blood group A⁷. Their results indicate that the individuals who have A antigen are more susceptible to develop hyperlipidaemia^{8,9}.

The aim of present study was to investigate the lipoprotein and lipid pattern in patients with Coronary Heart Disease (CHD) and healthy controls, divided according to their blood types in the ABO system i.e. blood type A, B, O and AB.

MATERIALS AND METHODS

Two hundred patients with CHD were selected during six months' period from wards of National Institute of Cardiovascular Diseases, Karachi, Civil Hospital, Karachi and Peoples Medical College Hospital, Nawabshah. All the patients were personally interviewed and their hospital records reviewed. A careful history was taken. The patients with incomplete records and atypical features were excluded. The blood grouping was done on the site by simple agglutination method¹⁰ by mixing the blood with antisera, i.e. Anti-A and Anti-B.

ISRAR AHMED AKHUND, Physiology Department, B.M.S.I., JPMC, Karachi.

ANWAR ALI AKHUND, Professor & Head of Department of Pathology, Peoples Medical College, Nawabshah.

IRSHAD ALI ALVI, Postgraduate Student of Medicine, Dow Medical College, Karachi.

HAFEEZULLAH, Assistant Professor Physiology, Sind Medical College, Karachi.

AHMED KAMAL ANSARI, Professor & Chairman Physiology Department, JPMC, Karachi.

Then 10 c.c. fasting blood samples were collected from antecubital vein for the estimation of serum cholesterol, HDL-c, LDL-c, VLDL-c and Triglycerides. Serum cholesterol, Triglycerides and HDL-c were estimated by the enzymatic-colorimetric methods^{11,12} while LDL-c and VLDL-c were estimated according to Levy¹³.

The same procedures were followed for healthy controls. One hundred fifty controls were taken. The controls comprised of non-smokers, non-obese, nondiabetics, with no preexisting cardiovascular disease, no high blood pressure and not taking hypolipidaemic drugs.

RESULTS

In table-1, the mean values of serum lipids of all the patients with CHD are expressed in relation to ABO blood groups. The mean levels of serum cholesterol in blood group A patients were significantly higher ($P < 0.01$) than that in patients with blood group B and AB. However, the differences observed were markedly significant ($P < 0.05$) when group A patients were compared with O.

Table-1 Comparison of Lipid Profile of IHI patients with different blood groups

PARAMETER	A	B	O	AB
S. Cholesterol (mg/dl)	234.5 ±2.92	216.4** *±2.15	223.4** ±3.93	218.4** *±1.35
S. Triglyceride (mg/dl)	161.8 ±1.24	157.7** *±1.38	159.6 ±1.28	158.2* ±1.20
HDL-C (mg/dl)	26.22 ±0.49	27.90 ±1.24	26.48 ±1.00	26.28 ±0.91
LDL-C (mg/dl)	166.2 ±2.20	147.1** *±3.47	165.5 ±2.48	160.7* ±1.43
VLDL-C (mg/dl)	128.3 ±2.35	122.0** ±2.39	130.1 ±2.95	127.0 ±2.01

*** = $p < 0.01$, ** = $p < 0.02$, * = $p < 0.05$

Regarding triglyceride levels, there was no significant difference between A and O, but highly significant difference was observed when A group patients were compared with B, and just significant difference ($P < 0.05$) was observed in T.G. values between A and AB.

There was no significant difference found among the values of HDL-c levels in A, B, O and AB blood group patients with CHD. The differences in the level of LDL-c in blood group A patients were highly significant, when compared with B, just significant when compared with AB and there was no significant difference seen between A and O. Regarding VLDL-c, the differences were found non-significant between A, O and AB, but markedly significant differences were noted between the values of A and B blood group patients with CHD.

In table-2, we compared the healthy controls of different blood groups. Mean serum cholesterol levels in blood group A healthy control were slightly higher than the upper normal values. The difference was highly significant, when compared with the other blood groups.

Table-2: Comparison of serum cholesterol and triglycerides in the control (Healthy) subjects

Parameters	A	B	O
S. Cholesterol (mg/dl)	221.6 ±1.52	210*** ±1.53	209.3*** ± 1.43
S. Triglyceride (mg/dl)	148.5 ±1.66	145.5 ±1.75	146.2 ±1.65

*** = p < 0.01, ** = p < 0.02, * = p < 0.05

DISCUSSION

The finding that serum cholesterol varies with ABO blood group, being highest in the blood group A patients than those of O, B or AB supports the results of the studies done by Whiccup *et al.*,⁴ and Tarian *et al.*⁶ The association of blood group A with higher than normal serum cholesterol levels in whites is consistent with several reports in healthy population" \ In a sample of Bogalusa Louisiana healthy adults serum total cholesterol was higher in those with blood group A among whites but also higher in those with blood group B in blacks, independent of age, weight and sex^{16,17}. Another recent study done by Gillum *et al.*,⁵ has shown that blood group A was associated with higher serum cholesterol levels in whites independent of age and weight. Others have also found slightly higher levels of serum cholesterol in both healthy men and women with blood group A, compared to those of blood group O, B or AB^{18,19}. In the present study, mean serum cholesterol levels in blood group A healthy control were slightly higher than upper normal values. So our study is in agreement with studies done by Garrison *et al.*,¹⁸ and Gillum *et al.*,⁵ Our population which comprised of Asians has also shown same results, but in blood group B controls, it was in normal values, in this respect, our study is different from the previous studies^{16,17}.

Hagerup *et al.*⁸ found significant relationship between Triglyceride levels and group A patients alongwith

higher serum cholesterol levels. In the present study, it was found that the T.G. levels in blood group A patients were significantly higher as compared to B, this is in agreement to the previous studies⁸. However, there was no significant difference seen in the Triglyceride levels in blood group A and O, just significant difference was found when A was compared with AB. In healthy controls, the mean levels of serum Triglycerides were seen in normal values.

Regarding HDL-c values, our study is in agreement with Horby *et al.*,²⁰ who also found no significant difference in HDL-c levels between A and non-A blood groups. In the present study, the levels of LDL-c in group A patient with IHD were significantly high, when compared with B and just significant in comparison with AB. In this respect, our study is in contrast to findings of Horby *et al.*²⁰ We didn't found significant differences in LDL-c values between blood group A and non-A groups. However, there was no significant difference found when A was compared with O blood group, as seen by Horby *et al.*²⁰

The existence, in the normal subjects of blood group A, of a slightly higher than upper normal levels of serum cholesterol suggests the possibility of an association between blood group A and atherosclerosis, but the mechanism of association is unknown. Possibilities include a pleomorphic effect of blood group genes to determine both red blood cell antigens and some aspect of cholesterol metabolism. Another possibility is linkage i.e. the location of genes associated with some determinants of serum cholesterol level on chromosome 9, the site of ABO genes.

CONCLUSION

The serum cholesterol levels were significantly higher in blood group A patient than non-A suffering from CHD. The levels in blood group A healthy control were also slightly higher than the upper normal values. Further genetic and wide scale population research is needed to determine the nature of the association of blood group A with serum cholesterol. This could be facilitated by the identification of genes specifying control of lipid metabolism. Other genetic markers need to be identified. Studies of ABO blood groups would be of interest in inherited disorders of lipoprotein metabolism for which the likely mode of transmission has been established.

REFERENCES

1. Allan T.M, and Dawson A.A: ABO blood groups and ischaemic heart disease in men. Br. Heart. J. 1977; 30: 377-82.
2. Morris T: ABO blood groups in occlusive and ectatic arterial disease. Br. J. Surg, 1973; 60; (11): 892-93.
3. Morton N.E: Genetic markers in atherosclerosis. A review; J. Med. Genet, 1976; 13:81-90.

4. Whincup D.G.C, Phillips A.N, Shaper A.G: ABO blood groups and ischaemic heart disease in British men. *B.M.J.* 1990; 1679-82.
5. Gillum R.F, Hyattsville, Maryland: Blood groups, serum cholesterol, serum uric acid, blood pressure and obesity in adolescents.
6. Tarjan Z, Tonelli M, Duba J, Zorandi A: Correlation between ABO and RH blood groups, serum cholesterol and ischaemic heart disease in patients under going coronarography. *Orv. Hetil*, 1995; 136(15):767-769.
7. Oliver M.F, Geizerova H, Gunning R.A. Heady J.A: Serum cholesterol and ABO and Rhesus blood groups *Lancet*, 1969; ii: 605-606.
8. Hagerup P.H, and Skov F: Serum cholesterol, serum triglycerides and ABO blood groups in population of 50 years old Danish men and women. *Am. J. Epid*, 1972; 95(ii): 99-103.
9. Comenwett J.L, Davis J.T.J.R, Garrett E: ABO blood groups and serum lipids in female atherosclerosis. *J. Cardiovac. Surg.* 1983; 24: 658-661.
10. Dacie J.V, and Lewis S.M (1984): in practical haematology. Churchill Livingstone, Edinburgh.
11. Varley H, Govenlock A.M, Bell M: Practical clinical Biochemistry. Vol: 1 London: William Heinemann Medical books, 1980; 388-95.
12. Richmond W: Estimation of Cholesterol by enzymatic method. *Clin. Chemist.*, 1973; 19:1350-2.
13. Levy RA: Enzymatic determination of LDL-cholesterol. *Clinical chemistry*, 1981; 27:653-62.
14. Garrison R.J, Havlik R.J, Harris R.B, Feinleib M, Kannel W.B, Padgett S.J: ABO blood groups and cardiovascular disease. *Atherosclerosis*, 1979; 25:311-18.
15. Medalie J.H, Papier B.A, Goldbout U, Levene C, Dreyfuss F, Oron D: Blood groups and hypertension. *Isr. J. Med. Sci*, 1973; 9:989-94.
16. Fox M.H, Webber L.S, Srinivasan S.R, Thurmon T.F, Berenson G.S: ABO blood group associations with cardiovascular risk factor variables, I: serum lipid and lipoproteins: *Hum. Biol*, 1981; 53: 411-437.
17. Boreckis L.B, Elston R.C, Rosenbaum P.A, Srinivasan S.R, Berenson G.S: ABO associations with blood pressure, serum lipid and lipoproteins, and anthropometric measures. *Hum, Hered*, 1985; 35:161-170.
18. Garrison R.J, Havlik R.J, Harris R.B: ABO blood groups and cardiovascular disease. *Atherosclerosis*, 1976; 25:311- 318.
19. Langman M.J.S, Foote J, Elwood P.Q, Pyrie Dr: ABO and Lewis blood groups and serum cholesterol: *Lancet*, 1969; ii: 607-609.
20. Horby J, Gyrtrub H.J, Grande P, Vestergaard, A: Relation of serum lipoproteins and lipids to the ABO blood groups in patients with intermittent claudication. *J. Cardiovac. Surg*, 1989;30:533-37.