

# The Correlation between the Blood Group A and Coronary Artery Disease

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## **Abstract**

**Background:** In recent years, lots of studies have been conducted in order to determine the correlation between the blood groups and the cardiovascular diseases. Most studies report a correlation between the blood group A and the Coronary Artery Disease. However, no similar studies have been conducted in Fars province; therefore, we decided to investigate the issue in this province.

**Methods:** This cross-sectional study was performed on 2750 patients with coronary artery disease in Kowsar hospital (one of the biggest hospitals in Shiraz). Using the epidemiologic reports which show the distribution of the blood groups in Fars province, a statistical comparison

(Using chi-squared exam) was done in order to determine the role of the blood groups as well as the risk factors in coronary artery disease.

**Results:** According to our results, we found that the rate of coronary artery disease in individuals with the blood group A was higher than the other blood groups. Regarding the risk factors, however, no significant difference was observed between the blood groups.

**Conclusion:** A correlation was found between the blood group A and the incidence of coronary artery disease and there was no significant difference between the blood groups, regarding the risk factors.

**Key words:** ABO blood groups, coronary artery disease, cardiovascular risk factors, Shiraz

## **Introduction**

Coronary artery disease also known as ischemic heart disease is a common cause of death in the adults. It may present a sudden death, but more usually causes angina pectoris, myocardial infarction (heart attack), or heart failure. It can also lead to the disturbance of the heart rhythm. Factors associated with an increased risk of developing the 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 dis-

abilities and incurs greater economic costs in our modern world. Ischemic heart disease is the most 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).

Atherosclerosis occurs due to the deposition of Cholesterol into the walls of the arteries. The process starts in childhood with the development of fatty streaks lining the arteries. In adulthood, these changes progress; in a way that they scar

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and calcify in order to form irregular narrowings within the arteries and eventually lead to the blockage of the vessel. The consequence of the narrowing or blockage depends on which vessels are involved. Coronary vessels, for instance, are believed to cause angina and heart attacks (1).

One of the most important research issues in this field is knowing the significance of the role of the risk factors in coronary artery disease; and one of these risk factors is the effect of ABO blood groups (3, 4, 5). Duo to the lack of information about the effect of ABO blood groups in coronary artery disease, reports which show the role of ABO blood groups in the breast cancer and the prognosis of this disease (6), and also its effects on the gastrointestinal disorders, which are confirmed in different researches (2, 7, 8, 9), the present study aims to determine the role of ABO blood groups in ischemic heart disease patients in Kowsar hospital of Shiraz.

### Materials and methods

This cross-sectional population base study was conducted in Fars Province in 2010. Recoursing to Kowsar Hospital of Shiraz, 2750 patients, who had been hospitalized as Ischemic Heart Disease and had undergone a Coronary Artery Bypass Graft (CABG) operation, were surveyed. In data form of each patient, age, sex, and risk factors of ischemic heart disease including Hypertension (HTN), Diabetes Mellitus (DM), Smoking, and Hyperlipidemia (HLP) were noted (Here, there is a model of this form. Figure1).

Since the items of family history and myocardial infarction were not completed in a large number of cases, these two risk factors were excluded from the study. Also, the ABO blood groups were derived and noted from the patients' documents. The data about the prevalence of the ABO blood groups in Shiraz was obtained by referring to Blood Transfusion Organization and using its data in this field. These data were only about individuals who had referred to Blood Transfusion Organization in 2010, and the repeated cases were omitted. Eventually, the prevalence of the ABO blood groups was determined in 147619 donors (8572 females and 139074 males). Resourcing to a statistical consultant, the prevalence of the blood groups in ischemic heart disease patients and people of Shiraz was assessed and the data were statistically analyzed. Regarding the risk factors, the blood groups were compared in ischemic heart disease patients through chi-square test.

### Result

Among 2722 patients of coronary artery disease, 1878 (69%) were males and 844(31%) were females. Moreover, the ratio of female to male was 1 to 2.22. The distribution of the patients in different blood groups and the distribution of the people of Shiraz in different blood groups are presented in table1. The table shows that in Shiraz, the blood group O is more prevalent than the others (41.12%). The next blood group is A (28.11%) followed by the blood group B (24.39%), and the last one being AB (6.37%). This assortment (O>A>B>AB) maintains in the patients with coronary artery disease, too. In order to investigate the role of the blood groups in coronary artery disease, we should compare the percentage of each blood group in the Shiraz society with the patients of coronary artery disease. The results of the comparison reveal that, only in the blood group A, the percentage of the coronary artery disease patients is more than that of the people of Shiraz (2.29%). Regarding the other blood groups, however, this comparison is vice versa. (table1)

Table 1 (percentage of blood groups)

	A	B	O	AB
Shiraz Society (control)	28.11	24.39	41.12	6.37
CAD Patients	30.4	23.3	40.9	5.4

The distribution of the observed patients, based on different blood groups classified by the risk factors of coronary artery disease, is presented in table2. Regarding the risk factors, the results of the Chi-square test revealed no significant difference among the blood groups ( $p>0.05$ ) (table2).

Table 2 (comparison of risk factors between the blood groups)

	A		B		O		AB		P-value
	No.	%	No.	%	No.	%	No.	%	
Hypertension	424	50.8	310	48.4	589	52.3	78	52.3	0.444
Hyperlipidemia	366	43.8	262	40.9	504	44	67	45	0.443
Diabetes mellitus	281	33.7	193	30.1	354	31.4	43	28.9	0.422
Smoking	287	34.4	213	33.2	378	33.6	52	34.9	0.956

### Discussion and Conclusion

The present study showed that although no significant difference was found in the risk factors among the blood groups, the prevalence of ischemic heart disease in the blood group A was more than the other blood groups. This shows the probable role of this blood group in the incidence of ischemic heart disease. The relationship between the blood

group and ischemic heart disease has been investigated in different studies and has been confirmed in some of them:

In a prospective study, which was conducted on 7662 males with known ABO blood group in 24 British towns, the blood group A was revealed to be related to the incidence of ischemic heart disease in individual subjects (10).

In a study on the interplay of genetic and environmental factors in the development of ischemic heart disease, blood grouping was carried out on 792 patients attending prothrombin clinics throughout the Cape Peninsula. In comparison to the controls there was an excessive proportion of groups A and B as well as a deficiency of the group O in the patients (11).

In a cohort study in Pakistan, 327 none-obese males and females were investigated. It was shown that blood group A is associated with substantially increased risk for coronary artery disease (5).

A study of 404 patients, who had attended the public clinic in Sulaimani for different reasons, it was shown that the patients with the blood group A had a significant elevation in their serum cholesterol as compared to other blood groups (12). Moreover a cross sectional research was carried out on 1000 patients with ischemic heart disease in Tehran. This study, in which the patients' blood groups as well as their risk factors were determined, revealed that the blood group A was related to the incidence of ischemic heart disease (13).

In the same line, a study of 13175 patients, which was conducted in Germany in 1981, showed that the blood group A was more prevalent in ischemic heart disease patients (14). But the question is that how the blood groups can affect the incidence as well as the prognosis of Ischemic heart disease and other diseases. It is suggested that more researches be performed on this issue in order to confirm this relationship. By doing so, lots of things can be done in order to decrease the incidence of ischemic heart disease in special blood groups.

Figure 1

	ID	BG	Age	Sex	Smoking	DM	HLP	HTN
1	1	B	36	Male	1	0	0	1
2	2	A	60	Female	0	0	0	0
3	3	O	53	Female	1	0	0	1
4	4	AB	56	Female	1	1	1	0
5	5	O	64	Female	0	0	0	0
6	6	A	55	Female	1	0	1	0

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