

## Association Between ABO Blood Groups And Myocardial Infarction In Jodhpur City of India

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### Abstract

**Background:** Many reports have appeared in recent years showing an association between blood groups and Myocardial Infarction. Clinical studies have shown a significant association between MI and blood group B. **Objective:** To investigate correlation of ABO blood groups with risk of MI. **Methods:** The present cross sectional study analyzed ABO blood group among total 400 subjects of any age from the local population of Jodhpur city from July to December 2011. Among them 200 subjects were normal healthy (135 male and 65 female) students of Dr. S.N. Medical College, Jodhpur and another 200 (135 male, 65 female) were MI patients admitted in the CCU of Mathura Das Memorial (MDM) Hospital, Jodhpur. ABO blood group of all subjects were determined by slide agglutination method. Risk of MI was expressed by risk ratio. Data were analyzed by one sample chi square test. **Results:** The results obtained in this study showed that the prevalence of MI in blood group B is significantly higher than in all other ABO blood groups. **Conclusion:** The results may conclude that there is a significant association between MI and blood group B. So this study reveals MI risk is associated with the blood group B.

**Keywords:** ABO blood groups, Myocardial Infarction, Jodhpur.

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### Introduction

**M**yocardial infarction or heart attack is a grave outcome of coronary artery disease. Coronary artery disease occurs from atherosclerosis, when arteries become narrow or hardened due to built up cholesterol plaque. Many reports have appeared in recent years suggesting an association between blood groups and MI. An eight year study of 7662 men done by Whincup and Colleagues published in the British Medical Journal found blood group A is linked to the incidence of ischemic heart disease, as well as having higher total serum cholesterol

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concentration.<sup>1</sup> Warirati et al. studied and concluded that the prevalence of CHD in blood groups A was invariably higher than in all other ABO blood groups.<sup>2</sup> whereas Meade et al. reported that incidence of ischaemic heart disease is significantly higher in patients with blood group phenotype AB than in those with groups O, A or B.<sup>3</sup> Saha, et al. and Nydegger et al. found that the O and B blood groups were predominant in patients with MI and these groups might play a role in the pathogenesis of MI.<sup>4-5</sup> Again, in the Hungarian population, blood group A is found more common in patients with CHD.<sup>6</sup> Sheikh et al. investigated association between blood group B and MI in sample

population in Malaysia. Their results showed that among 170 MI subjects, 31.8% were blood group B and among 170 controls, 30% were blood group B. But simple logistic regression analysis showed no association of MI with blood group B.<sup>7</sup>

Review of related literature has shown the existence of a relationship between ABO blood group and heart disease. A particular blood group in different global population is found more prone to the risk of MI. Investigations at different countries showed varying findings regarding the susceptible blood group as risk factor for MI in different population. Since MI is a serious complication of coronary artery disease, the current study was carried out to find out association between different ABO blood groups and risk of MI in local population of Jodhpur city.

#### Methods

This cross sectional study was carried out on total 200 diagnosed patients with Myocardial Infarction (MI) admitted in CCU as well as outdoor patients of Mathura Das Memorial(MDM) Hospital attached to Dr. S.N. Medical College, Jodhpur, India. 135 male and 65 female patients of any age were selected for this study. To determine the distribution of ABO blood groups in the population of Jodhpur City, out of 200 apparently healthy blood donors and medical students, 135 males and 65 females of any age were selected to act as a control group. For both patients and healthy subjects systematic simple random sampling technique was used. The study protocol was approved by the ethical review committee of Dr. S.N. Medical College, Jodhpur

The risk and benefit of the study was explained to all subjects and informed written consent was obtained. After a thorough clinical examination of each subject the information were recorded in a data schedule.

Standard slide agglutination test for the determination of ABO blood groups of all

subjects was used. Data thus obtained were analyzed statistically to determine any association between MI and different ABO blood groups. Data was expressed as percent and absolute number of frequency. By determining the frequency distribution of a particular blood group in MI patients and control subjects, the odds ratio for MI was calculated to identify the gradation of risk for a particular blood type for MI as follows –

Risk ratio for MI = Frequency % of a particular blood group in MI patients / Frequency % of the same particular blood group in control subjects.

One Sample Chi-Square test was further applied to determine whether any significant association exists between the frequency of a blood group in MI patients (observed) and in control (expected). It has been hypothesized that frequency of blood groups should be same (1:1) in both MI patients and in controls. Chi-Square statistic and probability were determined by Epi-Info Computer software at 95% confidence limit.

#### Results

The result of this study showed that the most frequent blood group in Jodhpur city was found to be group A followed by B, O and lastly AB in both males, females and in general population (Table I). Highest prevalence of MI was found in blood groups B then followed by O, A and lastly AB in both males, females and in general population. Table I also shows comparison of risks of MI in males, females and total subjects irrespective of gender belonging to different blood groups. These data thus indicate that subjects with blood group A had least risk of MI (0.58), whether they are male or female. Whereas highest risk for MI was found in blood group B. The group O (1.27) and group AB (0.74) subjects were in between in position for MI risk.

Table II shows the results of One Sample Chi-Square test. Significant association was found between types of blood groups and MI. Blood Group B showed highly significant association with MI.

**Table I:** Percent Distribution of ABO Blood Groups and Risk of MI in Different blood groups (total n= 400)

Blood groups	Male (n=270)			Female(n=130)			Total (n=400)		
	MI	Control	Risk	MI	Control	Risk	MI	Control	Risk
	(n=135)	(n=135)	Ratio	(n=65)	(n=65)	Ratio	200	200	Ratio
A	20.7	32.9	0.63	21.5	43.3	0.5	21	36	0.58
B	37.8	30	1.26	41.5	25	1.66	39.0	28.5	1.36
AB	8.9	11.4	0.78	3.1	5	0.62	7.0	9.5	0.74
O	32.6	25.7	1.26	33.9	26.7	1.27	33.9	26.0	1.27

**Table II:** One Sample Chi-Square table for association of blood group frequency with MI

		BLOOD GROUPS				P-Value
		A	B	AB	O	
Males	Expected Frequency of MI Patients	44	41	15	35	<0.0001 <sup>y</sup>
	Observed Frequency of MI Patients	28	51 <sup>y</sup>	12	44	
Females	Expected Frequency of MI Patients	28	17	3	17	<0.01 <sup>¶</sup>
	Observed Frequency of MI Patients	14	27 <sup>¶</sup>	2	22	
Both Sexes	Expected Frequency of MI Patients	72	58	18	52	<0.002 <sup>*</sup>
	Observed Frequency of MI Patients	42	78 <sup>*</sup>	14	66	

### Discussion

The purpose of this study was to find out the association between different ABO blood groups and MI. Results of this study showed a highly significant association between blood group B and MI. These findings are consistent with the findings of several investigators.<sup>5, 7,8</sup>

In Lithuanian women, Stakisaitis et al. observed significant relationship between blood group B and IHD. They studied 441 female patients with coronary atherosclerosis found 22.9 % patients had group B against 15% healthy female in group B. They further found that blood group A is not a risk factor for atherosclerosis in Lithuanian population.<sup>8</sup> But Sheikh et al. found no association of MI with blood group B in a sample population in Malaysia.<sup>7</sup>

On the other hand several investigators observed varying results.

Tarjan et al. found that blood group A was more frequent and the blood group O was less frequent among the patients with positive coronarygraphy.<sup>6</sup> Abdollahi and his colleagues found that group A subjects reported more family history of CAD than the subjects with other blood groups.<sup>9</sup> Again, Skaik et al. found that group A was the most common (57%) and the group O was the second (30.5%) among the MI patients in Gaza Stripe of Palestine<sup>10</sup>

Different clinical studies have shown that individuals of the A phenotype blood group are more susceptible to cardiovascular diseases.<sup>11-12</sup>

In British men and in the Hungarian population, the incidence of ischaemic heart disease is higher in patients with blood group A.<sup>1,6</sup>

In Bangladesh, Biswas et al. showed the prevalence of Coronary Artery Disease (CAD) was invariably higher in blood group O than all

other blood groups whereas the major blood group in Bangladeshi people is phenotype B.<sup>13</sup> It is similar to the observation of Anvari and his colleagues and Whincup et al. who concluded that the prevalence of CHD in blood group O was markedly higher than in all other blood groups which were in contrast with other studies done in Europe and United States.<sup>6,14</sup>

Yet another group of scientists found no difference between the different blood group frequencies in MI patients<sup>15-19</sup>.

Amirzadegan et al. investigated a possible association of ABO blood groups with coronary artery disease in 2026 CAD patients. Their analysis did not show any significant difference between the frequencies of ABO blood groups in coronary artery disease patients compared to the Iranian general population. Their findings suggest that there is no correlation between various ABO blood groups and development of coronary artery disease. Moreover, the prevalence of major risk factors was equal in patients with different blood groups, and therefore, blood groups had no impact on development of premature coronary artery disease in individual subjects.<sup>15</sup>

Lutfullah and associates investigated 907 IHD patients for blood groups, hypertension, lipid profile and other predisposing factors like obesity, smoking, BMI etc. and concluded that there was no association of ABO blood groups and major ischemic heart disease risk factors.<sup>16</sup> Mehamet et al. found no statistical differences among the various blood group with respect to any of the biochemical parameters.<sup>17</sup> Biancari et al. reported a very similar distribution of ABO blood groups among patients under-going coronary artery bypass graft (CABG) surgery compared to the general population.<sup>18</sup>

Sari et al. investigated 470 patients with acute ST elevation MI. Their results showed no direct correlation between ABO blood group in patients and MI.<sup>19</sup>

The association between ABO blood groups and MI is still unclear despite many studies addressing this topic. A pressing question remains – do the ABO antigens have a role in the etiology of MI? No study has convincingly explained the mechanisms by which either A or B antigens could modify the risk of MI. More research is needed to resolve this problem

### Conclusion

Considering all these previous varying results from different part of globe, this study attempted to evaluate the association of ABO blood groups with MI in Jodhpur city of Rajasthan. From the results of this study it may conclude that there is a direct association between MI and blood group B in the population of Jodhpur city. Data of this study suggest that it is the individuals belonging to B group who are more prone to MI in Jodhpur

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