Original Article

ABO Blood Group and Severity of Coronary Artery Disease Assessed by Syntax Score in Patients with Acute Myocardial

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Abstract:

Introduction: As coronary artery disease (CAD) is a major cause of morbidity and mortality; timely diagnosis and appropriate therapy is of paramount importance to improve clinical outcomes. Though there are major risk factors for CAD but sometimes it does not correlate with ACS. So, search for new risk factor is necessary for better management of CAD specially STEMI.

Aim: To see the association between ABO blood group and severity of CAD in patients with STEMI.

Methods: This study was done during the period of January 2016 to June 2016 with STEMI at National Institute of Cardiovascular diseases, Dhaka, Bangladesh. 100 patients were grouped in I and II where group-I having 50 patients of non-O blood group and group-II having 50 patients of O blood group. After CAG all reports were analyzed by two experts and SYNTAX score were calculated and data were analyzed by SPSS.

Results: Baseline characteristics (100 patients) were well matched between the groups. Low SYNTAX score (d"22) was 16% and 56%; intermediate score (23-32) was 40% and 36% and high score (>32) was 44% and 8% in group-I and group-II respectively. These indicate that patients of non-O blood group have high SYNTAX score that is more severe CAD. Univariate and multivariate regression analysis showed that non-O blood group is an independent risk factor for CAD. So easily available ABO blood grouping can be helpful to determine the severity of CAD in patients with STEMI.

Keywords: ABO blood group, Coronary Artery Disease(CAD), SYNTAX score, Acute Myocardial Infarction(AMI).

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Introduction:

Over the last two centuries, the industrial and technological revolutions and the economic and social transformations dramatically shift the major cause of death from infectious diseases and malnutrition to cardiovascular disease (CVD) and cancer. At the beginning of the 21th century, CVD accounts for nearly half of all deaths in the developed world and 25% in the developing world.

Regarding blood group in Dhaka, the capital city of Bangladesh, majority (39.8%) of people were identified having blood group B, while 27.6% were blood group O,

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23.5% and 9.2% were blood group A and AB respectively. Rh-D positive 97.4% and Rh-D negative were 2.6%.[1]

As CAD is a major cause of morbidity and mortality, timely diagnosis and appropriate therapy is of paramount importance to improve clinical outcome.[2]

Acute coronary syndrome (ACS) encompasses acute myocardial infarction (AMI) (resulting in ST-segment elevation or non–ST segment elevation) and unstable angina. ST-segment elevation myocardial infarction (STEMI) is a clinical syndrome defined by characteristic symptoms of myocardial ischemia in association with persistent electrocardiographic (ECG) ST elevation and subsequent release of biomarkers of myocardial necrosis. Non-ST elevation myocardial infarction (NSTEMI) and unstable angina can be viewed as very closely related clinical conditions with similar presentation but the diagnosis of NSTEMI is established if there is evidence of myocardial necrosis based on elevated cardiac markers especially elevated High Sensitivity Troponin-I with or without ECG change but with classical symptoms of ischaemia.[3]

It is well known that smoking, hypertension, diabetes mellitus, dyslipidemia, family history of premature CAD and obesity are most important risk factors for CAD.[4]

Risk factors of acute myocardial infarction (AMI) in younger people (<40 years) was observed in a study in Bangladesh, where smoking and triglyceride were found to be strikingly associated risk factor for AMI in that group.[5] Family history has been said to be more likely positive in the younger patients with CAD .[6]

The incidence of atherosclerosis increases as blood pressure rises, and this excess risk is related to both systolic and diastolic blood pressure as well as pulse pressure.[7]

Accurate but simple methods of risk assessment are important for patient care and for determining the prognosis and providing information for the patient.[8]

Despite improvement in risk scoring, there still remain patients identified as being low risk who experience CAD events, as well as, patients deemed high risk who remain free of CAD events. This information leads to search for additional emerging risk factors that may aid in further risk discrimination. In some cases, the tests are not universally available (apolipoprotein B) or are relatively expensive (lipoprotein-associated phospholipase A. In other cases, the tests harbor potential risk (radiation with myocardial perfusion imaging or cardiac CT) or require specialized laboratories for testing (brachial flow mediated dilation and genetic testing).[9]

ABO blood groups are composed of complex carbohydrate molecules with different antigenic structures expressed on the surface of red blood cells and a variety of human tissues, including epithelium, sensory neurons, platelets, and vascular endothelium.[10] The A and B alleles of the ABO locus encode A and B glycosyltransferase activities, which convert precursor H antigen into either A or B determinants, the A and B antigens having an extra saccharide unit to the 0 unit (N--acetyl galactosamine and galactose, respectively). Group O individuals lack such transferase enzymes (loss of function) and express basic, unchanged H-antigen.[11]

It has long been acknowledged that human ABO blood type might affect the risk factors of cardiovascular disease. In non-0 individuals, plasma levels of factor VIII–von Willebrand factor (vWF) complex are 25% higher than group O individuals.[12] Accumulating evidence indicates that elevated vWF level is a risk factor for coronary heart disease.[13] Other studies also indicates that ABO blood group might influence plasma lipid levels.[14] Recently, several genome-wide association studies found that variants at ABO locus were associated with plasma lipid levels[15]and inflammatory markers, including soluble intercellular adhesion molecule I[16,17],plasma soluble E-selectin levels. [18,19] and P-selectin levels[17] and tumor necrosis factor-á[20,] which were associated with the CAD risk.

The SYNTAX score is an angiographic lesion-based scoring system originally invented to evaluate the severity of CAD. It is able to aid revascularization decisions and predicts mortality and morbidity in patients with CAD[21].The relationship between ABO blood group and the severity of CAD assessed by SYNTAX Score in patients with CAD has not been clearly determined.

Therefore, we aimed to assess the association between the severity of coronary artery disease by SYNTAX Score with ABO blood group in patients with AMI.

Hypothesis

Non-O blood group is associated with more severe coronary artery disease than O blood groups in patients with acute myocardial infarction

Objectives

General Objective

To evaluate the relationship of non-O blood group and 0 blood group with severity of coronary artery disease in patients with acute MI.

Specific Objectives

1. To determine ABO Blood group of study subjects.
2. To calculate the severity of coronary artery disease of study subjects after angiogram by SYNTAX score.

3. To find out the association of non-O blood group and O blood group with severity of coronary artery disease.

Methodology

All study patients admitted during the period of January'16 to June'16 with acute myocardial infarction in the Department of Cardiology, NICVD, Dhaka, who agreed to undergo coronary angiography included for the study after considering inclusion and exclusion criteria. Patients with Unstable angina, significant valvular heart disease, congestive heart failure, post-PCI, post-CABG and patient with thrombolytic were excluded from the study. Informed written consent were taken from each patient or legal guardian before enrollment. After meticulous history taking and clinical examination demographic data such as, age, sex, body mass index (BMI) was recorded. AMI will be diagnosed as per the criteria of Joint ESC/ACCF/ AHA/WHF Task Force for the definition of AMI in usual clinical setting. Risk factors include smoking, tobacco consumption, hypertension, diabetes, dyslipidemia, family history of premature CAD, Pulse and Blood pressure (BP) was recorded.

ABO blood group determination was done using a commercially available hemagglutination technique. Routine investigations (troponin I, blood sugar, serum creatinine, fasting lipid profile) and other screening tests for coronary angiogram, resting ECG, left ventricular ejection fraction by echocardiogram (LVEF) were done**.** Coronary angiogram was done after appropriate patient preparation by femoral artery cannulation and Judkin's system was applied for cannulation of the left and right coronary arteries. All angiographic views were evaluated by two experienced cardiologists who were blinded to the study. The severity of the CAD was assessed by SYNTAX score. Data were collected by using a preformed data sheet. The numerical data obtained from the study were analyzed and significance of differences 3was estimated by using statistical methods. The SPSS Statistical Software (21.0 version, SPSS Inc., Chicago, Illinois, USA) was used for data analysis.

Results and Observations:

This observational study was carried out at the National Institute of Cardiovascular Diseases (NICVD), Dhaka, during the period from January 2016 t0 June 12016. This study was done with an aim to evaluate the relationship between ABO blood group and severity of coronary artery disease in patients with acute myocardial infarction (AMI). A total of 100 patients with acute MI who agreed to undergo coronary angiography were included in the study. Coronary angiogram was done during index hospital admission. On the basis of ABO blood group, study subjects were categorized into two groups: 50 patients of acute MI having non O blood group were considered as group I and 50 patients of acute MI having O blood group were considered as group II.

Table I

Age distribution of the study patients (n=100)

Age in Years	Group I (n=50)		Group II (n=50)		Total(n=100)		P
	Number	%	Number	%	Number	%	Value
<40	13	26.0	3	6.0	16	16.0	
41-50	18	36.0	23	46.0	41	41.0	
51-60	11	22.0	17	34.0	28	28.0	
> 60	8	16.0	7	14.0	15	15.0	
Mean ± SD(Range)	49.2±12.6(27-78)		52.9±8.8(38-78)		51.0±10.9(27-78)		0.09^{NS}

The mean age of the studied patients were 51.0±10.9 years ranging from 27 to 78 years. In group I mean age was 49.2±12.6 years and in group II was 52.9±8.8 years, the difference between two groups was not statistically significant (p=0.09).

Regarding the gender 86% was male in group I and 90% was in group II. No significant difference (p=0.53) was found between the groups in terms of sex distribution.

Table II
Risk factors of the study patients (n=100)

Risk Factors	Group I (n=50)		Group 11 (n=50)		Total (n=100)		p value
	Number	%	Number	%	Number	%	
Smoking							
Yes	38	76.0	26	52.0	64	64.0	0.018[s]
No	12	24.0	24	48.0	36	36.0	
Hypertension							
Yes	35	70.0	24	48.0	59	59.0	0.028[s]
No	15	30.0	26	52.0	41	41.0	
Diabetes mellitus							
Yes	21	42.0	24	48.0	45	45.0	0.54[NS]
No	29	58.0	26	52.0	55	55.0	
Dyslipidaemia							
Yes	33	66.0	22	44.0	55	55.0	0.03[s]
No	17	34.0	28	56.0	45	45.0	
Family H/O of premature CAD							
Yes	23	46.0	14	28.0	37	37.0	0.06[NS]
No	27	54.0	36	72.0	63	63.0	

Table II shows among the studied patients, highest percentage had history of smoking (76%) followed by hypertension (70%), dyslipidemia (66%), family history of premature CAD (46%) and diabetes mellitus (42%) in Group I. On the contrary, highest percentage had history of smoking (52%) followed by hypertension and diabetes mellitus (48%), dyslipidemia (44%) and family history of premature CAD (28%) in Group II. Smoking, hypertension and dyslipidemia were significantly more in group I than in group II ($p<0.05$). It was also observed that diabetes mellitus and positive family history of CAD were almost identical in the study groups ($p>0.05$).

Mean body mass index of the group I was 23.6±2.7 (kg/m^2) and that of group II was 24.8±3.6 (kg/m^2) indicates that patients are identical in both groups. (p=0.07)

Table III
Biochemical status of the study patients (n=100)

Biochemical parameters	Group I (n= 50)	Group 11 (n=50)	p value
	Mean ± SD	Mean ± SD	
Total Cholesterol(mg/dl)	166.9±43.2	164.1±46.1	0.75[NS]
Triglyceride (mg/dl)	180.3±54.2	164.4±40.6	0.1011[NS]
LDL cholesterol(mg/di)	111.0±29.2	97.3±16.2	0.0046[NS]
HDL cholesterol	38.4±5.8	41.3±6.7	0.08[NS]
S. creatinine (mg/di)	1.3±0.7	1.1±0.6	0.14[NS]
RBS (mg/dl)	7.5±1.9	8.0±1.1	0.68[NS]

The mean total cholesterol level was 166.9±43.2 mg/dl in group I and 164.1±46.1 mg/dl in group II (p=0.75). The mean triglyceride was 180.3±54.2 mg/dl in group I and 164.8±40.6mg/dl in group II (p=0.10). The mean LDL cholesterol level was 111.0±29.2mg/dl in group I and 97.3±16.2 mg/dl in Group II and the mean difference was statistically significant between the two groups (p=0.004). The mean HDL cholesterol level was 38.4±5.8 mg/dl in group I and41.3±6.7 mg/dl in group II (p=0.08). The mean S. creatinine level was1.3±0.7 mg/dl in group I and 1.1±0.6 mg/dl in group II (p=0.14).The mean RBS level was7.5±1.9m/dl in group I and 8.0±1.1 mg/dl in group II (p=0.50).

The mean ejection fraction 48.9±9.8% for the patients with group I and 55.8±6.9% for the patients of group II (p=0.04).

Table IV
Distribution of the study patients according to ABO bood group (n=100)

ABO blood group	Number	%
A	21	42.0
B	14	28.0
AB	15	30.0
0	50	100.0

ABO blood group in study patients and it was found that 42%, 28% and 30% patients having in A, B, AB blood group respectively. Remaining,50% patients having O blood group.

Positive Rh typing was found (84% vs 74%) in group I and group II patients respectively. (p=0.22).

Table V
Distribution of the study patients according to SYNTAX (n=100)

SYNTAX Score	Group I (n= 50)		Group II (n=50)		p
	Number	%	Number	%	value
Low (up to 22)	8	16.0	28	56.0	0.001^{S}
Intermediate (23 to 32)	20	40.0	18	36.0	0.68^{S}
High (above 32)	22	44.0	4	8.0	0.001^{S}
Mean ± SD	32.2±10.3		22.5±6.8		0.001^{S}

Table V shows low SYNTAX score was found (16% vs 56%) in group I and group II respectively with highly significant association (p=0.001). Intermediate SYNTAX score was found (40% vs 36%) in group I and group II respectively with no statistical association (p=0.68). High SYNTAX score was found (44% vs 8%) in group I and group II respectively with highly significant association (p=0.001).

Mean SYNTAX score significantly higher in group I than group II (32.2±10.3 vs 22.5±6.8) respectively. So, the severity of CAD is significantly more in patients having non 0 blood group than 0 blood group.

Table VI
Mean SYNTAX score among the non-O blood group patients (n=100)

Non-O blood group	SYNTAX score		p value
	Mean	SD	
A (n=21)	29.8	9.3	
B (n=14)	32.6	11.0	0.32^{NS}
AB (n=15)	35.1	10.8	

Table VI shows the mean SYNTAX Score of non-O blood group study patients according to A, B, AB. The mean SYNTAX Score of A, B and AB blood groups were29.8±9.3, 32.6±11.0 and 35.1±10.8 respectively. The SYNTAX Score increased accordingly in A, B and AB blood group and the differences were not statistically significant (p=0.32).

Table VII
Univariate logistic regression of determinants of high SYNTAX score

Variables of interest	B	S.E	p value	OR	95% CI
Smoking	0.979	0.302	0.02	3.21	1.66-7.180
Diabetes mellitus	0.294	0.104	0.24 ^{NS}	0.50	0.159– 1.583
Hypertension	0.675	0.336	0.03^{s}	1.77	1.201– 6.185
Dyslipidemia	0.773	0.535	0.02^{s}	2.17	1.325– 7.518
LVEF	0.693	0.435	0.03^{s}	1.89	1.221– 7.518
Serum Creatinine	0.214	0.114	0.33 ^{NS}	0.49	0.112– 1.524
Non-O blood group	0.826	0.465	0.001^{s}	3.42	1.81–5.649

Table VIII
Multivariate logistic regression of determinants of high SYNTAX score

Variables of interest	B	S.E	p value	OR	95% CI
Smoking	0.829	0.322	0.02 S	3.11	1.45-6.880
Diabetes mellitus	0.289	0.109	0.27s	0.47	0.149-1.423
Hypertension	0.625	0.436	0.04s	1.66	1.101-.285
Dyslipidemia	0.623	0.505	0.03s	1.98	1.125-6.118
LVEF	0.493	0.235	0.1 INS	1.11	0.221-3.518
Serum creatinine	0.204	0.104	0.27 NS	0.42	0.102-.424
Non-O blood group	0.806	0.495	0.001s	3.05	1.75-5.219

Table VII demonstrates the binary logistic regression analysis of odds ratio (OR) for characteristics of the subjects likely to cause of high SYNTAX Score. The variables revealed to be significantly associated with high SYNTAX score by univariate analysis. Of the 5 variables smoking, hypertension, dyslipidemia, LVEF and non-O blood group *were* found to be the independently significant predictors of high SYNTAX Score with ORs being 3.21, 1.77, 2.17, 1.89 and 3.42 respectively

Dependent variable: high SYNTAX Score; Independent variables: smoking, diabetes mellitus, hypertension, Dyslipidemia, LVEF, Serum creatinine and non-0 blood group; S = Significant, NS = Not significant

Table XII demonstrates the binary logistic regression analysis of odds ratio (OR) for characteristics of the subjects likely to cause of high SYNTAX Score. The variables revealed to be significantly associated with high SYNTAX Score by univariate analysis were entered into the model directly. Of the 4 variables smoking, hypertension, dyslipidemia and non-O blood group were found to be the significant predictors of high SYNTAX Score with ORs being 3.11, 1.66, 1.98 and 3.05 respectively.

Discussion:

This observational study was carried out at the National Institute of Cardiovascular Diseases (NICVD), Dhaka, during the period from January, 2016 to June, 2016. This study was done with an aim to evaluate the relationship between non-O blood group and O blood group with severity of coronary artery disease in patients with acute myocardial infarction (AMI) by SYNTAX score, a new modality of severity scoring system which gain vast acceptance in PCI era. A total of 100 patients with acute MI were included in the study, 50 patients in group I and 50 patients in group II.

The mean age of the studied patients was 51.0±10.9 years ranging from 27 to78 years. The mean age of group I patients was 49.2±12.6 years ranging from 27 to 78 years and the mean age of group II was 52.9±8.8 years ranging from 38 to 78 years. In a study it was found mean age of patients having coronary artery disease in Bangladesh was 50.15±8.8 and ranging from 22 to 76 [22]. In a similar study it was 51.48 ±

9.32 years [23]. In group I, 43 (86%) patients were male and 45 (90%) patients were male in group II. No significant difference (p=0.53) was found between the groups in terms of sex distribution. In a study in 2012 reported 73.1% patients were male and several other studies repot the male predominance in AMI study population[24]. This sex-difference should be cautiously interpreted because of small sample size.

Among the studied patients, highest percentage had history of smoking (76%) followed by hypertension (70%), dyslipidemia (66%), family history of premature CAD (46%) and diabetes mellitus (42%) in Group I. On the contrary, highest percentage had history of smoking (52%) followed by hypertension and diabetes mellitus (48%), dyslipidemia (44%) and family history of premature CAD (28%) in Group II. Smoking, hypertension and dyslipidemia were significantly more in group I than in group II. According to Akhand et al[22]most prevalent risk factors were smoking (60%) and dyslipidemia (60%) among the patients of CAD. Islam & Majumder (2013) reported high prevalence of hypertension (20% in adult and 40-65% in elderly) in Bangladeshi population that contributes to CAD[25]. However, a study in USA Mukherjee et al 2005, these findings are different, where 30.5% was diabetic, 66.8% hypertensive, 60.6% dyslipidemic, 21.3% smoker. These differences might be due to variation in the life style [26]. Carpeggiani et al (2010) found

a significance association between non-O blood group and family history of ischemic heart disease, hypercholesterolemia and presence of coronary atherosclerosis[27]. We found significance presence of lipid disorder in non-O blood group. Interestingly, both groups have similar incidence of DM. In the current study, mean body mass index (BMI) of the group I was 23.6±2.7 (kg/m2) and that of group II was 24.8±3.6 (kg/m2). BMI demonstrates that patients are identical in both groups. It was observed that there was no significant difference between the groups regarding BMI. The mean total cholesterol level was 166.9±43.2 mg/dl in group I and 164.1±46.1mg/dl in group II. The mean difference of total cholesterol between the two groups was statistically insignificant. The mean triglyceride was 180.3±54.2 mg/dl in group I and 164.8±40.6 mg/dl in group II. Mean difference of triglyceride level was statistically insignificant among the two groups. The mean LDL cholesterol level was111.0±29.2 mg/dl in group I and 97.3±16.2 mg/dl in Group II and the mean difference was statistically significant between the two groups in terms of LDL cholesterol. The mean HDL cholesterol level was 38.4±5.8 mg/dl in group I and 41.3±6.7 mg/dl in group II and the mean difference of HDL cholesterol between the two groups was statistically insignificant. There was no statistically significant difference in mean total cholesterol, HDL-C, triglyceride level between two groups (P>0.05) but significant difference was observed in case of LDL-C. Dyslipidemia was found statistically significant in risk factor analysis. The Nurses' Health study (2012) also found non-O group have raised level of LDL-C. Both groups are well matched regarding kidney function and glycemic level.

The mean percent of ejection fraction of the study patients was 48.9 ± 9.8%for the patients with group I and 55.8±6.9% for the patients of group II and the mean difference between the two groups was statistically significant.

Among Non O group, 42%, 28% and 30% patients are belonging to A, B and AB blood group respectively, remaining 50% patients are O blood groups. Positive Rh typing was found (84% vs 74%) in group I and group II patients respectively. At the same time, rest are negative Rh typing in group I and group II patients respectively. Rayhana et al 2013[1] found majority (39.8%) of population in Dhaka city were identified as having blood group B, while 27.6% were blood group O, 23.5% and 9.2% were blood group A and AB respectively. Rh-D positive were 97.4% and Rh-D negative were 2.6%. No statistical association was found between study groups in terms of Rh typing.

SYNTAX score was found low up to 22 (16% vs 56%) in group I and group II respectively with highly significant association (p=0.001). Intermediate SYNTAX score >22 up to 32 was found (20% vs 36%) in group I and group II respectively with no statistical association (p=0.07). High SYNTAX score was found (44% vs 8%) ingroup I and group II respectively with highly significant association (p=0.001). Ahmetet al (2014)[28] found Non-O blood group was found significantly higher in the upper SYNTAX score tertiles (56.2 vs 75.9 vs 80.2%, p<.05). However, the frequencies of Rh type similar in all tertiles. This finding supports that Rh antigen do not play any role on CAD and its severity.

The mean SYNTAX Score of A, B and AB blood groups were 29.8±9.3, 32.6±11.0 and 35.1±10.8 respectively. The differences were not statistically significant(p=0.32). The mean SYNTAX score significantly higher in group I than group II (32.2±10.3 vs 22.5±6.8) respectively. Ahmet et al (2014)[28] found high SYNTEX score among A, B and AB were 49.5%,26.4% and 4.4% respectively. No statistically significance association found among Non-O blood groups.

In this study, univariate logistic regression analysis revealed that among the 5 variables smoking, hypertension, dyslipidemia, LVEF and non-O blood group were found to be the independently significant predictors of high SYNTAX Score with ORs being 3.21, 1.77, 2.17, 1.89 and 3.42 respectively. The variables revealed to be significantly associated with high SYNTAX Score by multivariate analysis were entered into the model directly. Of the 4 variables smoking, hypertension, dyslipidemia and non-O blood group were found to be the significant predictors of high SYNTAX Score with ORs being 3.11, 1.66, 1.98 and 3.05 respectively. In multivariate logistic regression analysis, after adjustment of factors blood group remain independent predictors of severe CAD. A meta-analysis was performed by Meian et al in 2012 from two large prospective cohort studies, "The Nurses' Health Study" and "The Health Professionals Follow-up Study", were found in combined analysis adjusted for cardiovascular risk factors, compared with participants with blood group O, those with blood groups A, B, or AB were more likely to develop CAD (adjusted hazard ratios [95% CI] for incident CAD were 1.06 [0.99-1.15], 1.15 [1.04-1.26], and 1.23 [1.11-1.36], respectively[29]. Overall, 6.27% of the CAD cases were attributable to inheriting a non-0 blood group. Meta-analysis indicated that non-0 blood group had higher risk of CAD (relative risk =1.11; 95% CI, 1.05-1.18; P=0.001) compared with 0 blood group. Ahmet et al found non-0 blood group (OR: 2.68,

95% CI 1.65-4.35, p<0.001), LVEF (OR: 0.93, 95% CI 0.91-0.95, p<0.001), LDL (OR: 0.98, 95% CI 0.97-0.99, p<0.001) were independent predictors of high SYNTAX Score.

Summary and Conclusion

Coronary artery disease (CAD) is a major cause of morbidity and mortality and timely diagnosis and appropriate therapy is of paramount importance to improve clinical outcomes. Though there are major risk factors for CAD but sometimes it does not correlate with ACS. So, search for new risk factor is necessary for better management of CAD.

With the aim to see the association between ABO blood group and severity of CAD of patients with STEMI, we conducted a study with 100 patients, were grouped in I and II where group-I having 50 patients of non-O blood group and group-II having 50 patients of O blood group. After analysis of data reveals well matched baseline characteristics. Low SYNTAX score (d"22) was 16% and 56% in group I and II respectively indicates that patients of non-O blood group having less severe disease in comparison to O blood group patients. Similar results were observed in intermediate (23-32) and high (>32) SYNTAX score in group-I and group-II respectively.

After univariate and multivariate regression analysis it was shown that non-O blood group is an independent risk factor for CAD patients who presented as STEMI. So easily available ABO blood grouping can be helpful to determine the severity of CAD & its measurement of patients with STEMI.

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