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ORIGINAL ARTICLE

Relationship of Haemoglobin and C Reactive Protein level with Different Types of Heart Failure Patients

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Abstract

Background: Initial level of haemoglobin and CRP level is important issue among the different type of heart failure patients for their in-hospital outcomes. **Objective:** The purpose of the present study was to see the relationship of haemoglobin (Hb) and CRP level with different types of heart failure patients. **Methodology:** This cross-sectional study was conducted in the Department of Cardiology at Mymensingh Medical College, Mymensingh, Bangladesh from December 2010 to November 2011 for a period of two (2) years. Patients of ACS who were presented within 12 hours of chest pain were included as study population. Study population were categorized in four groups according to the level of hemoglobin and C-reactive protein. Blood sample was collected for baseline laboratory investigations like Troponin-I, random blood sugar (RBS), blood urea, serum creatinine, lipid profile, Hemoglobin and CRP level. Sample were then send to standard laboratory/Biochemistry department of MMCH. **Result:** The mean age of the population was 52.18±8.88 years. Statistically non-significant mean age difference among the groups. Significant difference of mean left ventricular (LV) ejection fraction was found among the groups (p=0.005). Maximum patient in group 1 (48.5%) had ejection fraction in the range of 40 to 50%, compare to group 2(32.0%), group 3 (11.1%) and group 4 (5.8%). The heart failure was statistically significant in Killip class I (p=0.000) and Killip class II (p=0.000). **Conclusion:** In conclusion haemoglobin and CRP level of acute coronary syndrome patients is statistically significantly associated with different types of heart failure. [*Journal of Current and Advance Medical Research 2019;6(2):101-105*]

Keywords: Relationship; haemoglobin level; CRP level; Heart Failure

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Introduction

Lower hemoglobin level is associated with higher mortality in part with myocardial infraction[1]. Statistically significant increase in mortality was found in patient presenting with hemoglobin concentration lower than 10 gm/dL[2]. Clinical data suggest that C- reactive protein may represent a valuable marker of risk in the short term as well[3].There is rapidly growing evidence suggesting that atherosclerosis is in part an inflammatory condition. CRP is a serum marker of inflammation which is easily and inexpensively measured[4].

Hemoglobin and C-reactive protein can be measured in low cost. In our country there are small number of study with hemoglobin and C - reactive protein. This study may help in management to reduce the morbidity and mortality in ACS. With decline in mortality due to infectious and diarrhoeal disease and death from perinatal cause, cardiovascular diseases particularly CHD will be major health problem and number one killer diseases in developing countries[5].

Anemia is common in heart failure and is associated with poor out come a large cohort of community-dwelling patient with CHF anemia is a common and an independent prognostic factor for mortality[6]. Lower level of hemoglobin are associated with higher short term mortality in patient with acute myocardial infraction. Specific therapeutic strategies in anemic patient with MI should be further considered[2]. Anemia causes hypoxia-induced vasodilatation leading to increased sympathetic activity and cardiac output. This mechanism decrease coronary reserve, which is already limited in patients with CAD because of high extraction rate of oxygen in cardiac circulation[7]. Manifestation of myocardial ischemia may occur with only mild anemia. Elevated sympathetic activity was also repeatedly associated with worse outcome after acute myocardial infraction[8]. In the long term there alterations lead to gradual development of cardiac enlargement and left ventricular hypertrophy. This present study was undertaken to see the relationship of haemoglobin and CRP level with different types of heart failure patients.

Methodology

This comparative cross-sectional study was conducted in the Department of Cardiology at Mymensingh Medical College, Mymensingh, Bangladesh from December 2010 to November 2011 for a period of two (02) years. Patients of ACS who were presented within 12 hours of chest pain were included as study population. Patient who were admitted in CCU with clinical features of ischaemic type of chest pain of both sexes within 12 hours of onset of chest pain and diagnosed as ACS were included in this study. Patients with iron therapy before admission, blood transfusion before admission, History of previous or current haemostatic disorder, patient with recent bleeding, renal insufficiency, patient admitted with Chronic disease or inflammatory condition, Patient with malignancy, history of PCI or history of CABG were excluded from this study.

All the data were recorded in a data collection sheet. Study population were categorized in four groups according to the level of hemoglobin and C-reactive protein. Patients who had less than 10 gm/dl haemoglobin level and more than or equal to 12 mg/L of CRP were designated as Group I. Patients who had more than 10 gm/dl haemoglobin level and less than 12 mg/L of CRP were designated as Group II. Patients who had more than 10 gm/dl haemoglobin level and more than or equal to 12 mg/L of CRP were designated as Group III. Patients who had less than 10 gm/dl haemoglobin level and less than 12 mg/L of CRP were designated as Group IV.

Age, sex, cardiovascular risks factor, history, family history of cardiovascular disease, treatment history and ECG were taken during admission. Blood sample was collected for baseline laboratory investigations like Troponin-I, Random Blood Sugar (RBS), Blood urea, Serum creatinine, lipid profile , Hemoglobin & CRP level .Sample were then send to standard laboratory /Biochemistry department of MMCH. The period of follow up was 5 days after admission. Permission from the ethical committee was taken. Continuous data were expressed as mean±SD.

Categorical data were analyzed with chi square test, Student's unpaired 't' test was used for analysis of continuous variables. Comparison between groups was done by unpaired t-test. Multivariate logistic regression analysis was done to determine the association of Hemoglobin & CRP Levels with in hospital out come in Acute Coronary Syndrome. Avitex CRP (Omega Diagnostics Ltd. Scotland. UK) is a rapid latex agglutination test kit for detection of C-reactive protein in human serum. The detection limit is 6mg/L. Hemoglobin estimation was done by analyzer.

Result

Majority of the study population were in the age group of 41 to 50 Years and 51 to 60 Years of age group which were 73(36.3%) cases in each followed by 61 to 70 Years which was 33(16.4%) cases. The mean age of the population was 52.18±8.88 years. Statistically non-significant mean age difference among the groups (Table 1).

Table 1: Age distribution of the study population

Age Group	Group Name				Total
	Group 1	Group 2	Group 3	Group 4	
30 to 40 Years	11(14.7%)	6(6.5%)	5(22.7%)	0(0.0%)	22(10.9%)
41 to 50 Years	23(30.7%)	38(41.3%)	7(31.8%)	5(41.7%)	73(36.3%)
51 to 60 Years	28(37.3%)	33(35.9%)	8(36.4%)	4(33.3%)	73(36.3%)
61 to 70 Years	13(17.3%)	15(16.3%)	2(9.1%)	3(25.0%)	33(16.4%)
Total	75(100.0%)	92(100.0%)	22(100.0%)	12(100.0%)	201(100.0%)

Mean±SD = 52.18±8.88; χ^2 = 9.56, P = 0.39 NS; Group 1=Hb < 10 gm/dl CRP ≥ 12 mg/L; Group 2=Hb > 10 gm/dl CRP< 12 mg/L; Group 3=Hb > 10 gm/dl CRP > 12 mg/L; Group4= Hb < 10 gm/dl CRP< 12 gm/L

Significant difference of mean left ventricular (LV) ejection fraction was found among the groups. (p=0.005). Maximum patient in group 1 (48.5%) had ejection fraction in the range of 40 to 50%, compare to group 2 (32%), group 3 (11.1%) and group 4 (5.8%) (Table 2).

Table 2: Distribution of the study population by Ejection fraction

Ejection fraction	Group Name				Total
	Group 1	Group 2	Group 3	Group 4	
< 40	4 (66.7%)	1(16.7%)	1(16.7%)	0(0.0%)	6(100.0%)
40 to 50	48(48.5%)	32(32.3%)	11(11.1%)	8(5.8%)	99(100.0%)
51 to 60	13(22.4%)	38(65.5%)	5(8.6%)	2(3.4%)	58(100.0%)
>60	5(20.8%)	14(58.3%)	4(16.7%)	1(4.2%)	24(100.0%)
Total	70(37.4%)	85(45.5%)	21(11.2%)	11(5.9%)	187(100.0%)

X^2 = 23.736; P = 0.005; Group 1=Hb < 10 gm/dl CRP ≥ 12 mg/L; Group 2=Hb > 10 gm/dl CRP< 12 mg/L; Group 3=Hb > 10 gm/dl CRP > 12 mg/L; Group4= Hb < 10 gm/dl CRP< 12 gm/L

The heart failure was statistically significant in Killip class I (p=0.000) and Killip class II (p=0.000). Number of Killip class II was more in Group I (38.7%) than other groups (Table 3).

Table 3: Distribution of the study population by types of heart failure

Heart Failure	Group Name				Total	P value
	Group 1	Group 2	Group 3	Group 4		
No HF	26(34.7%)	70(76.1%)	13(59.1%)	8(66.7%)	117(58.2%)	0.357^{NS}
Killip I	1(1.3%)	0(0.0%)	0(0.0%)	0(0.0%)	1(0.5%)	0.000^{S}
Killip II	29(38.7%)	14(15.2%)	6(27.3%)	3(25.0%)	52(25.9%)	0.000^{S}
Killip III	12(16.0%)	5(6.5%)	2(9.1%)	1(8.3%)	21(10.4%)	0.99^{NS}
Killip IV	7(9.3%)	2(2.2%)	1(4.5%)	0(0.0%)	10(5.0%)	0.92^{NS}
Total	**75(100.0%)**	**92(100.0%)**	**22(100.0%)**	**12(100.0%)**	**201(100.0)**	

X^2 = 31.406; P = 0.002; Group 1=Hb < 10 gm/dl CRP ≥ 12 mg/L; Group 2=Hb > 10 gm/dl CRP< 12 mg/L; Group 3=Hb > 10 gm/dl CRP > 12 mg/L; Group4= Hb < 10 gm/dl CRP< 12 gm/L

Discussion

This prospective observational study was carried out in the department of cardiology, Mymensingh Medical College Hospital, Mymensingh during the period of December 2010 to November 2011. This study was done to find out the correlation of hemoglobin and C-reactive protein with acute coronary syndrome and in hospital outcome.

Among the admitted patient in coronary care unit Mymensingh Medical College Hospital, a total of 201 patient diagnosed as acute coronary syndrome including unstable angina, non-ST elevation myocardial infarction & ST elevation myocardial infraction were included in the study after considering the inclusion and exclusion criteria. The patients were divided in to 4 groups Group-I, Group-II, Group-III and Group-IV according to level of hemoglobin and C-reactive protein level. Among the 201 patient 75 patients were in Group-I (Hemoglobin <10 gm/dl, CRP $\geq$ 12 mg/L), 92 patients in Group-II (Hemoglobin > 10 gm/dl, CRP <12 mg/L) 22 patients in Group-III (Hemoglobin> 10 gm/dl, CRP > 12 mg/L,) 12 patients included in Group-IV (Hemoglobin : <10 gm/dl, CRP < 12 mg/L).

There were no significant difference of age between these groups. The mean age of the patients were 52.18$\pm$8.88 years. The highest percentage of Group-I were 51-60 years, and Group-II were 41-50 years, Islam and Majumder[10] found the mean age of the ACS patients were 53.60$\pm$8.5 in Bangladeshi population. Lee et al[11] found the mean age of ACS patients were 53.2$\pm$10.6 years in Bangladeshi population which supported the finding of present study.

In this study maximum number of patients is Group-I had LV ejection fraction in the range of 40-50%, Group-I 48.5%, Group-II 32.3%,Group-III-11.1% and Group-IV 5.8%, respectively which was statistically significant.

Heart failure (any Killip class) was significantly more in Group-I than Group-II, III, IV. Though the incidence of Killip class III and cardiogenic shock/Killip IV were not significant among the groups, but Killip class-II, Killip class- III and Killip class- IV heart failure were more in the patient with low hemoglobin and high CRP level.

Al-Ahmad et al[12] found that highly statistically significant and independent association between low hemoglobin concentration and adverse cardiovascular outcome among the patient with ACS. Their finding was worsening degrees of anemia were associated with progressively higher rates of hypotension tachycardia and heart failure. Franklin et al[13] found that the patient group with lower hemoglobin concentration on admission more likely suffered from cardiogenic shock, CCF and post infarction angina than the groups with higher hemoglobin level on admission.

Conclusion

In conclusion haemoglobin and CRP level of acute coronary syndrome patients is statistically significantly associated with different types of heart failure. Patient with ACS has variable levels of hemoglobin and C-reactive protein. It has been found that patient with lower hemoglobin and higher CRP level have adverse in hospital outcome including heart failure and death. So categorizations of patient with ACS on basis of hemoglobin and CRP level may help for risk stratification and management.

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