

LEVEL OF HIGH SENSITIVITY C-REACTIVE PROTEIN IN PATIENTS OF ACUTE MYOCARDIAL INFARCTION WITH OR WITHOUT DIABETES MELLITUS

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Date of Submission: 14-06-2022; Date of Acceptance: 11-10-2022; Date of Publication: 15-12-2022

ABSTRACT:

BACKGROUND:

Myocardial infarction (MI) is diagnosed by history of typical angina chest pain of prolonged duration along with ST segment elevation on ECG and/or raised cardiac biomarkers. Increased levels of CRP are associated with increased risk of HTN, DM and ischemic heart disease. Increased intake of trans fatty acids lead to increased levels of CRP, endothelial dysfunction and ischemic heart disease. Vessel wall is damaged after the inflammation and CRP is a marker of inflammation, so it can predict the cardiovascular disease.

AIMS & OBJECTIVE:

The objective of this study was to determine the level of high sensitivity CRP in MI patients with or without diabetes mellitus.

MATERIAL & METHODS:

Total 60 patients were enrolled in the study. Diabetic and non diabetic patients having age from 40 to 70 years with acute myocardial infarction were included in the study. Patients having heart disease other than MI, auto immune disorders and patients less than 40 years of age were excluded. Level of high sensitivity CRP of patients of MI was analyzed by using chemiluminescence technique. High sensitivity CRP was analyzed quantitatively.

RESULTS:

In this study 60 individuals with AMI were divided into two groups based on presence (n=30) 50% and absence (n=30) 50% of diabetes mellitus. The mean age of the population was 58.32 ± 11.24 years. Levels of high sensitivity CRP were distributed in four groups, the first group includes hsCRP < 10 mg/l, group-2 includes hsCRP 11-50 mg/l, group-3 comprises levels of hsCRP from 51-100mg/l and group-4 includes hsCRP level from 101-150mg/l. Both groups of AMI patients without and with DM had significantly higher levels of hsCRP as 40% and 31% patients have CRP level lie in group 3 and group 4 respectively. Moreover, the diabetic patients had higher levels of hsCRP as 50% of diabetic patients have levels of hsCRP (51 to 100 mg/l) that is group 3 whereas only 13.3% non-diabetic patients have hsCRP in group 3, and this difference is statistically significant with the p value. ($p=0.007$).

CONCLUSION:

The raised hsCRP is seen in acute myocardial infarction patients having diabetes mellitus as compared to non diabetic patients. Smokers and hypertensive patients also have raised hsCRP. Patients having positive family history do not have increase hsCRP as compared to those patients who had no positive family history.

KEY WORDS:

C-reactive protein levels, myocardial infarction, diabetes mellitus.

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Author's Contribution: FI: Conducted the study and wrote the article. FS: Supervised the study and helped in manuscript writing. AA: Article writing and corrections in manuscript.

INTRODUCTION:

Myocardial infarction (MI) is the irreversible damage to heart muscles due to coronary artery occlusion. MI is diagnosed by history of typical angina chest pain of prolonged duration along with ST segment elevation and ECG and or raised cardiac biomarkers.¹

There are multiple risk factors including diabetes mellitus (DM), hypertension (HTN), smoking so the preventive measures like regular exercise avoid smoking decrease fat intake can be done to avoid the risk of MI.²

Coronary artery disease (CAD) is the leading cause of deaths i.e 17.1 million globally. MI is the most lethal manifestation of coronary artery disease and the incidence is rising in our part of the world as compared to the west.³

Iqbal et al. studied the risk factors in Pakistani population which showed that large number of patients are suffering from ischemic heart disease / MI (30% over the age of 45 years). Punjab is the most developed and populated province accounting for more than 45% of the entire population of our country. Although disease burden is very high but little data is available about the actual status of disease.⁴

In a recent study it was reported that increased levels of CRP are associated with increased risk of HTN, DM and ischemic heart disease.⁵⁻⁶ Lopez-Garcia et al. reported that increased intake of trans fatty acids lead to increased levels of CRP, endothelial dysfunction and ischemic heart disease.⁷

Vessel wall is damaged after the inflammation and CRP is a marker of inflammation, so it can predict the cardiovascular disease.⁸

The levels of CRP are important as the level rises, the risk increases e.g CPR > 2.4 mg/L increases the two-fold risk of acute ischemic events as compared to the CPR level <1.0 mg/L. However, in general population without the evidence of any ischemia symptoms the CRP levels cannot be validated because this is a non-specific marker of inflammation.⁹

The risk of ischemic heart disease according to the AHA is as follows: <1.0 mg/L is low risk, 1-3 mg/L is average risk while >3.0 mg/L is high

risk.¹⁰

CRP must be considered along with major risk factor of coronary artery disease, like smoking, diabetes, hypertension, high cholesterol levels, high BMI to evaluate the actual risk of ischemic heart disease.¹¹

MATERIALS AND METHODS:

A descriptive study conducted at from Immunology Department of Children's Hospital and University of Child Health Sciences, Lahore over a period of six months in 2020. Patients of acute myocardial infarction were selected from Jinnah Hospital, Lahore. Consecutive sampling technique was used and the sample size was calculated by using 95% confidence interval and 5% margin of error. The sample size is 60. Patients having age from 40 to 70 years, diabetic patients and non-diabetic (male) and patients with acute myocardial infarcted patients were included. Patients having heart disease other than MI, patients less than 40 years were excluded. Level of high sensitivity CRP of patients of MI was analyzed by using chemiluminescence technique. High sensitivity CRP was analyzed quantitatively. To analyze the data, SPSS 24 was used. Chi-square test was applied to categorical variables.

RESULTS:

In this study 60 individuals with AMI were divided in two groups based on presence (n=30) 50% and absence (n=30) 50% of diabetes mellitus. All were male. The mean age of the subjects was 58.32 ± 11.24 .

In our study levels of high sensitivity CRP were distributed in four groups, the first group includes hsCRP < 10 mg/l whereas group 2 includes hsCRP 11-50 mg/l, third group comprises levels of hsCRP from 51-100mg/l and fourth group includes hsCRP level from 101-150 mg/l.

The results of our study inferred that out of total 60 subjects, 11 (18.5%) subjects were in group 1. While 24 (40.2%) subjects were in group 2 and 19(31%) subjects were in group 3 whereas 6 (10.3%) subjects were in group 4.

Both groups of AMI patients without and with DM had significantly higher levels of hsCRP as 40% and 31% in group 3 and group 4 respectively.

Moreover, the diabetic patients had higher levels

Table no- 1: Distribution of Diabetes, hypertension, smoking and family history of Myocardial infarction (MI)					
Variables	High sensitivity CRP				P-*value
N		<10mg/l	11-50mg/l	51-100mg/l	101-150mg/l
Diabetes	n (%)	n (%)	n (%)	n (%)	p=0.007
Yes	30	4(13.3)	7 (23.3)	15 (50)	4(13.3)
No	30	7(23.3)	17(56.6)	4(13.3)	2 (6.6)
Hypertension					p=0.026
Yes	31	4(12.9)	10(32.2)	12(38.7)	5(16.1)
No	29	7(24.1)	14(48.2)	7(24.1)	1(3.4)
Smoking					p=0.001
Yes	26	1(3.84)	8(30.7)	11(42.3)	6(23.0)
No	34	10(29.4)	16(47)	9(26.4)	0(0)
family H/O MI					p=0.447
Yes	25	11(16.1)	7(38.7)	4(32.2)	3(12.9)
No	35	7(20.6)	13(41.3)	12(31)	3(6.8)

of hsCRP as 50% of diabetic patients having levels of hsCRP were in group 3 whereas only 13.3% non-diabetic patients were in group 3. And this difference is statistically significant with the p value (p=0.007).

Among 60 patients of AMI, 31 were with the history of hypertension while 29 were not. Pearsons Chi Square was applied to history of hypertension and level of CRP. They both are statistically significant with the p- value of 0.026(table 4. 1). Association between smoking and hs CRP is also determined. The subjects with history of smoking had higher level hs CRP and its difference to non-smokers is statistically significant as its p- value is 0.001. (table 1)

Family history of AMI is positive in 25 patients while 35 have no family history. Its correlation with CRP was insignificant as its p-value was 0.447. (table 1)

DISCUSSION:

Diabetes mellitus may contribute to development of myocardial infarction, stroke and other cardiovascular diseases (CVD), in which inflammation plays a major part. In this research, plasma levels of high-sensitivity C reactive protein (hsCRP) were measured in subjects having Acute myocardial infarction (AMI) divided into two groups with or without diabetes mellitus. Because hsCRP is an important acute phase reactant protein whose level increases in many CVDs and metabolic disorders like DM.¹² Results of study indicates that there is highly significant co-relation between diabetes mellitus and plasma levels of hsCRP in

AMI patients (p=0.007).

Inflammation of low grade can increase cardiovascular disease by endothelial dysfunction and diabetes mellitus.¹³ DM and increased inflammation has reported by Mankowska et al. and enhancing the risk of cardiovascular disease.¹⁴

It is not confirmed that diabetic patients have any association of atherosclerosis with chronic low-grade inflammation.¹⁵ Moreover, in diabetic patients, there was association of arterial stiffness with CRP levels.¹⁶

The hsCRP is a predictor of diverse end points ranging from T2DM, raised carotid intima-media thickness, CAD, metabolic syndrome, first acute coronary event, and recurrent CVD events. In larger researches, hsCRP is considered a risk factors for diabetes, glucose intolerance and CVD. In another cross-sectional study of 9,517 subjects, it was assessed that there is a link between hsCRP levels, obesity and insulin resistance and metabolic syndrome.¹⁷ In a study on 1726 patients by Jaiswal et al. assessed that hsCRP is independently associated with deranged fasting glucose and deranged glucose tolerance.¹⁸ According to these studies, hsCRP levels are linked with CAD. In a cohort study by Rao et al. who studied 1021 patients, out of them 772 patients had CAD, they assessed that hsCRP was an independent predictor of repeat coronary events.¹⁹

CONCLUSION:

The raised hsCRP is seen in acute myocardial infarction patients having diabetes mellitus as

compared to non diabetic patients. Smokers and hypertensive patients also have raised hsCRP.

Patients having positive family history do not have increase hsCRP as compared to those patients who had no positive family history.

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