Study on Role of C-Reactive Protein as a Prognostic Marker in Diabetic and Non-Diabetic Patients with acute Myocardial Infarction

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Abstract

Introduction: *Atherosclerosis is associated with low grade inflammation of vascular structure and endothelial cells. Studies have shown that CRP, a marker for inflammation is augmented in MI, Stroke and Coronary Artery Disease. Type 2 Diabetes is an independent risk factor for atherosclerosis. It is considered to be a state of low grade inflammation. CRP levels have been reported to be augmented in diabetic patients.*

Aims & Objectives: *This study is aimed at assessing the role of CRP in patients with MI and at comparing the results between diabetic and non -diabetic patients. The aim of the study is to determine the CRP level at the time of admission as a marker of hospital mortality and morbidity in both diabetic and non-diabetic patients who had acute myocardial infarction.*

Materials and Methods: *The study was conducted on 100 patients (50 Diabetics & 50 Non-Diabetics) in Great Eastern Medical School & Hospital, Ragolu, Srikakulam, Andhra Pradesh with acute Myocardial infarction. The patients were divided into two groups, 50 Diabetics and 50 Non-Diabetics. Venous blood sample was collected on admission and sent for investigations. Cut-off of 7mg/l for C-reactive protein on admission is taken for patients with acute myocardial infarction. Statistical evaluation was performed using suitable statistical methods.*

Results: *The study demonstrated that CRP levels on admission were higher in both Diabetic patients and non-diabetic patients with acute MI. The CRP levels were higher in diabetics than non-diabetics. The diabetic patients with higher CRP level had higher incidence of mortality and morbidity as compared to non-diabetic patients with acute MI.*

Conclusion: *This study found that CRP on admission is a strong predictor for hospital morbidity and mortality in both diabetic and non diabetic patients with acute myocardial infarction. Diabetic patients presented with higher CRP levels compared with those in non diabetic patients with acute myocardial infarction. CRP may serve as marker in predicting the hospital mortality in patients with acute myocardial infarction.*

Introduction

- Atherosclerosis is associated with chronic low grade inflammation of vascular structure and endothelial cells.

- Acute Myocardial Infarction (AMI) is a complication of coronary artery disease

which is fatal and cause disability due to compromised LV function. AMI is one of the leading causes of death in developed and developing countries.

- The incidence is difficult to judge because of varied reporting pattern. Moreover a part of cases die even before reaching hospital without having been examined by a qualified practitioner.
- Acute phase response occur secondary to inflammatory process.
- This response is due to pro-inflammatory cytokines which are released from the tissue.
- These stimulate the liver to synthesize acute phase proteins.
- C - reactive protein (CRP), being one among them, is synthesized by the liver in response to factors released by adipocytes.
- CRP is a marker for inflammation and is increased in both atherosclerosis and in coronary artery disease.
- Diabetes mellitus is identified as one major cause of mortality and morbidity.
- Diabetes mellitus is an independent risk factor for atherosclerosis.
- It is considered to be a state of low-grade inflammation.
- CRP levels have been reported to be augmented in diabetic patients.

Aims & Objectives

To determine the CRP level at the time of admission as a strong predictor of hospital mortality and morbidity in patients with Diabetes mellitus as well as in patients without Diabetes mellitus who had acute myocardial infarction.

Materials and Methods

Source of Data: The material for the present study is collected from the patients admitted in Intensive Coronary Care Unit in Great Eastern Medical School, ragolu, Srikakulam.

Period of Study: November 2021 to October 2022.

Study Design: This is a longitudinal study, in which patients suffering from acute myocardial infarction; venous blood will be collected on admission and sent for required investigations mentioned.

Sample Size: 100 patients were selected for the study based on the inclusion and exclusion criteria after obtaining informed consent.

Method of Data Collection

- By detail history
- By detail examination
- By relevant investigations like ECG changes, lipid profile, CPKMB enzyme levels, blood glucose levels (FBS/PPBS) and C-reactive protein.
- The patient will be followed till discharge and all complications like arrhythmias, failure and outcome noted.

Inclusion Criteria

- Patients of any age who are admitted in ICCU in GEMS Hospital, Ragolu, Srikakulam from November 2021 to October 2022.
- The non-ST segment elevation MI, ST segment elevation MI is selected on basis of history, examination and relevant investigations.
- Patient is considered to be diabetic if patient was informed of the diagnosis earlier or was on prescribed anti-diabetic treatment (ADA criteria).

Exclusion Criteria

- Renal failure
- Inflammatory bowel disease
- Non cardiac chest pain
- Recent infections
- Immunologic disorder
- Known or suspected neoplastic disease
- Recent(less than 3 month old) Major trauma, Surgery, Burns
- Re-infarction patient

Data Analysis

- Data entered in excel sheet and analyzed using SPSS 2020 software.
- Collected data was analyzed by frequency, percentage, mean, standard deviation and P value calculated by Chi-Square test and unpaired t test.
- Tables & Graphs were used to show the data.
- P value <0.05 is considered as statistically significant.

Results & Discussion

- Total of 100 patients were included in the study.
- Out of which 50 subjects were non-diabetic and 50 were diabetic.
- These patients have been divided into two groups
- Group A : Diabetic patients
- Group B: Non-diabetic patients

Distribution according to Age

- The youngest patient was aged 26 years and eldest patient being 88 years.
- The maximum number of patients between age group 51-70 years.
- In diabetic group 42% of patients were in the age group of 61-70 years.
- 36% of patients in non diabetic were in the age group of 51-60 years.
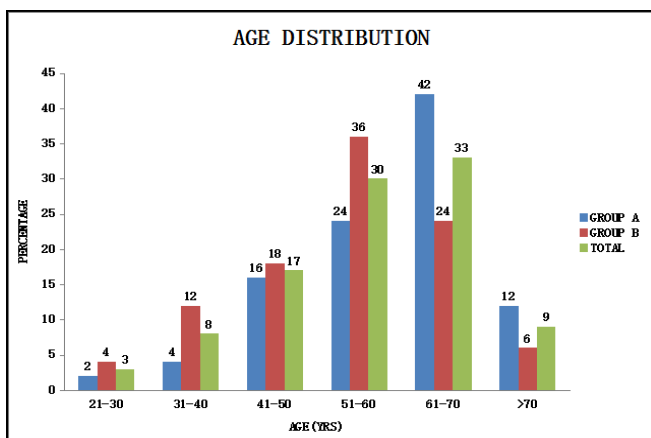
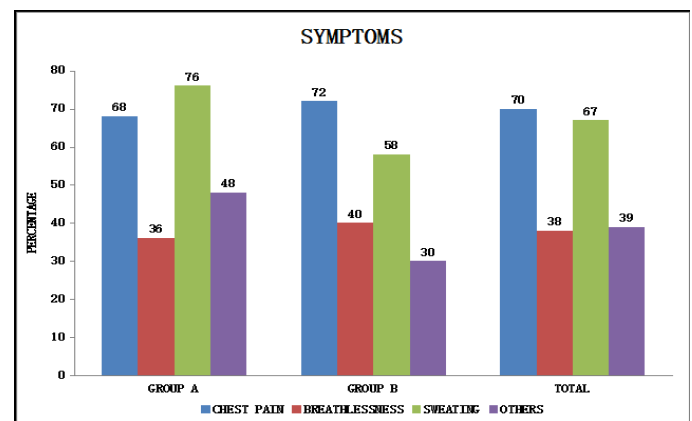## Sex Distribution

- Out of 100 patients 71 were male and 29 patients were female.
- In diabetic group 66% were males and in non-diabetic group 76% were males.
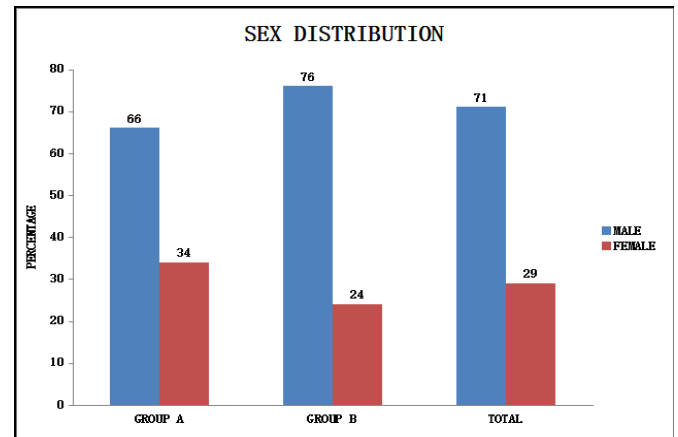
Distribution of Symptoms

- Chest pain is the most common symptom occurring in 70 patients, followed by Sweating in 67, and breathlessness in 38 patients of acute myocardial infarction.


Distribution of Risk Factors

- In this study the most common non modifiable risk factor is male sex accounting for 71% of all cases followed by age >60 years (42%)
- The common modifiable risk factor other than diabetes is dyslipidemia noted in 72% patients followed by smoking (46%) and hypertension (27%).
- Among diabetics 42 patients had dyslipidemia (84%) while 30 patients in non diabetic group had dyslipidemia (60%)
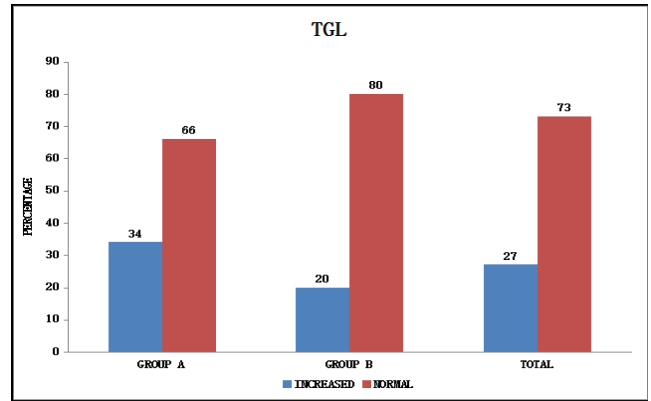
RISK FACTORS
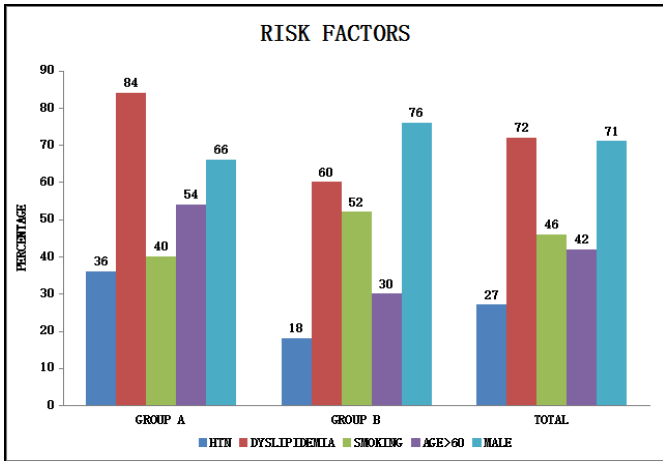
- Serum HDL levels were low in 13 patients (26%) in diabetic group and none of non diabetic group had low HDL.


HDL
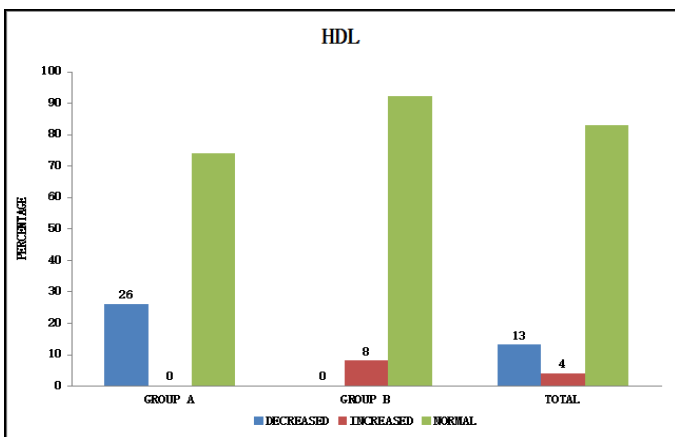
- Serum VLDL was increased in 6 patients in diabetic group (12%) and 5 patients (11%) in non diabetic group.


VLDL
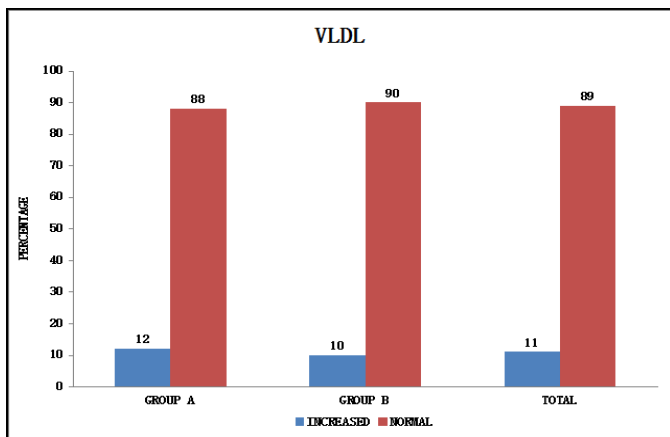
- Serum TGL levels were increased in 17 patients (34%) in diabetic group and 10 patients (20%) in non diabetic group.

TGL

- Serum LDL was increased in 27 patients (54%) in diabetic group and 9 (18%) in non diabetic group so thus the most common modifiable risk factor was dyslipidemias particularly LDL.
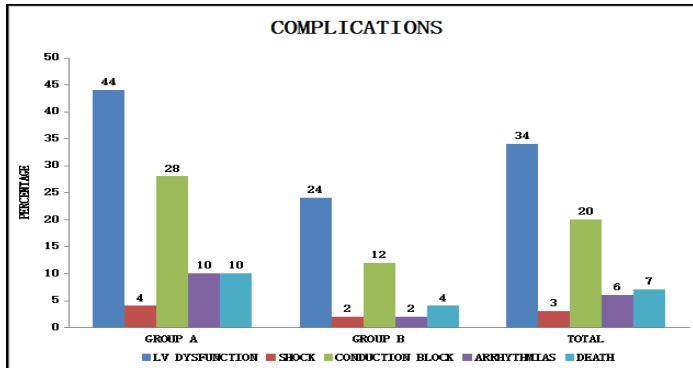

LDL
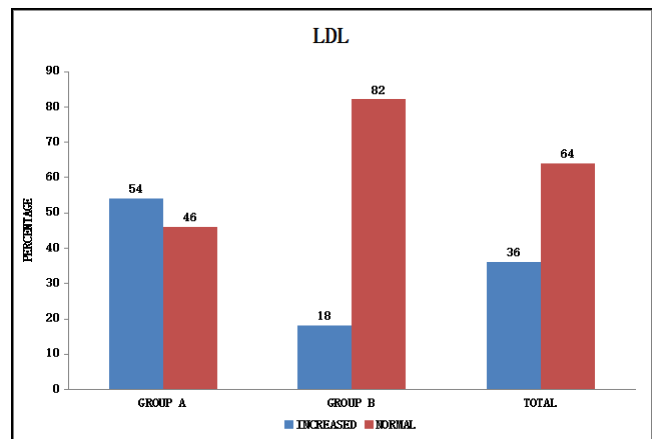
- Total serum cholesterol was increased in 11 patients (22%) in diabetic group and 8(16%) In non diabetic group.

CHOLESTEROL
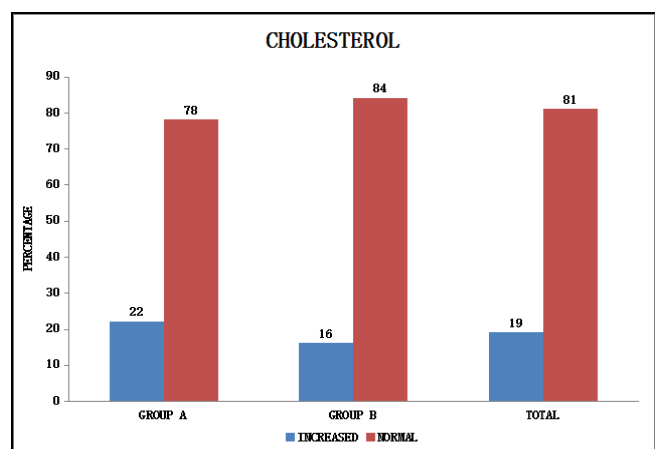
Distribution of Complications
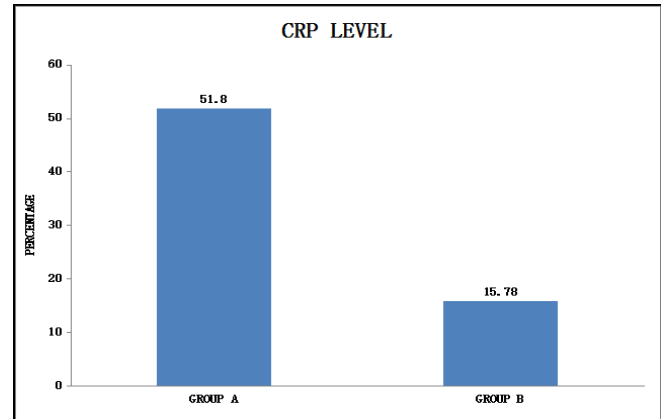- Left ventricular dysfunction was the most

common complication seen in34% patients, followed by conduction blocks in 20% patients, arrhythmias in 6% patients, cardiogenic shock in 3% patients and death in 7% patients.
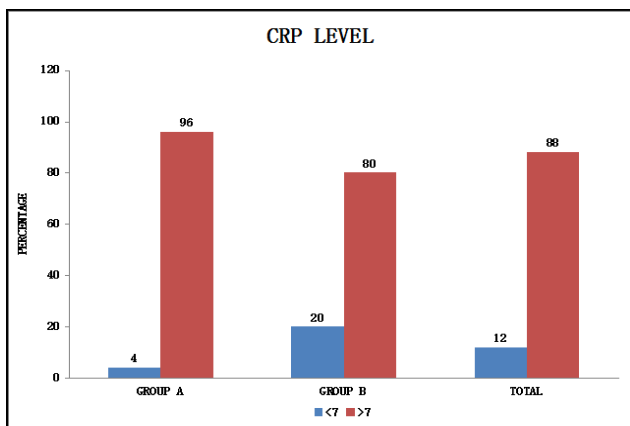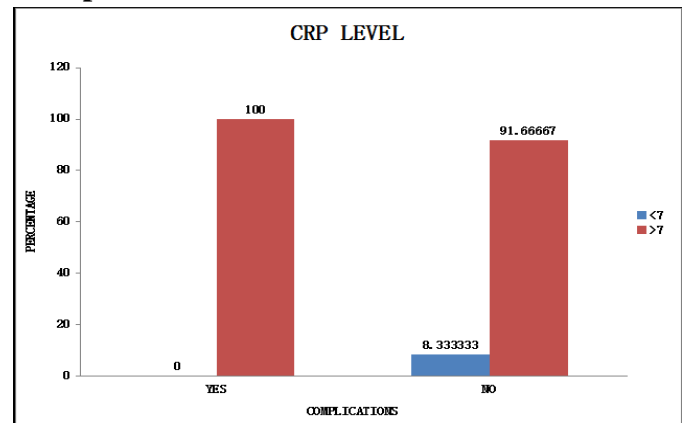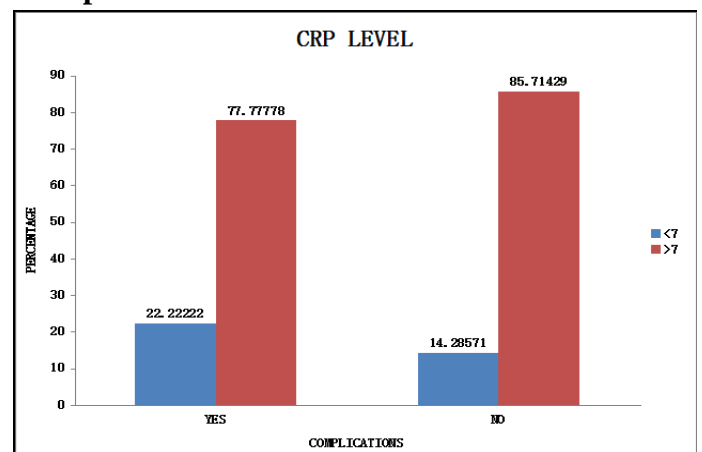

CRP Levels at Admission

- In our study CRP level of 7mg/L is taken as cut off.
- Among the study groups 88 (88%) patients had CRP of more than 7mg/l, and 12(12%) patients had CRP of less than 7mg/l.

- In our study group, 96% of diabetic patients were found to be having CRP level >7mg/l as compared to 80% of non diabetic patients in AMI.
- The mean CRP in diabetic group was 51.80 mg/l as compared to 15.78mg/l in non diabetic group which was statistically significant (p<0.001).
- On applying appropriate statistical test there was significant correlation between CRP level and diabetes in patients with

AMI.

- CRP levels on admission were higher in diabetic patients than in non diabetic patients with median value of CRP in diabetic patients.

Mean CRP Level between Group A and Group B

Proportion of Complications by CRP Level in Group A

Proportion of Complications by CRP Level in Group B

Conclusion

- The present study results demonstrated that CRP on admission is a strong predictor for hospital morbidity and mortality in both diabetic and non diabetic patients with AMI.
- Diabetic patients presented with higher CRP levels compared with those in non diabetic patients with AMI.
- CRP may serve as marker in predicting the hospital mortality in patients with AMI.
- It can be concluded that significant high values of CRP in diabetics may indicate a considerable damage to the vascular endothelium, which could play role in causation of cardiovascular events.

Summary

- A total of 100 patients with acute myocardial infarction were included and out of which 50 patients were diabetic and 50 patients were non diabetic.
- Immediately after admission, venous sample was drawn sent for blood glucose, CRP levels, and other required investigations.
- Outcome of the patients in the hospital including complications like arrhythmias, shock, conduction blocks, and deaths were documented and these data were correlated with the diabetic status and CRP levels.
- In our study group, 96% of diabetic patients were found to be having CRP level >7mg/l as compared to 80% of non diabetic patients with AMI.
- The mean CRP in diabetic group was 51.80 mg/l as compared to 15.78mg/l in non diabetic group which was statistically significant (p<0.001).
- Diabetic patients who died in hospital presented with higher plasma levels of CRP on admission as compared to non diabetic patients.
- Thus, this study reveals that CRP can be used as a prognostic marker in diabetic patients with AMI.

References

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