ORIGINAL RESEARCH PAPER

General Medicine

PROGNOSTIC IMPORTANCE OF TOTAL NEUTROPHIL COUNT NEUTROPHIL /LYMPHOCYTE RATIO & PLASMA GLUCOSE AT ADMISSION IN ACUTE MYOCARDIAL INFARCTION

KEY WORDS: STEMI, Plasma Glucose, NLR

Dr Yatin Prajapati	Resident, Department of General Medicine, Pacific Institute of Medical Sciences, Udaipur
Dr Pramod Dhuddate	Professor, Department of General Medicine, Pacific Institute of Medical Sciences, Udaipur

ABSTRACT

Background - Acute myocardial infarction is a life-threatening condition that occurs when blood flow to the heart muscle sudden cut off, causing tissue damage. This occurs usually due to a blockage in one or more of the coronary arteries. A blockage can develop due to a growth of plaque, a substance mostly made of fat, cholesterol, and cellular waste products. **Method** This is an analytical study. Data for this study will be collected in a pre-set proforma meeting the objectives of the study. A detailed history and clinical examination Relevant blood investigations will be done. Other investigations as and when required for the patient will be carried out accordingly. Blood Sampling Method –Patient's blood samples for CBC, Plasma Glucose (venous sample) at admission **Result:** The study was found to be statistically significant. **Conclusion:** In STEMI, baseline NLR, total neutrophil count and random blood glucose on admission could be helpful in prognosis and a more intensive treatment might be needed for patients with high blood parameters.

INTRODUCTION:

Acute myocardial infarction is a life-threatening condition that occurs when blood flow to the heart muscle sudden cut off, causing tissue damage. This occur usually due to a blockage in one or more of the coronary arteries. A blockage can develop due to a growth of plaque, a substance mostly made of fat, cholesterol, and cellular waste products.

Atherosclerosis is disease of the arteries characterized by the deposition of fatty material on their inner walls.

Diabetes mellitus was defined as fasting plasma glucose >126 mg/dL, a two hour plasma glucose >200 mg/dL or HbA1c >6.5% warrants diagnosis of diabetes mellitus (ADA criteria) or Any Random plasma glucose concentration >200 mg/dL accompanied by classical symptom of diabetes mellitus(polyuria, polydipsia and weight loss).

Usually Atherosclerosis is the signs of inflammation in the first stages of lipid accumulation in the artery wall. Blood leukocytes, which attribute host defences and inflammation, localize to the earliest lesions of atherosclerosis in both human and animals. Inflammatory processes promote initiation and development of atheroma and contribute clearly to acute thrombotic complications of atheroma.[1]

During unstable periods(stressful condition) with activated inflammation in the vascular wall, most of time patients may be present with myocardial infarction. Myocardial infarction may be a minor event in a lifelong chronic disease, it may even go unnoticable, but it may also be a major crisis event leading to sudden death or severe hemodynamic deterioration.

Myocardial infarction in a population can be used as a representative for the preva myocardial infarction may be defined from a number of different clinical, electrocardiographic, biochemical, imaging, and pathological characteristics.[2]

Elevated blood glucose (BG) on admission is a known risk factor for higher mortality in patients (pts) with AMI.Continuous blood glocse(BG) monitoring during hospital course is mandatory in acute myocardial infarction patient so that we can predict the prognosis and mortality than admission BG is unknown.[3]

Inflammation plays an important part in the pathogenesis of cardiogenic shock (CGS). the neutrophil-lymphocyte ratio (NLR) is an integrated biomarker of inflammation,which is associated with the outcome of CGS . This retrospective cohort study was performed to identify the utility of using NLR among patients with CGS.[4]

Patient of cardio vascular disease associated with Severe inflammation causes poor outcomes in coronary care unit (CCU) patients. The neutrophil-lymphocyte ratio (NLR) is a biomarker used to monitor inflammation and the immune response by which we can predict a poor prognosis in various diseases.[5]

Objectives Of The Proposed Study :
1. To study the Prognostic Importance of total neutrophil count, neutrophil/Lymphocyte & Plasma glucose Acute myocardial infarction on Admission in Pacific Institute Of Medical Sciences

MATERIALS AND METHODS:
Study Design – Analytical study

Study Place – All the Acute Myocardial Infarction patients admitted in Pacific Institute Of Medical Sciences, Umarda, Udaipur

Study Duration – February 2021 to July 2023

METHOD OF COLLECTION OF DATA:
This is an analytical study. Data for this study will be collected in a pre-set proforma meeting the objectives of the study. A detailed history and clinical examination Relevant blood investigations will be done. Other investigations as and when required for the patient will be carried out accordingly.

Blood Sampling Method
Patients' blood samples for HbA1c analyse

Blood Sampling Method -
Patient 's blood samples for CBC, Plasma Glucose (venous sample) at admission

Biochemical Analysis –
- CBC will be analyzed using device, Model – ABACUS-5(DIATRON)/EM-200(TRANSASIA), serial no-510780, B2001672-N.
- Plasma Glucose (venous sample) will be analyzed using TRANSASIA, Model- EM-360, serial no – 60551.

Sample Size :
A total of 120 patients will be taken according to the inclusion and exclusion criteria.

$$n = \frac{Z^2 \times \sigma^2}{d^2}$$

where, n is sample size

Z is 1.96, level of confidence at 90%

σ is 216, standard deviation

and d is 40, error.

Sample size(n) required is 120.

Proposed Statistical Analysis:

The data will be entered in MS Excel software version 17 and analysed using Statistical Packages for Social Sciences (SPSS). The descriptive data will be expressed in proportions, mean and frequency tables. The quantitative data will be analysed using Independent Student's T test, Pearson's correlation test, ANOVA test.

Inclusion Criteria:
• Diagnosed cases of Acute Myocardial infarction with ECG, Serum Biomarker at admission

Exclusion Criteria:
• All the cases of Post myocardial Infraction
• Patients with chronic infections, renal disease, endocrine disease, malignancy.
• Patients on steroids, hormone replacement therapy.
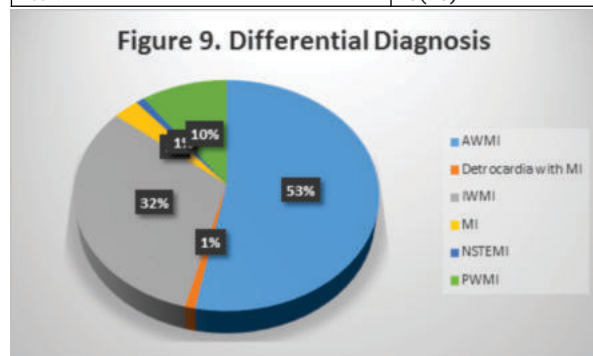• Patients not signing informed consent.

Assessment To Be Done :
• Patients will be assessed by the following parameters:
• Detailed clinical history
• All Routine Blood Investigation
• ECG
• 2D ECHO

RESULTS:
Table 9. Differential Diagnosis

Diagnosis	Frequency (%)
AWMI	53 (53)
Detrocardia with MI	1(1)
IWMI	32(32)
MI	3(3)
NSTEMI	1 (1)
PWMI	10(10)

Figure 9. Differential Diagnosis

Total 53% study participants were diagnosed with AWMI, followed by 32% cases were diagnosed with IWMI. Only 10 case diagnosed with PWMI.

DISCUSSION:

One of the most dangerous and lethal cardiovascular emergencies is acute myocardial infarction (AMI). A key pathophysiological phase of myocardial infarction is the rupture of susceptible coronary plaques and the production of thrombi, which can lead to total or partial obstruction of the coronary arteries and myocardial ischemia or necrosis.

A major mechanism for the rupture of weak plaques is inflammation. Numerous inflammatory cells, primarily neutrophils, penetrate the atheromatous plaque in the coronary arteries, congregate within the arterial wall, and promote the adhesion and activation of vascular endothelial cells while secreting peroxidase and tissue damage factors such alkaline phosphatase.

The neutrophil-lymphocyte ratio (NLR), which is the absolute ratio of neutrophils to lymphocytes in peripheral blood, might indicate if there is systemic inflammation. Numerous signs involving lymphocytes and neutrophils are also present.

In the study, 73% cases were residing at urban area and remaining 27% cases were residing at Rural area. Among the study participants, 73 cases had chief complained of chestpain, followed by 42 cases had complained of shortness of breath and only 5 cases had complained of vertigo. Among the study participants, 17 and 18 cases had respectively presence of Diabetes and Hypertension. In research majority patients had chief complained of chest pain and shortness of breath.

The mean Total Leucocyte count was 8615.40 mg/dl. The mean Neutrophil and Lymphocyte ratio was 3.3. The mean RBS was 143.61mmol. Out of total, among 31 cases had presence of troponin I biomarker.

CONCLUSION:

The present study demonstrated the close relationship between higher NLR and Plsama glucose level increased rate of all-cause mortality in patients with STEMI. Patients with inflammatory or autoimmune disorders are well known to have an increased risk of cardiovascular disease, which is most likely the consequence of inflflammatory responses affecting Some emerging inflammatory markers, such as neopterin, uric acid, and circulation micro ribonucleic acid, have been suggested as markers of disease activity or inflammation in patients with cardiovascular disease Neutrophil count also associates with myocardial extension of the areas of infarction.

Lymphocytes are known to have protective effect on clinical outcomes in cardiovascular disease The NLR could act as a combined surrogate marker for both acute inflammatory reaction and Cardiovascular disease. NLR could be a more potent clinical predictor after STEMI than other inflflammatory markers and markers representing activated neurohormonal system, such as cortisol, norepinephrine, and angiotensin II. The NLR might be related with serious post-MI complication, In conclusion, increased NLR was associated increased rate of Cardio vascular disease.

In STEMI, baseline NLR could help to assess the prognosis and a more intensive treatment might be needed for patients with increased NLR.

Compared to NMR, PLR, and LMR, NLR had the best ability in predicting in-hospital death after NSTEMI. Age, creatinine, LDL-C, diabetes and smoking history were all important factors affecting the predictive efficiency in NSTEMI. NLR had the limited predictive ability in STEMI. Plasma glucose and NLR are positively linked with the incidence in patients with AMI. single CBC analysis may help to identify STEMI patients at risk for mortality and heart failure, and total neutrophil count is the most valuable in predicting both. the early acting immunological nature of neutrophils and lymphocytes and their presence in the blood circulation, we recommend the use of NLR as a biomarker of CAD because of their simple, easily measurable, and inexpensive method. Along with our study supports the use of NLR as a cost-effective biomarker to predict the future cardiovascular risk. this study strongly shows NLR ratio high and high plasma glucose in acute myocardial infarction higher chance to mortality

REFERENCES:
1. Punit Gupta, O.P. Patidar, Deepak Gupta. Prognostic value of ratio of neutrophil to lymphocyte to predict prognostic outcomes in patients with acute ST segment elevation myocardial infarction. International Journal of

Contemporary Medical Research 2018;5(4):D30-D32.

2. Gazi E, Bayram B, Gazi S, et al. Prognostic Value of the Neutrophil–Lymphocyte Ratio in Patients With ST-Elevated Acute Myocardial Infarction. *Clinical and Applied Thrombosis/Hemostasis*. 2015;21(2):155-159. doi:10.1177/1076029613492011

3. He J, Li J, Wang Y, Hao P, Hua Q. Neutrophil-to-lymphocyte ratio (NLR) predicts mortality and adverse-outcomes after ST-segment elevation myocardial infarction in Chinese people. Int J Clin Exp Pathol. 2014 Jun 15;7(7):4045-56. PMID:25120783;PMCID:PMC4129018.

4. Asli Kurtar Mansiroglu, Isa Sincer, Yilmaz Gunes, Assessment of neutrophil and neutrophil/ lymphocyte ratio in coronary collateral developed patients with acute coronary syndrome, REV ASSOC MED BRAS 2020; 66(7):954-959.

5. Ghaffari S, Nadiri M, Pourafkari L, Sepehrvand N, Movasagpoor A, Rahmatvand N, Rezazadeh Saatloo M, Ahmadi M, Nader ND. The predictive Value of Total Neutrophil Count and Neutrophil/Lymphocyte Ratio in Predicting In-hospital Mortality and Complications after STEMI. J Cardiovasc Thorac Res. 2014;6(1):35-41. doi: 10.5681/jcvtr.2014.007. Epub 2014 Mar 21. PMID:24753830;PMCID:PMC3992730.

6. Chinese Society of Cardiology of Chinese Medical A Editorial Board of Chinese Journal of C . 2019 Chinese Society of Cardiology (CSC) guidelines for the diagnosis and management of patients with ST-segment elevation myocardial infarction. Zhonghua xin xue guan bing za zhi. (2019) 47:766–83. 10.3760/cma.j.issn.0253-3758.2019.10.003

7. Stone GW, Mintz GS, Virmani R. Vulnerable plaques, vulnerable patients, and intravascular imaging. J Am Coll Cardiol. (2018) 72:2022–6. 10.1016/j.jacc.2018.09.010

8. Arbab-Zadeh A, Fuster V. The myth of the "vulnerable plaque": transitioning from a focus on individual lesions to atherosclerotic disease burden for coronary artery disease risk assessment. J Am Coll Cardiol. (2015) 65:846–55. 10.1016/j.jacc.2014.11.041

9. Bentzon JF, Otsuka F, Virmani R, Falk E. Mechanisms of plaque formation and rupture. Circ Res. (2014) 114:1852–66. 10.1161/CIRCRESAHA.114.302721

10. Sadeghi MT, Esgandarian I, Nouri-Vaskeh M, Golmohammadi A, Rahvar N, Teimourizad A. Role of circulatory leukocyte based indices in short-term mortality of patients with heart failure with reduced ejection fraction. Med Pharm Rep. (2020) 93:351–6. 10.15386/mpr-1644.