

Correlation of Neutrophil-Lymphocyte ratio and Mean platelet volume to the severity of coronary atherosclerosis

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ABSTRACT

Atherosclerotic coronary artery disease is the main cause of Coronary artery disease (CAD) morbidity and mortality , Inflammation plays a major role in

the process of Coronary atherosclerosis. Hematological markers like neutrophil-lymphocyte ratio (NLR) and mean platelet volume MPV correlate with the severity of atherosclerotic

coronary artery disease (ASCAD). Our study aims to show the correlation between NLR and MPV to the Severity of coronary atherosclerosis in patients undergoing coronary angiography . This study was conducted on 50 patients with suspected or known ASCAD in Fayoum university hospital.

KEY WORDS: Coronary artery disease , coronary atherosclerosis , Neutrophil-Lymphocyte ratio , Mean Platelet Volume .

INTRODUCTION

Atherosclerotic coronary artery disease (ASCAD) is the main cause of coronary artery disease (CAD), in which atherosclerotic changes occur within the walls of the coronary arteries , by impairing or obstructing normal blood flow, atherosclerotic buildup causes myocardial ischemia [1].

The quantitative increase in neutrophils is also related to the atherogenic process, acting through lipid mediation, necrosis and inflammation, secreting chemokines and cytokines. This cell type regulates ICAM-1 and

expresses MPO, promoting greater LDL oxidation, exacerbating the pathological process[2] .

The interaction of platelets with endothelial cells appears to be important for the initiation and propagation of inflammatory processes of atherosclerosis in the arterial wall . Because of the great health impact of atherosclerosis, much has been described regarding interactions between platelets and endothelial cells [3] .

This study aimed to show the correlation of NLR and MPV to the severity of coronary atherosclerosis among patients with suspected or known ASCAD undergoing coronary angiography.

Subjects and Methods

Study design

This study is a prospective study that was conducted at Fayoum University Hospital on 50 Patients undergoing coronary angiography for suspected or known coronary arter disease over 3 months duration .

Inclusion criteria :

- Silent myocardial ischemia
- Stable angina
- Acute coronary syndromes

Exclusion criteria:

- Clinically significant valvular heart disease.
- Significant congestive heart failure.
- Cancer.
- Renal or liver disease.
- Ongoing infection or systemic inflammatory conditions, and Auto-immune diseases.

Methods

All patients were subjected to full history taking including risk factors for coronary artery disease , Clinical examination , Resting 12 leads electrocardiography and bedside screening ECHO. Laboratory investigations were done including the following :

-Complete blood count with total and differential leukocyte counts were measured by an automated hematology analyzer.. Neutrophil lymphocyte ratio was computed as neurophils count divided by lymphocytes count . platelet counts and MPV were measured by an automated hematology analyzer(sysmex xs-500i).

-Renal function test (serum creatinine).

-Total and high-density lipoprotein cholesterol, triglycerides, and plasma glucose levels were measured.

Percutaneous coronary

angiography

Coronary angiography was performed for all patients enrolled in the study by Judkin's technique through the femoral artery. The Gensini scoring system was used to assess the severity of CAD. This method classifies and scores the degree and extent of the stenosis of the coronary arteries.

Statistical methods:

Data were collected and coded to facilitate data manipulation and double entered into Microsoft Access and data analysis was performed using Statistical Package of Social Science (SPSS) software version 18 in windows 7. Simple

descriptive analysis in the form of numbers and percentages for qualitative data, and arithmetic means as central tendency measurement, standard deviations as measure of dispersion for quantitative parametric data. Quantitative data included in the study was first tested for normality by One-Sample Kolmogorov-Smirnov test in each study group then inferential statistic tests were selected.

Results

The mean age of study group was (55.1± 10.4) years old . Males were 35 patients representing 70%, and females were 15 patients representing 30 % of total number 50 patients. 42% of study group were smoker, and 12% were ex-smoker versus 46% were

nonsmoker, as regards medical history 6% were alcoholism, 46% had hypertension, 38% were

diabetic, 32% had dyslipidemia, and 14% had known CAD.

Variables	Number (n=100)	
Age (years)		
Mean+- /SD	55.1 +-	10.4
Sex		
Male	35	70%
Female	15	30%

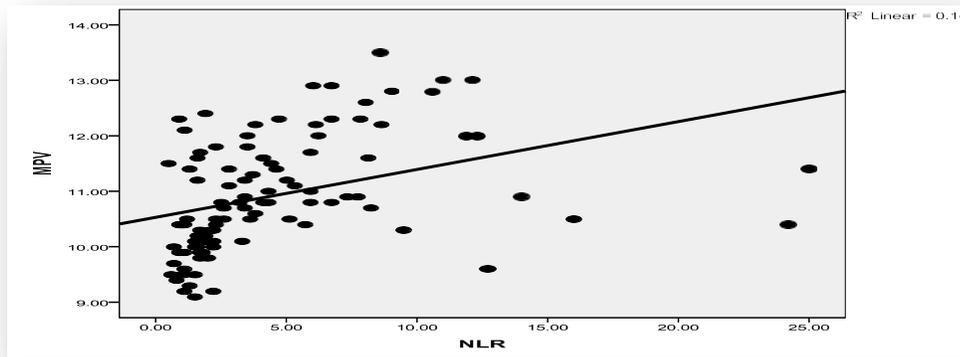
Variables (n=100)	Medical history	
	Number	percentage%
Smoking		
Non smoker	23	46%
Smoker	21	42%
Ex-smoker	6	12%
Alcoholism		
No	47	94%
Yes	3	6%
HTN		
No	27	54%
Yes	23	46%
DM		
No	31	62%
Yes	19	38%
Dyslipidemia		
No	34	78%
Yes	16	32%
Known CAD		
No	43	86%
Yes	7	14%

The study illustrates the sensitivity of NLR marker in diagnosis was (78.6%) and specificity was (77.6%) at cut-off level of (3.45) and for MPV

marker in diagnosis was (69%) and specificity was 60.3%) at cutoff level of (10.75), with total accuracy of 85.8% for NLR versus 70.8% for MPV, which indicated NLR more accurate than MPV in detection of severe atherosclerosis.

Variable	Sensitivity	Specificity	AUC	Cut off point
NLR	78.6%	77.6%	85.8%	3.45
MPV	69%	60.3%	70.8%	10.75

This Figure shows Correlation between level of NLR with MPV;



Discussion

Leukocytes play a key role in the pathophysiology of ACS, given their effect on the instability of atherosclerotic plaques. In the initial stage, leukocytes permeate endothelial cells and become activated when reaching the tunica

intima. They induce the formation of microvasculature there and, as a result, make plaques more susceptible to rupture [4].

The present study results showed no statistical significance difference (p-value >0.05) in NLR level regarding different sex, smoking and medical history

(alcoholism, hypertension, diabetes, dyslipidemia, and CAD) . This indicates that NLR is not significantly affected by HTN , DM and dyslipidemia , unlike a study by Teeranan et al showed that NLR is most strongly impacted by uncontrolled HTN, then DM and dyslipidemia with mediation effect on cardiovascular events [5] .There was no statistical significance difference in MPV level regarding different sex, smoking and medical history (alcoholism, hypertension, diabetes, dyslipidemia, and known CAD). This indicates that MPV is not significantly affected by HTN , DM and dyslipidemia. unlike, a study by Ulutas et al that showed a relationship between MPV and HbA₁C suggested that platelets of diabetic patients become more aggregable and reactive due to increased MPV. Increased risk of atherosclerosis in regard with type

2 DM may be a result of high MPV [6].

CONCLUSION

This study revealed the independent predictor roles of both NLR and MPV for the severity of ASCAD, Which indicated that NLR is more accurate than MPV in detection of severe atherosclerosis.

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List of Abbreviations

ACS	Acute coronary syndrome
AUC	Area under curve
ASCAD	Atherosclerotic coronary artery disease
CAD	Coronary artery disease
CBC	Complete blood count
DM	Diabetes mellitus
HTN	Hypertension
LDL	Low density lipoprotein
MPV	Mean platelet volume
MPO	Myeloperoxidase

NLR	Neutrophil lymphocyte ratio
PLT	Platelets
PMNL	Polymorph nuclear leukocytes
ICAM-1	Intercellular adhesion molecule 1
