



**Relationship Between Hematological Parameters
and Myocardial Perfusion in Patients with Acute
Anterior Myocardial Infarction Managed by
Primary Percutaneous Coronary Intervention**

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لسببائك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدقة الله العظيم

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List of Abbreviations

Abb.	Full term
ACE.....	Angiotensin converting enzyme
ACS.....	Acute coronary syndrome
AMI.....	Acute myocardial infarction
APC.....	Antigen presenting cells
AT	Angiotensin
ATP	Adenosine triphosphate
B cells	B lymphocytes
CABG.....	Coronary artery bypass grafting
CAD	Coronary artery disease
CAMs	Cellular adhesion molecules
CD40L.....	CD40 ligand
ck-MB	Creatine kinase MB
CRP.....	C-reactive protein
cTn	Cardiac troponin values
CXCR.....	CXC chemokine receptors
DBP.....	Diastolic blood pressure
EC	Endothelial cell
ECM.....	Extracellular matrix
ET-1	Endothelin-1
G-CSF	Granulocyte colony-stimulatory factor
GM-CSF	Granulocyte-monocyte colony-stimulatory factor
GP	Glycoprotein
H ₂ O ₂	Hydrogen peroxide
HbA1c	Glycosylated hemoglobin
HOCl.....	Hypochlorous acid
ICAM-1	Intercellular adhesion molecule 1
IFN- γ	Interferon- γ

IgFcR..... Immunoglobulin fragment crystallisable receptor

List of Abbreviations Cont...

Abb.	Full term
IL.....	Interleukin
K-ATP	Potassium-ATP
LBBB	Left bundle branch block
LDL.....	Lipoproteins
LV	Left ventricular
LVEF	Left ventricular ejection fraction
MBG	Myocardial blush grade
MCP-1.....	Monocyte chemoattractant protein 1
MI.....	Myocardial infarction
MIP	Macrophage inflammatory protein
MMP	Matrix metalloproteinases
MMRs	Mannose receptors
MPO	Myeloperoxidase
N/L	Neutrophils/lymphocytes
Na/Ca.....	Sodium/calcium
Na/H	Sodium/hydrogen
Na/K.....	Sodium/potassium
NLR	Neutrophil-to-lymphocyte ratio
NO.....	Nitric oxide
NSTEMI.....	Non-ST segment elevation myocardial infarction
O ₂	Superoxide anion
OH-	Hydroxyl radical
PCI.....	Percutaneous coronary intervention
PMNs	Polymorphonuclear cells family
PR-3	Proteinases-3
REACT.....	Rescue angioplasty versus conservative treatment

ROS..... Reactive oxygen species

List of Abbreviations Cont...

Abb.	Full term
SBP	Systolic blood pressure
SMC	Smooth muscle cells
STEMI	ST-segment elevation MI
T cell	T lymphocytes
TGF	Transforming growth factor
Th1	Type 1 helper T cell
TIMI.....	Thrombolysis in Myocardial Infarction
TLC	Total leukocyte count
TLR	Toll-like receptor
TNF	Tumour necrosis factor
TNFD	Tumor necrosis factor D
URL	Upper reference limit
VSMC.....	Vascular smooth muscle cell
WBC.....	White blood cells

INTRODUCTION

The global incidence rate of acute myocardial infarction (AMI) was 8.6 million. According to a presenting electrocardiogram, it has been reported that more than 3 million people are currently diagnosed with an ST-segment elevation MI (STEMI) (*Tanindi et al., 2014*).

According to Euro Heart Survey, the in-hospital mortality rate of patients with STEMI ranges from 6% to 14% (*Brevetti et al., 2010*).

Atherosclerosis is a progressive, complex and multifactorial disease characterized by the accumulation of lipids and fibrous elements in the large arteries and inflammation plays an important role in all stages of the atherosclerosis development (*Tamhane et al., 2008*).

Inflammatory processes along with endothelial dysfunction initiates a progressive process within the arterial wall, resulting in the reduction or obstruction of blood supply to end organs of the body (*Bae et al., 2014*).

The neutrophil-to-lymphocyte ratio (NLR) has been shown to be a marker of inflammation and closely related to increased cardiovascular mortality and morbidity (*Açar et al., 2015*).

Elevated white cell count in patients with STEMI is related to the body stress response and changes due to coronary endothelial dysfunction. This

- ✓ Up-regulates the production of inflammatory cells and cytokines.
- ✓ Promotes capillary congestion.
- ✓ Induces and aggravates acute coronary disease.

(Arbel et al., 2012)

It was reported that high NLR values could be a useful parameter in evaluating cardiovascular risk *(Choi et al., 2014)*.

Positive correlation between NLR values at admission and the severity of coronary artery disease was found *(He et al., 2014)*.

NLR value could be the determinant of coronary atherosclerosis progression. High NLR values at admission were identified to be more with rupture-prone coronary atherosclerotic plaque components *(Wang et al., 2014)*.

High NLR Associated with poor prognosis in patients with acute STEMI *(Kolh et al., 2014)*.

High NLR was found to be a determinant of mortality and cardiovascular incidents in patients who underwent angiography or cardiac revascularization *(Rasoul et al., 2010)*.

The objective of primary PCI is to restore normal blood flow in the infarct-related artery. Previous studies have shown that preservation of the microcirculation is critical for a positive clinical outcome. Several diagnostic techniques have been employed to evaluate tissue-level microvascular perfusion in the last decade. Thrombolysis in Myocardial Infarction (TIMI) grades correlate with the final infarct size in patients with AMI treated with thrombolysis. However, the TIMI flow cannot be used as reliable markers of myocardial tissue perfusion after reperfusion therapy (*Kolh et al., 2014*). Despite normal coronary patency, tissue perfusion may be impaired or absent. Myocardial blush grade (MBG) has been well validated as an angiographic technique to assess myocardial perfusion in patients with STEMI. It is strongly related to prognosis in patients undergoing primary PCI for STEMI (*Rasoul et al., 2010*).

AIM OF THE WORK

To evaluate relationship between TLC, NLR and the myocardial perfusion in patient with acute ST segment elevation myocardial infarction managed by primary PCI.

*Chapter 1***MYOCARDIAL INFARCTION (MI)****Introduction**

Coronary artery disease (CAD) is characterized by an atherosclerotic process taking place on the coronary vasculature. The first signs of atherosclerosis can be noticed in infants, followed by a regression in childhood, reappearance in puberty and progression over time (*Bentzon and Falk, 2011*). Asymptomatic disease can become symptomatic anytime with angina, exertional or at rest, myocardial infarction (MI) or sudden death.

The incidence and prevalence of CAD are difficult to assess as different definitions are used and due to its detection only upon symptom appearance. The prevalence of angina increases with age and is higher in middle-aged females than males.

It seems like mortality from CAD is decreasing; however, prevalence is not undoubtedly as a result of better survival (*Montalescot et al., 2013*). On an annual basis, 13.2% of all deaths are attributed to CAD, which makes CAD with 7.4 million deaths the leading cause of death in the world (*WHO, 2016*).

In developed countries, the incidence of MI has been decreasing in the last couple of years, and so is the incidence of ST segment elevation myocardial infarction (STEMI) patients.