

# Profile of Dyslipidemia and Type 2 Diabetes Mellitus in Geriatric Inpatients with STEMI in the Department of Cardiology and Vascular Medicine at a Tertiary Hospital in Surabaya, Indonesia

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## ABSTRACT

**Background:** Coronary heart disease (CHD) is the leading cause of death in the world, and the highest case fatality rate (CFR) is acute myocardial infarct (AMI). AMI is necrosis of the myocardium because of inefficient and acute clotting in the coronary artery and the collateral system that is not working properly. The highest case of AMI occurs in geriatric patients. Dyslipidemia and Diabetes Mellitus Type 2 (DMT2) are risk factors for AMI. In dyslipidemia, the fat contents thicken the blood vessel walls. Meanwhile, in cases of DMT2 that manifests in CHD, early arteriosclerosis attacks vital organs. Based on dyslipidemia and DMT2 in AMI, this paper details the visualization of dyslipidemia and DMT2 in geriatric inpatients with STEMI located in the Department of Cardiology and Vascular Medicine, Dr. Soetomo General Hospital, Surabaya. **Objective:** To determine the profile of dyslipidemia and DMT2 in STEMI geriatric inpatients treated at Dr. Soetomo Hospital in 2016 - 2021. **Methods:** This paper uses the medical record secondary data analyzed with descriptive method and cross-sectional research design. **Results:** STEMI clinical profile in geriatric serving as inpatients in Dr. Soetomo General Hospital in the period 2016 – 2021, is dominated by patients in the age group of 60 – 74 years old (93,4%), and male patients (64,5%). The leading diagnosis is STEMI of the inferior wall (57,9%) and DMT2 (46,1%). Normal LDL levels (32,9%), and above normal (32,9%), and low HDL levels (59,2%) dominated. On average, triglyceride levels (63,2%) and total cholesterol levels (72,4%) are normal. From the result of HbA1C, DMT2 (35,5%) ranks highest, patients diagnosed with DMT2 (63,2%) occur more in non-DMT2 groups (36,8%).

**Keywords:** AMI; STEMI; Dyslipidemia; DMT2.

## INTRODUCTION

Coronary Heart Disease (CHD) is the leading cause of death worldwide. According to World Health Organization (WHO) data from 2019, approximately 17.5 million people worldwide died due to cardiovascular diseases. Out of these deaths 7.4 million (42.3%) were caused by CHD. Research indicates that ischemic heart disease is the most common case in hospitals, while the highest case fatality rate (CFR) is observed in Acute Myocardial Infarction (AMI) [1].

Acute myocardial infarction (AMI) is defined as myocardial necrosis caused by ischemia due to an acute blockage in previously insufficient coronary arteries, with poorly functioning collateral circulation. AMI is commonly associated with modifiable and non-modifiable atherosclerosis risk factors. A study identified modifiable risk factors, including smoking, physical inactivity, high LDL and triglyceride levels, obesity, diabetes, hypertension, and psychological stress [2].

AMI is closely related to dyslipidemia. According to Aswania's 2020 study, 47.2% of 70 AMI patients at Sanglah General Hospital had a history of dyslipidemia. This condition disrupts blood lipid profiles, leading to fat buildup in blood vessels, which can cause myocardial infarction (AMI). Dyslipidemia is a key factor in cardiovascular diseases, increasing morbidity and mortality. Diabetes mellitus (DM), particularly type 2, also raises the risk of AMI by causing early atherosclerosis. Diabetic patients are more prone to AMI, and fasting glucose levels can predict its outcomes. DM often coexists with dyslipidemia, worsening AMI prognosis [3].

During the period of 2016–2021, the profile of dyslipidemia and type 2 diabetes mellitus in geriatric inpatients with STEMI cases treated in the Cardiology and Vascular Department at Dr. Soetomo General Hospital in Surabaya has not been extensively studied or analyzed. Therefore, this study aims to conduct an in-depth investigation to contribute to the collection and presentation of burn case data as part of a strategic approach for future management.

## METHODS

This research is a descriptive study that involves collecting retrospective data on dyslipidemia and type 2 diabetes mellitus in geriatric inpatients with STEMI treated in the Cardiology and Vascular Department at Dr. Soetomo General Hospital, Surabaya. The data were obtained from patient medical records at the hospital. The study focuses on several key variables, including the patient's age, gender, dyslipidemia, type 2 diabetes mellitus, and STEMI. The data collection process in this study involved reviewing medical records and recording the information on data collection sheets. This process was conducted during regular working days and hours.

## ETHICS

The Dr. Soetomo General Academic Hospital's Committee for Research Ethics has accepted this study (No. 1374/101/4/IV/2022). To ensure confidentiality, the identities of the patients are not disclosed in this study. The authors will be the only ones to keep and utilize all of the collected data for the aim of this research.

## RESULTS AND DISCUSSION

The results of this study were obtained from the medical records of dyslipidemia and type 2 diabetes mellitus in geriatric inpatients with STEMI treated in the Cardiology and Vascular Department at Dr. Soetomo General Hospital in Surabaya during the 2016–2021 period. A total of 76 patients were admitted and treated at Dr. Soetomo General Hospital during this time.

**TABLE 1:** Age group distribution of patients.

Age	Frequency (n)	Percentage (%)
60 – 74 Years	71	93.4
75 – 90 Years	5	6.6
<b>Total</b>	<b>76</b>	<b>100</b>

Based on the findings from the Cardiology and Vascular Department at Dr. Soetomo General Hospital in Surabaya, it was observed that 76 STEMI patients treated at Dr. Soetomo General Hospital during the 2016 – 2021 period, the majority (93.4%) were from the 60 – 74 years age group, while the other 6.6% were from the 75 – 90 years age group. The study also indicates that individuals aged 75 and above are most commonly diagnosed with STEMI, with coronary artery disease being the most prevalent condition in the elderly, and aging causing the heart and blood vessels to become stiffer. Acute coronary syndrome is responsible for one-third of deaths among individuals over the age of 65 [4].

**TABLE 2:** Gender Distribution of Patients.

Gender	Frequency (n)	Percentage (%)
Male	49	64.5
Female	27	35.5
<b>Total</b>	<b>76</b>	<b>100</b>

Based on research conducted by Cardiology and Vascular Department at Dr. Soetomo General Hospital, Surabaya, 76 STEMI patients aged 60 and older showed that the majority of patients were male, with 49 patients (64.5%), while the remaining 27 patients (35.5%) were female. This aligns with a Harvard study which concluded that men are twice as likely to experience coronary heart attacks compared to women [5]. Men tend to smoke more, are more susceptible to hypertension, and have lower HDL levels compared to women. They also manage stress differently, often using distractions and alcohol consumption, which are significant contributors to coronary heart disease [6]. However, coronary heart disease is influenced by various other risk factors, and gender alone cannot determine an individual's likelihood of developing it.

**TABLE 3:** Main Diagnosis Distribution.

Main Diagnosis	Frequency (n)	Percentage (%)
ST. elevation (STEMI) myocardial infarction of the inferior wall	44	57.9
ST. elevation (STEMI) myocardial infarction of other sites	2	2.6
ST. elevation (STEMI) myocardial of unspecified sites	4	5.3
Acute myocardial infarction, unspecified	8	10.5
Acute transmural myocardial infarction of the anterior wall	18	23.7
<b>Total</b>	<b>76</b>	<b>100</b>

According to the study, a total of 76 STEMI patients were observed for their medical record data. The distribution of ICD-10 codes for STEMI in geriatric patients at Dr. Soetomo Hospital in 2016 – 2021 was divided into 5 groups, namely *ST elevation (STEMI) myocardial infarction of anterior wall*, *ST elevation (STEMI) myocardial infarction of other sites*, *ST elevation (STEMI) myocardial infarction of unspecified site*, *Acute myocardial infarction unspecified*, dan *Acute transmural myocardial infarction of anterior wall*. From the data that has been collected, it was obtained that the majority of the main diagnosis of patients was ST elevation (*STEMI*) myocardial infarction of the inferior wall in as many as 44 patients (57.9%). Furthermore, Acute transmural myocardial infarction of the anterior wall in as many as 18 patients (23.7%). Then Acute unspecified myocardial infarction in as many as 8 patients (10.5%) and ST elevation (*STEMI*) myocardial of unspecified sites 4 patients (5.3%). The lowest number is the main diagnosis of ST elevation (*STEMI*) myocardial infarction of other sites in as many as 2 patients (2.6%). This is in accordance with a study stating that 40% -50% of myocardial infarctions are associated with the inferior wall. In general, has a better prognosis than myocardial infarction on the anterior wall [7]. Inferior *STEMI* is usually caused by occlusion of the right coronary artery or is rarely found in the circumflex branch of the left coronary artery [8].

**TABLE 4:** Secondary Diagnosis Distribution.

Secondary Diagnosis	Frequency (n)	Percentage (%)
DMT2	35	46.1
Dyslipidemia	7	9.2
DMT2 & Dyslipidemia	2	2.6
Other than the above	32	42.1
<b>Total</b>	<b>76</b>	<b>100</b>

Risk factors for STEMI are often comorbid conditions. Modifiable cardiovascular risk factors include LDL levels, hypertension, smoking, and diabetes mellitus (9). Atherosclerosis begins with lipoprotein accumulation in the arterial walls. In the subendothelial space, foam cell formation and LDL oxidation lead to vascular modifications. Many factors contributing to atherosclerosis and coronary artery disease are common comorbidities in type 2 diabetes, including hypertension, insulin resistance, hyperglycemia, obesity, and dyslipidemia (10). The highest number of secondary diagnoses was Type 2 Diabetes Mellitus, with 35 patients (46.1%). The second most common was secondary diagnoses other than dyslipidemia and Type 2 Diabetes Mellitus, with 32 patients (42.1%), followed by dyslipidemia with 7 patients (9.2%). Lastly, Type 2 Diabetes Mellitus and dyslipidemia were found in 2 patients (2.6%).

**TABLE 5:** Distribution of DMT2 Diagnosis.

Diagnosis DMT2	Frequency (n)	Percentage (%)
Yes	48	63.2
No	28	36.8
<b>Total</b>	<b>76</b>	<b>100</b>

According to the International Diabetes Federation, cardiovascular disease is the leading cause of death in individuals with diabetes. The risk of mortality and morbidity in myocardial infarction remains higher than in the general population, especially when additional risk factors such as type 2 diabetes mellitus (*T2DM*), hypertension, or advanced age are present. Recently, Levitan et al. emphasized that hyperglycemia in nondiabetic cases is associated with an increased risk of cardiovascular disease (11). This study collected data on RBG, FBG, 2h-PPBG, and HbA1C levels from 76 STEMI patients with specific medical histories. Among the 32 patients whose RBG levels were examined, 15 had levels  $\geq 200$  and were categorized as having T2DM, the same number as those found in FBG measurements, with 18 patients classified as T2DM. For 2h-PPBG, among the 5 patients examined, 2 were identified as having T2DM. Meanwhile, among the 50 patients whose HbA1C levels were assessed, 27 were categorized as T2DM. In-hospital mortality analysis revealed a correlation between random blood glucose levels and mortality in STEMI patients with diabetes. A linear relationship was also observed between blood glucose levels and mortality in non-diabetic cardiac patients (12).

## CONCLUSIONS

The total number of Dyslipidemia and Type 2 Diabetes Mellitus in Geriatric Inpatients with STEMI from the Cardiology and Vascular Department at Dr. Soetomo General Hospital, Surabaya, during the 2016–2021 period was 76 patients. Among them, there were 49 male patients and 27 female patients, with males accounting for the majority at 65% of cases. The age range of Dyslipidemia and Type 2 Diabetes Mellitus in Geriatric Inpatients with STEMI patients during this period was between 60 and 90 years, with the highest incidence occurring in the 60–74 years age group, comprising 93.4% of the cases.

The majority of the main diagnosis of patients was ST elevation (*STEMI*) myocardial infarction of the inferior wall in as many as 44 patients (57.9%). The highest number of secondary diagnoses was Type 2 Diabetes Mellitus, with 35 patients (46.1%). The second most common was secondary diagnoses other than dyslipidemia and Type 2 Diabetes Mellitus, with 32 patients (42.1%). And lastly, among the 32 patients whose RBG levels were examined, 15 had levels  $\geq 200$  and were categorized as having T2DM, the same number as those found in FBG measurements, with 18 patients classified as T2DM. For 2h-PPBG, among the 5 patients examined, 2 were identified as having T2DM.

Meanwhile, among the 50 patients whose HbA1C levels were assessed, 27 were categorized as T2DM. In-hospital mortality analysis revealed a correlation between random blood glucose levels and mortality in STEMI patients with diabetes. A linear relationship was also observed between blood glucose levels and mortality in non-diabetic cardiac patients.

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