ORIGINAL ARTICLE

ANALYSIS OF DEMOGRAPHIC PROFILE AND CHARACTERISTICS OF ACUTE CORONARY SYNDROME PATIENTS: AN OBSERVATIONAL STUDY

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ABSTRACT

Cardiovascular disease (CVD) is the leading cause of death globally. Based on the 2018 Indonesia Basic Health Research data, the prevalence of heart disease in Indonesia reached 1.5% including Acute Myocardial Infarction (AMI). Blockage or total occlusion of the coronary arteries in ST-Elevation Myocardial Infarction (STEMI) patients requires immediate reperfusion (Percutaneous Coronary Intervention (PCI) or fibrinolytic therapy). Based on data from the Sidoarjo Health Office in 2023, there was 3968 cases of AMI. This study aims to identify the profile of Acute Coronary Syndrome (ACS) patients in Sidoarjo, This is a descriptive observational study with a retrospective cohort study design. This study used secondary data from the medical records with an inclusion and exclusion criteria. There were 150 samples which predominantly males (85%) with aged 50-60 years (47%). The most systolic blood pressure was ≤120 mmHg (55%). The result of PCI in patients showed that the most was Coronary Artery Disease (CAD) triple vessel disease (44%). A total of 67 of 150 patients experienced occlusion, 36 were chronic total occlusion (CTO) and 31 others were acute total occlusion. The location of the most common cause of blockage was in the Left Anterior Descendens (LAD) artery, which was 121 patients. This study showed that the most PCI patients were male, aged 51-60 years, systolic blood pressure <120 mmHg, multi vessel disease, chronic total occlusion, the most arterial blockage was located in the LAD artery, and had normal creatinine serum.

Keywords: Acute coronary syndrome, cardiovascular diasease, chronic total occusion

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INTRODUCTION

Acute coronary syndrome or ACS is one of the diseases of coronary artery disease or CAD (Cardiovascular artery disease), where other diseases that are included in CAD are stable angina.[1,2] Artery Disease (CAD) is a disease characterized by atherosclerosis in the coronary arteries. CAD is a heart disease with the highest incidence and is the third leading cause of death in the world with a total of 17.8 million deaths each year.[1,3] American Heart Association in 2015 reported that the myocardial infarction mortality rate reached 7.8-11.4% within 30 days.[4] Myocardial infarction contributes to the highest mortality rate of 15% worldwide. Effective management for acute myocardial infarction includes antianginal drugs and reperfusion with thrombolytics or acute coronary intervention.[5]

Acute Coronary Syndrome risk factors are divided into two, namely modifiable risk factors and non-modifiable risk factors. Modifiable risk factors include hypertension, hyperlipidemia, diabetes mellitus, obesity, smoking, lack of physical activity, unhealthy diet, and stress. While some non-modifiable risk factors include age, gender, ethnicity, and family history of coronary artery disease.[3,6] The risk of mortality in ACS increases significantly with increasing age and systolic blood pressure.[1] A study by Pencina, et al in 2019 stated that age, gender, and ethnicity have a 63-80% influence on prognosis, while modifiable risk factors only make a small contribution.[3]

Risk factors such as family history of disease, hypertension, diabetes mellitus, smoking, and age play an important role in the development of endothelial dysfunction, which is an early stage in the pathogenesis of atherosclerosis. Endothelial dysfunction facilitates the absorption of LDL into the subendothelium, which is then oxidized and triggers an inflammatory response and oxidative stress. This leads to the formation of atheromatous plaques, which can block blood flow in blood vessels and cause myocardial ischemia. When atheromatous plaques rupture, thrombi can form, causing acute coronary syndrome that has the potential to cause myocardial infarction if oxygen supply is interrupted for more than 20 minutes.[7–9]

Acute chest pain that can be described as aching, pressure, tightness, heaviness, or burning is the primary symptom prompting consideration of a clinical diagnosis of ACS. Symptoms equivalent to chest pain include shortness of breath, epigastric pain, and pain in the left or right arm, neck/jaw.[10] The physical examination of a patient with suspected ACS focuses more on checking the pulse, measuring blood pressure in both arms, auscultating the heart and lungs, and assessing for signs of heart failure or circulatory disorders.[10]

Percutaneous coronary intervention or PCI is a non-surgical invasive procedure that aims to relieve coronary artery occlusion and improve blood supply to systemic tissues. The main clinical indications for PCI include STEMI, NSTEMI, unstable angina, stable angina with unstable hemodynamics. Other conditions indicated for PCI include stable ischemic heart disease, including post-ACS patients and stable ischemic heart disease without symptoms or silent ischemia.[5,11,12]

Contraindications for PCI procedures consist of absolute and relative contraindications. Absolute contraindications for this procedure include non-compliance with the procedure, intolerance to long-term antiplatelet therapy, high risk of bleeding such as thrombocytopenia, gastric ulcers, severe coagulopathy, and multiple percutaneous coronary intervention restenosis. Relative contraindications for PCI procedures include blood vessel diameter less than 1.5 mm, widespread arterial or venous blood vessel disease, lack of cardiac surgical reserve, hypercoagulation, high-grade chronic kidney disease, chronic total *saphenous vein graft* (SVG) occlusion, stenosis <50%, and critical left main stenosis without collateral flow or patent bypass graft.[11,13] Complications that can occur after the PCI procedure include perforation, peri-procedural myocardial infarction, retroperitoneal bleeding, intramural hematoma, distal embolization, arrhythmia, allergic reactions, acute renal failure,

infection, radiation effects, and the other stent complications.[11]

Based on data from the Sidoarjo Health Office in 2023, number of patients experiencing ACS were still high (3968 cases). Behind the high incidence rate, there is no data related to the risk factors that cause ACS in Sidoarjo Regency. Therefore, the purpose of this study was to determine the profile of Acute Coronary Syndrome (ACS) patients in Sidoarjo Regency so the result can be used as a basis for decision making for the government and the doctors to more aware of ACS and its management. This study uses a descriptive observational approach with a retrospective cohort study design.

METHOD

This study used a descriptive observational approach with a retrospective cohort study design. This study used secondary data from patient medical records. The subjects of the study were patients who underwent PCI at Siti Khodijah Sepanjang Hospital from July 2023 to March 2024. The inclusion criteria were patients with complete medical records, undergoing PCI, aged >18 years. Exclusion criteria included patients who returned home at their own request. This study collected data on sociodemographic characteristics (age and gender), blood pressure on admission, coronary lesions, number of stenosis and occlusions, location of blockage, and creatinine serum values. Statistical analysis used descriptive tests.

RESULTS

This study has taken all samples in the specified period and then excluded them so that the number of inclusion samples was 150 samples. Most of them were male, totaling 127 patients (85%), and patients aged 51-60 with a total of 70 patients (47%).

Table 1. Characteristics of Subject

Variable	n	%
Gender		
Man	127	85
Woman	23	15
Age (years)		
20-30	2	1
31-40	7	95
41-50	31	21
51-60	70	47
61-70	36	24
>70	4	3

The clinical characteristics of PCI patients mostly had systolic blood pressure ≤120 mmHg, which was 83 (55%) samples, the conclusion of PCI in the sample showed that the most was CAD triple vessel disease with 66 (44%) samples, the largest number of stenosis was 2 stenosis with a total of 43 (39%) samples. A total of 67 (45%) of 150 patients experienced occlusion, 36 of which were chronic total occlusion (CTO) and 31 others were acute total occlusion. Four patients with CTO died. The largest number of occlusions was one occlusion in the coronary artery blood vessel with 57 (38%) samples. The location of the most blocked arteries was in the LAD, which was 121 (81%) samples, and had a creatinine serum value <1.3, which was 112 (75%) samples.

Table 2. Clinical Characteristics of Subject

Variable	N	%
Systolic blood pressure (mmHg)		
≤ 120	83 (55)	55
121-140	46 (31)	31
141-160	14 (9)	9
161-180	2 (1)	1
>180	5 (3)	3
Coronary lesion		
Single vessel disease	45 (30)	30
Double vessel disease	39 (26)	26
Triple vessel disease	66 (44)	44
Number of stenosis		
0	5 (3)	3
1	39 (26)	26
2	43 (39)	39
3	33 (22)	22
4	23 (15)	15
5	6 (4)	4
>5	1 (1)	1
Number of occlusions		

0	83 (55)	55
1	57 (38)	38
2	7 (5)	5
3	3 (2)	2
Location of blocked arteries		
LAD	121 (81)	81
LCx	5 (3)	3
LMCA	13 (9)	9
RCA	7 (5)	5
D1	2 (1)	1
D2	1 (1)	1
OM2	1 (1)	1
Creatinine Serum		
<1.3	112 (75)	75
>1.3	38 (25)	25

DISCUSSION

This study shows that coronary artery disease (CAD) is most common in men (85%) with the most age range between 51-60 years (47%). This is in line with research Men are more at risk of experiencing CAD, this is associated with the lifestyle and habits of men, such as smoking, alcohol consumption, depression due to work and/or unemployment.[14] In this study, 55% of CAD patients had systolic blood pressure ≤120 mmHg. This is different from the results of previous studies where the average blood pressure of CAD patients was high. Continuous high blood pressure will damage the coronary arteries, plaque that sticks to the blood vessels if it increases and accumulates can cause the blood vessels to become hard, thick, and stiff, then the elasticity of the blood vessels will decrease. If the elasticity of the blood vessels decreases, the function and performance of the heart in pumping blood will decrease.[15]

Based on the involvement of coronary artery branches, CAD conditions can be classified into Single Vessel Disease (SVD) and Multi Vessel Disease (MVD). The mortality rate of MVD is 3.14 times higher than SVD.[16] This study showed that 70% of patients experienced MVD, where 11 of the 14 patients who died in this study had MVD. The study of Apriliani D & Akbar M in 2018-2019 in Dr. Hasan Hospital Bandung, that 33 from 99 patientas are multi vessel disease.[17] Multi Vessel Disease has a worse prognosis due to the possibility of additional plaque instability, impaired myocardial perfusion, and decreased contractility in non-infarct areas.[18]

This study showed that more than one-third of the total sample (45%) experienced total occlusion and most of them were Chronic Total Occlusion (CTO). The definition of CTO itself is 100% occlusion of the coronary artery for more than three months based on angiographic evidence.[19] Percutaneous Coronary Intervention for CTO is associated with improved angina, improved quality of life, increased left ventricular ejection fraction, and reduced need for Coronary Artery Bypass Graft (CABG).[19,20] A meta-analysis study by Simsek B, et al in 2022 concluded that PCI in CTO patients was associated with better clinical outcomes.[21] In this study, the results showed that 32 of 36 patients with CTO were still alive and had a fairly good quality of life.

In this study, the location of the artery that experienced the most blockage occurred in the LAD (81%). This study is in accordance with previous research, by Ahmed, et al. in 2022 in Saudi Arabia reported that the most common coronary artery that experienced blockage was the LAD artery (52.5% of 280 samples).[22] A study by Ghanim et al. (2017) showed that 68.6% of 242 samples had blockages in the LAD artery.[23] Hemodynamic and anatomical differences between the right and left coronary arteries play an important role. The left coronary artery wall model is generally not deformable. In addition, the decreased angle in the LAD causes the flow to be more disturbed and increases the risk of plaque formation.[24] Physiologically, the left artery tends to experience a remarkable systolic decrease accompanied by a significant diastolic increase. So that oscillatory shear stress becomes a proven atherogenic factor in this case. In addition, differences in geometry and motion between the RCA and LCA also play a role in susceptibility to atherosclerosis.[24]

One of the contraindications for invasive PCI in ACS patients is patients with kidney disorders. This is due to the

nephrotoxic effects produced by iodinated contrast agents in PCI used to visualize the coronary arteries during the procedure. This substance triggers Contrast Induced Nephropathy (CIN), which is impaired kidney function as measured by an increase in creatinine serum of 25% from the initial value and an increase in absolute creatinine serum of 0.5 mg/dL in the first 48-72 hours after intravenous contrast administration.[25] This study showed that 75% of patients had creatinine serum values <1.3 mg/dL.

CONCLUSION

Based on the research conducted, it was found that most PCI patients were male, aged 51-60 years, systolic blood pressure <120mmHg, multiple vessel disease, chronic total occlusion, the most common blockage was in the Left Anterior Descendens (LAD) artery, and had normal creatinine serum.

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