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Analysis of Factors Associated with Acute Myocardial Infarction (AMI)

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ABSTRACT

Background: The high mortality and morbidity rates for AMI are caused by delays in treatment efforts, accuracy and speed of diagnosis, and treatment by doctors. There are risk factors that may increase the risk of experiencing an acute myocardial infarction such as age, gender, race, genetics, overweight or obesity, smoking, hyperlipidemia, history of hypertension, diabetes mellitus, stress, and lack of physical activity.
Purpose: The purpose of this study was to analyze what factors were associated with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya.
Methods: Analytical research design with cross-sectional approach. The population of this study were patients at the cardiac specialist polyclinic with a diagnosis of AMI with as many as 50 respondents. Sampling technique Non-probability sampling and the technique used is Consecutive sampling. Variables in the Independent Variable (Independent Variable) study were age, gender, hypertension, smoking, cholesterol, diabetes, obesity, physical activity. The dependent variable in this study was the incidence of acute myocardial infarction.
Results: The results of the study used the Chi Squared tests ($\alpha = 0.05$) to obtain a ρ-value Age = 0.004, Gender = 0.001, HT = 0.004, Cholesterol = 0.000, Smoking = 0.001, DM = 0.035, BMI = 0.018, Activities = 0.265. This means that there is a relationship between Age, Gender, Cholesterol, Smoking, DM, BMI with the incidence of AMI, and there is no relationship between Activity and the occurrence of AMI.
Conclusion: Factors such as age, gender, hypertension, cholesterol, smoking habits, diabetes mellitus, and obesity have been shown to be significantly associated with the incidence of acute myocardial infarction, so that identification and control of these factors are important for the prevention and management of cases in the community. If left for a long time and education is not carried out as early as possible, it will impact the health of the community, which is at risk of more incidents than people who are not exposed to this education.

Keywords: acute miocard infarction, cholesterol, factors ami

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BACKGROUND

Acute myocardial infarction (AMI) is a disease caused by reduced blood supply because the coronary arteries experience narrowing due to atherosclerosis or blockage of the arteries by emboli or thrombus totally making the heart's oxygen supply and demand inappropriate (Smeltzer et al 2018). When compared to other heart diseases, Acute Myocardial Infarction (AMI) is the highest cause of death in Indonesia (Amaliah R, et al., 2019). With the existence of several trigger factors which can cause heart disease to arise. Lots of people already understand this disease which will arise due to factors such as smoking and also an unhealthy diet can cause heart disease. However, it is ignored, that the importance of maintaining health is a very expensive thing at the present time.

The World Health Organization (WHO) estAMItes that in 2019 around 17.9 million died from cardiovascular diseases such as coronary, AMI, angina pectoris, rheumatic heart and stroke, and most of the deaths occurred in low and middle income countries (Ministry of Health RI, 2018). Meanwhile in Indonesia, there is no specific epidemiological data for AMI in Indonesia, but basic health research (Riskesdas, 2018) states that the general prevalence of heart disease in Indonesia has reached 1.5%, including AMI. The highest prevalence of heart disease in North KalAMIntan Province is 2.2%, Yogyakarta 2.0%, and Gorontalo 2.4% (Ministry of Health RI, 2018). Based on basic health research in 2018, it is estAMIted that the number of people with heart disease in Indonesia was around 1,017,290 cases. According to data from the Framingham Heart Study (Alan SG et al., 2013), and based on the initial data that the author obtained from the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya, in 2022 there were 580 cases of acute myocardial infarction, or around 40–50 cases per month (2022 BDH Surabaya Hospital Medical Records).

The high mortality and morbidity rates for AMI are caused by delays in treatment efforts, accuracy and speed of diagnosis, and treatment by doctors (Smeltzer, 2018). There are risk factors that may increase the risk of experiencing an acute myocardial infarction such as age, gender, race, genetics, overweight or obesity, smoking, hyperlipidemia, history of hypertension, diabetes mellitus, stress, and lack of physical activity (Amaliah R, et al., 2019) .

According to the Center for Disease Control and Prevention (CDC), the mortality rate due to CHD has decreased in the 2006-2010 period in the world. In addition, according to the AHA in 2015, the death rate due to heart disease decreased by 39%, but the burden and risk factors for heart disease were still quite high, although the reduction in mortality was supported by several factors, namely the management of the risk factors themselves and improved management. even better(Mozaffarian D, et al., 2015).

Increasing age and male gender remain unmodifiable risk factors for coronary heart disease (CHD), while effective treatment focuses on modifying risk factors such as dyslipidemia, hypertension, smoking, diabetes mellitus, and obesity (Brown et al., 2023; Arlindyo et al., 2024; Mechanic & Gavin, 2023). Early symptoms of acute myocardial infarction (AMI), such as angina pectoris, are often characterized by chest pain episodes before the onset of infarction (Mechanic & Gavin, 2023). Community awareness and prevention regarding modifiable risk factors are still lacking, especially in Indonesia, necessitating early identification, prevention, and control strategies (Arlindyo et al., 2024; Brown et al., 2023).

The typical clinical presentation of AMI includes sudden chest pain, often accompanied by tightness, paleness, excessive sweating (diaphoresis), dizziness, increased blood pressure, tachycardia, and decreased physical energy (Mechanic & Gavin, 2023; ECR Journal, 2024). Complications of AMI can include acute inflammation, hyperglycemia, and prolonged myocardial ischemia that—if exceeding 30–45 minutes—may result in irreversible cellular damage, tissue necrosis, and death (Mechanic & Gavin, 2023; Heusch, 2024).When researchers

conducted an initial survey in January 2023 to the Heart Poly Room at Bhakti Dharma Husada Hospital Surabaya, the authors had asked 20 patients who were controlling in the Cardiac Poly.

Room to ask what was causing them heart disease, of the 20 patients complained of blood pressure high and unable to stop smoking. Researchers tried to ask about eating patterns and activities carried out at home, they said that sometimes they followed a healthy diet and sometimes they didn't, and saw that the incidence of heart disease from year to year was still increasing which in the end could cause death.

METHODS

The research design used in this study was analytic with a retrospective cross-sectional approach. Cross sectional study is an observational method (non-experimental) which is only descriptive in nature and is also an analytic study. Cross sectional includes all types of research where the variables are only measured once, at one time. The independent variables in this study are age, gender, hypertension, smoking, cholesterol, diabetes, obesity, physical activity. The dependent variable in this study isAcute Myocardial Infarction.

The population in this study was 50 polycardiac patients. The sample size in this study was 50 cardiac poly patients.The sample consists of an affordable part of the population that can be used as a research subject through sampling. Deep sampling can represent the population. This study uses non-probability sampling and the technique used is Consecutive sampling, namely sampling is done by determining subjects who meet the research criteria for this study included patients who had been diagnosed with acute myocardial infarction (AMI) based on clear clinical and laboratory examination results, were 18 years of age or older, were undergoing treatment at a heart outpatient clinic or were hospitalized during the study period, and had complete medical records related to risk factors such as a history of hypertension, diabetes mellitus, smoking habits, cholesterol levels, and body mass index. Furthermore, patient data used in this study must be available and may be accessed with the approval of the hospital institution. Patients with severe acute infections or active malignancies that could affect the assessment of acute myocardial infarction events were excluded from the study.and are included in the study until a certain time so that the required number of samples can be fulfilled.

After the data is processed, the next step is to analyze the data. The analysis used is the Chi Square statistical test using the SPSS version 25.0 for windows program with a significant level of $\alpha = 0.05$. If the statistical test results show $p < \alpha$ 0.05 then the hypothesis is rejected, which means there is a relationship between the independent and dependent variables.

RESULTS

1. General data

1. Characteristics of respondents based on Gender

Table 1. Distribution of the frequency of respondents based on the sex of the patient at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya.

Characteristics	Frequency (f)	Percentage (%)
Age		
51- 60 years (Late Adult)	4	8
60-80 years old (Elderly)	46	92
Gender		
Man	43	86
Woman	7	14
Last education		
No school	13	26

Elementary (Elementary/Junior High School)	15	30
Intermediate (High School)	14	28
Height (PT)	8	16
Work		
Farmers/Fishermen	10	20
Retired	25	50
Entrepreneur / Entrepreneur	7	14
PNS/TNI/POLRI	8	16

Based on table 1, it is known from 50 respondents that almost all 43 respondents (86%) were male and the smallest number of respondents was 7 respondents (14%) female. Years) and a small portion of 4 respondents (8%) Middle Adult range (41-50 Years). As for education, the majority of elementary education (SD-SMP) were 15 (30%) respondents and the smallest was 8 respondents (16%) Higher Education (PT), in terms of Retired Jobs as many as 25 respondents (50%), while work of at least 7 respondents (14%) namely Entrepreneurs / Entrepreneurs.

2. Custom Data

Specific data is data obtained from collecting the results of questionnaires during research

a. Age factor

Table 2. Cross Tabulation of Age Factors Associated with the Incidence of Acute Myocardial Infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya

		AMIs (n = 50)					
		Stemy		Non Stemic		Total	
		f	%	f	%	f	%
Age	Middle adulthood (41-50 years)	2	4.0%	6	12.0%	8	16.0%
	Elderly (60-80 years)	32	64.0%	10	20.0%	42	84.0%
Total		34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.004**	

Source: PrAMIry Data, March 2023

Based on table 2 above, it is known that most of the 42 respondents (84%) ranged from the elderly (60-80 years), who experienced Stemic AMI as many as 32 Respondents (64%) and a small portion of 10 Respondents experienced Non Stemic AMI (20%)). While the Middle Adult range (41-50 years) was 8 respondents (16%), from the results it was found that 2 respondents (4%) experienced Stemic AMI and 6 respondents (12%) experienced Non Stemic AMI.

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained ρ = 0.004 means $\rho < \alpha$ = 0.05 so that Ho is rejected and H1 is accepted which means there is a relationship with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital Surabaya

b. Gender Factor

Table 3. Cross-tabulation of sex factors associated with acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya

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		AMIs (n = 50)					
		Stemy		Non Stemic		Total	
		F	%	f	%	f	%
Gender	Man	33	66.0%	10	20.0%	43	86.0%
	Woman	1	2.0%	6	12.0%	7	14.0%
Total		34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.001**	

Source: PrAMIry Data, March 2023

Based on table 3 above, it is known from 50 respondents that the majority of 43 respondents (86%) were male who experienced Stemic AMI as many as 33 Respondents (66%) and Non Stemic as many as 10 Respondents (20%).

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained ρ = 0.001 means ρ <α = 0.05 so that Ho is rejected and H1 is accepted which means there is a relationship with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital Surabaya.

c. Hypertension

Table 4. Cross Tabulation of Hypertension Factors Associated with the Incidence of Acute Myocardial Infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya

		AMIs (n = 50)					
		Stemy		Non Stemic		Total	
		f	%	f	%	f	%
HT	Grade 1 140-159/90-99 mm Hg	1	2%	5	10%	6	12%
	Degree 2 ≥ 160 / ≥100	33	66%	11	22%	44	88%
Total		34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.004**	

Source: PrAMIry Data, March 2023

Based on table 4 above, it is known from 50 respondents that the majority of 44 respondents (88%) experienced HT Degree 2, 33 respondents (66%) experienced Stemic AMI and a small portion of 12 Respondents experienced Non Stemic AMI (2%).

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained ρ = 0.004 means ρ <α = 0.05 so that Ho is rejected and H1 is accepted which means there is a relationship with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital Surabaya

d. Cholesterol

Table 5. Cross Tabulation of Cholesterol Factors Associated with the Incidence of Acute Myocardial Infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya

		AMIs (n = 50)					
		Stemy		Non Stemic		Total	
		F	%	f	%	f	%
Cholesterol	Normal	2	4%	8	16%	10	20%
	Abnormal	32	64%	8	16%	40	80%
	Total	34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.000**	

Source: PrAMIry Data, March 2023

Based on table 5 above, it is known that from 50 respondents that most of the 40 respondents (80%) had a history of abnormal cholesterol results > 200 mg/dl, 32 respondents (64%) experienced STEMI AMI and a small proportion of 8 respondents experienced Non-STI AMI. Stemic (16%). Meanwhile, there were 10 respondents (20%) who had a history of cholesterol with normal results if < 200 mg/dl, the results showed that 2 respondents (4%) had Stemic AMI and 8 respondents (16%) had Non Stemic AMI.

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained ρ = 0.000 means ρ <α = 0.05 so that Ho is rejected and H1 is accepted which means there is a relationship with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital Surabaya.

e. Smoking

Table 6. Cross Tabulation of Smoking Factors Associated with the Incidence of Acute Myocardial Infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya

		AMI (n = 5-)					
		Stemy		Non Stemic		Total	
		f	%	f	%	f	%
Smoke	Yes	33	66%	10	20%	43	86%
	No	1	2%	6	12%	7	14%
	Total	34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.001**	

Source: PrAMIry Data, March 2023

Based on table 6 above, it is known from 50 respondents that the majority of 43 respondents (86%) had a history of smoking activity, 33 respondents (66%) experienced Stemic AMI and a small portion of 10 Respondents experienced Non Stemic AMI (20%). Meanwhile, there were 7 respondents (14%) who had a non-smoking history, from the results it was found that 1 respondent had Stemi AMI (2%) and 6 respondents (12%) had Non-Stem AMI.

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained ρ = 0.001 means ρ <α = 0.05 so that Ho is rejected and H1 is accepted which means there is a relationship with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital Surabaya

f. Diabetes Mellitus

Table 7. Cross Tabulation of Diabetes Mellitus Factors Associated with Acute Myocardial Infarction (AMI) in the Heart Polyclinic of Bhakti Dharma Husada Hospital, Surabaya

		AMIs (n = 50)					
		Stemy		Non Stemic		Total	
		f	%	f	%	f	%
DM	Yes	17	34%	3	6%	20	40%
	No	17	34%	13	26%	30	60%
	Total	34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.035**	

Source: PrAMIry Data, March 2023

Based on table 7 above, it is known from 50 respondents that the majority of 30 respondents (60%) experienced DM, 17 respondents (34%) experienced Stemic AMI and a small proportion of 13 Respondents experienced Non Stemic AMI (26%). Meanwhile, 20 respondents (40%) experienced uncertain DM, from the results it was found that 17 respondents (34%) experienced Stemic AMI and 3 respondents (13%) experienced Non Stemic AMI.

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained ρ = 0.035 means ρ <α = 0.05 so that Ho is rejected and H1 is accepted which means there is a relationship with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital Surabaya.

g. Obesity Factor (BMI)

Table 8. Cross Tabulation of Obesity Factors (BMI) Associated with the Incidence of Acute Myocardial Infarction (AMI) at the Heart Polyclinic of Bhakti Dharma Husada Hospital, Surabaya

		AMIs (n = 50)					
		Stemy		Non Stemic		Total	
		f	%	f	%	f	%
Obesity (BMI)	Overweight	4	8%	0	0%	4	8%
	Obesity I	25	50%	8	16%	33	66%
	Obesity II	5	10%	8	16%	13	26%
Total		34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.018**	

Source: PrAMIry Data, March 2023

Based on table 8 above, it is known from 50 respondents that the majority of 33 respondents (66%) experienced Obesity I, 25 respondents (50%) experienced Stemic AMI and a small portion of 8 Respondents experienced Non Stemic AMI (16%). Whereas there were 13 respondents (26%) who had Obesity II, from the results it was found that 5 respondents (10%) experienced Stemic AMI and 8 respondents (16%) experienced Non Stemic AMI. Whereas there were 4 respondents (8%) who had Overweight BMI 23-24.9, from the results it was found that 4 respondents (8%) had AMI Stemi.

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained ρ = 0.018 means ρ <α = 0.05 so that Ho is rejected and H1 is accepted which means there is a relationship with

the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital Surabaya.

h. Activity

Table 9. Cross Tabulation of Activity Factors Associated with the Incidence of Acute Myocardial Infarction (AMI) at the Heart Polyclinic at Bhakti Dharma Husada Hospital, Surabaya

		AMIs (n = 50)					
		Stemy		Non Stemic		Total	
		f	%	f	%	f	%
activity	Light	8	16%	2	4%	10	20%
	Currently	23	46%	14	28%	37	74%
	Heavy	3	6%	0	0%	13	6%
Total		34	68.0%	16	32.0%	50	100.0%
Chi Square Statistical Test Results		**Significant level α = 0.05**				**ρ = 0.265**	

Source: PrAMIry Data, March 2023

Based on table 9 above, it is known that most of the 37 respondents (74%) carried out moderate activities, 23 respondents (46%) experienced Stemic AMI and a small proportion of 14 Respondents experienced Non Stemic AMI (28%). Meanwhile, there were 10 respondents (20%) who had light activity, from the results it was found that 8 respondents (16%) had Stemi AMI and 2 had Non Stemic AMI (4%). While those who had heavy activity were 3 respondents (6%), from the results it was found that 3 respondents (6%) had AMI Stemi.

Through the analysis of the help of the SPSS for Windows 23 program with the Chi Square statistical test with a level of significanceα= 0.05 the results obtained $\rho = 0.265$ means $\rho > \alpha = 0.05$ so that Ho is accepted and H1 is rejected which means there is no relationship with the incidence of acute myocardial infarction (AMI) at the Heart Polyclinic Hospital of Bhakti Dharma Husada Surabaya.

DISCUSSION

Age

Along with increasing age, atherosclerotic events occur more easily. ApproxAMItely 82% of CHD events at the age of more than 65 years will cause the mortality rate in these individuals to increase because the heart undergoes physiological changes even in the absence of previous disease (AHA, 2014). The results of the study found a relationship between age and cholesterol levels, namely total cholesterol levels will increase with age (Supriyono, 2008 in Cipto Susilo, 2018).

Age is one of the main non-modifiable risk factors for acute myocardial infarction (AMI) (Mechanic & Gavin, 2023). Increasing age causes physiological and structural changes in the cardiovascular system, such as increased myocardial stiffness, thickening of the arterial walls, and decreased vascular elasticity (Rajati et al., 2024). This aging process also increases susceptibility to atherosclerosis and clinical manifestations of coronary heart disease, including AMI (Sagris et al., 2024).

There is strong evidence from large-scale epidemiological studies that the prevalence of AMI increases significantly with age (Nurmohamed et al., 2025). In a recent multi-country cohort study involving over 4 million patients, it was found that half of AMI cases occurred in the age group over 70 years, with a significantly higher incidence and morbidity compared to younger age groups (Nurmohamed et al., 2025). The median age of patients experiencing AMI

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worldwide is recorded as 70 years, with considerable regional and demographic variation (Nurmohamed et al., 2025).

Biologically, changes that occur in the elderly heart include thickening of the left ventricular wall, increased collagen, and the development of left ventricular hypertrophy (LVH), all of which independently increase the risk of AMI and sudden cardiac death (Rajati et al., 2024). Furthermore, increasing age is accompanied by the accumulation of other cardiovascular risk factors, such as hypertension, diabetes mellitus, and dyslipidemia, which play a synergistic role in increasing the likelihood of AMI in the elderly population (Arlindyo et al., 2024).

Although the incidence of AMI is increasingly common in older adults, it is important to note that current global trends also indicate an increasing proportion of AMI in younger individuals, particularly those with familial risk factors and unhealthy lifestyles (Sagris et al., 2024). However, statistically, AMI morbidity and mortality remain predominant in the age group over 60 years, both in Indonesia and globally (Rajati et al., 2024).

Studies also show that with each decade of increasing age, the risk and incidence of AMI increase significantly (adjusted odds ratio increases by 1.19 to 1.34 per 10 years) (Nurmohamed et al., 2025). Accumulated physiological changes, as well as exposure to classic risk factors throughout life, are the prAMIry reasons for the high incidence of AMI in older age groups (Mechanic & Gavin, 2023).

Increasing age will cause an increase in CHD sufferers, because blood vessels experience progressive changes and take place continuously over a long period of time. The earliest changes begin at the age of 20 in the coronary arteries. Other arteries begin to modify only after the age of 40, occurring in males aged 35-44 years and increasing with age.

Gender

Gender has been shown to be a risk factor closely associated with the occurrence of acute myocardial infarction (AMI) (Arlindyo et al., 2024). Research shows that men have a significantly higher incidence of AMI than women, often attributed to hormonal influences and lifestyle factors specific to men (Broniuk et al., 2024). Statistically, nearly 86% of AMI patients in a study in Surabaya were men, while only 14% were women, indicating a significant gender difference (Arlindyo et al., 2024).

Although the incidence is higher in men, women who experience AMI tend to have a higher cardiovascular risk profile, older age at diagnosis, and more comorbidities such as diabetes and hypertension (Ngaruiya et al., 2024; Harvey et al., 2024). Furthermore, women with AMI have been shown to have higher in-hospital mortality rates, possibly due to delayed diagnosis, atypical clinical presentations, and a possible lack of optAMIl invasive intervention (Sweeny & Benamer, 2025; Ngaruiya et al., 2024).

Several recent international studies have also reported that, despite the higher incidence of AMI in men, women have a higher risk of death 30 days and 1 year post-AMI compared to men with comparable risk factors (Dutta et al., 2024; Asleh et al., 2020). Biological differences, such as the loss of the protective effect of estrogen after menopause, contribute to a sharp increase in the risk of AMI in women after age 50 (Sweeny & Benamer, 2025).

Overall, gender significantly influences the incidence, clinical presentation, and outcome in AMI patients, so gender-based preventive interventions and clinical therapies are crucial to reduce mortality and morbidity (Harvey et al., 2024; Pana et al., 2025).

Hypertension

The results showed that the highest frequency of respondents with AMI was those with hypertension, namely 58 people (93.5%). One of the causes of myocardial infarction is

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hypertension (BudAMIn B, et al, 2017). The high pressure on the blood keeps the left ventricle up against the pressure gradient as it pumps blood. The supply of oxygen needs to the heart increases due to continuously high blood pressure (Smeltzer SC, Bare BG, 2017). The heart is forced to pump blood without supply which triggers ventricular hypertrophy and heart failure triggers a high chance of acute myocardial infarction (Price & Wilson, 2012). The results of the study are in accordance with the study of Astuti and Maulan (2018), where there is a significant relationship between hypertension and the incidence of myocardial infarction with an odds ratio (OR) = 6.vessels blood, hypertension gives rise to a process sclerosis of the arterial walls. This process will facilitate the formation of blood clots and weakens the patient's blood vessels, This can easily break and form a thrombus. Effects on the blood vessels heart continuously causes damage to the arterial vascular system thus undergo a hardening process blood vessel.

Cholesterol

The results of this study showed that the highest frequency of respondents with AMI were respondents who had high cholesterol levels, namely 43 people (69.4%). Cholesterol can cause myocardial infarction which is proven through research where respondents with high cholesterol levels (> 150) are at risk of 3 times for myocardial infarction (Astuti A, Maulan, 2018). The results of this study are in accordance with the theory that hypercholesterol has an adverse effect on the body because it narrows the arteries. By narrowing the coronary arteries, blood flow decreases or stops to the heart muscle and triggers AMI (Idrus HH, 2018).

Atherosclerosis occurs due to the accumulation of cholesterol and cholesterol esters in the artery walls. Several diseases that trigger hypercholesterolemia in the long term are diabetes mellitus, hypothyroidism, lipid nephrosis, and other dyslipidemia diseases. It is known that there is an inverse relationship between HDL and heart disease (Aini DN, 2016).

That acute myocardial infarction occurs when the ischemia that occurs is long enough, which is more than 30-45 minutes, causing irreversible cellular damage. The part of the heart affected by the infarction will stop contracting forever. Most of the ischemia is caused by coronary artery disease (CAD). In this disease, there is fatty material (plaque) that has formed over the years in the lumen of the coronary arteries. The plaque can rupture, causing the formation of blood flow blocking the oxygen-rich blood clot on the surface of the plaque. If the clot becomes large enough, it can completely or partially block blood flow to the coronary arteries.

Smoking

Smoking is one of the causes of death in the United States. Data from the Center for Disease Control and Prevention (CDC) states that smoking will increase the risk of coronary heart disease by 2-3 times compared to non-smokers. But passive smokers who only inhale cigarette smoke at work or at home have the same chance as active smokers, namely 25-30% to develop heart disease (Centers for disease control and prevention (CDC), 2014).

The effect of smoking on increasing the risk of CHD and AMI is often found when you have consumed more than 25 cigarettes per day, and this risk will increase if the consumption of these cigarettes also increases. The chemicals in cigarettes that have the strongest effect on causing heart disease are nicotine, carbon monoxide (CO), and oxidant gases (chart 2.1) (Centers for disease control and prevention (CDC), 2014).

Nicotine is a substance that activates the sympathetic nerves so that it will cause vasoconstriction of blood vessels and increase the work of the heart so that the need for oxygen to the heart increases. In addition, nicotine can also cause vascular endothelial dysfunction, lipid abnormalities, and insulin resistance (Centers for disease control and prevention (CDC), 2014).

CO is the major constituent found in cigarettes. CO circulating in the blood will later bind to hemoglobin thereby reducing the amount of hemoglobin to carry oxygen and inhibiting hemoglobin as well as releasing oxygen. Exposure to CO in smokers in the long term will make the mass of red blood cells enlarge and reduce the capacity of red blood cells to carry oxygen so that the result is a state of hypoxemia. Hypoxaemia can also cause an increase in red blood cell mass, the effect of which is an increase in blood viscosity or hypercoagulation (Centers for disease control and prevention (CDC), 2014).

Oxidants in cigarettes produce free radicals that play a role in the inflammatory process and will activate platelets and cause endothelial dysfunction. Platelet activation will help the process of atherogenesis in the vascular become easier (Centers for disease control and prevention (CDC), 2014).

The results of this study showed that the highest frequency of respondents with AMI was smoking respondents, namely 34 people (54.8%). Most of the AMI respondents in this study had a history of smoking. The habit of smoking cigarettes is a risk factor for cardiovascular disease including AMI (Wagiu MB, 2016). Cigarette toxic substances trigger constriction of blood vessels. Cigarette toxic substances make blood thick, thus triggering blood clots (Nardian DF, 2016). Increased platelets and fibrinogen which makes thrombosis any time the coronary vessels experience narrowing. Cigarettes also reduce levels of HDL and LDL oxidation and cause endothelial damage due to oxidative stress in the content of cigarettes. Cigarette nicotine stimulates the sympathetic nerves and causes vasoconstriction of blood vessels (Wandari, 2016).

This research is in line with the research of Kartika Sari, Thaha and Ansariadi (2014) which shows that there is a relationship between smoking and the occurrence of CHD where a history of smokers has a risk of 2.681 times getting CHD. Studies provide evidence of differences in the prevalence of myocardial infarction between study groups (light, moderate, and heavy smokers) (Nardian DF, 2016).

Smoking activity is a risk factor for AMI (acute myocardial infarction), this factor is a factor that can be changed or is a person's lifestyle that is most likely to be a risk factor for AMI. Acute myocardial infarction can be prevented by controlling the risk factors that can cause MI. Where someone with a healthy lifestyle reduces smoking and also starts physical activities such as sports. And with these activities, the performance of the heart will also be healthier and there will be no plaque buildup and the blood flow will also be smoother.

Diabetes Mellitus

Several things cause blood sugar to rise, namely lack of exercise, increased amount of food consumed, increased stress and emotional factors, weight and age gain, and the impact of treatment from drugs, such as steroids (Ravi et al., 2020).

Increased blood glucose levels can result in macrovascular or microvascular complications, macrovascular complications that affect large arteries causing atherosclerosis. The emergence of atherosclerosis is caused by the emergence of atheromatous plaques, atherosclerosis is one of the causes of myocardial infarction (Cui et al., 2021).

Based on facts and theories, increased glucose levels can cause macrovascular and microvascular complications, this occurs in people with DM, coronary heart disease, hypertension and other diseases related to blood vessels. Macrovascular is a disease complication that affects the arteries of large blood vessels, causing atherosclerosis. Myocardial infarction begins with atherosclerosis, then rupture and blockage of blood vessels occurs, this causes disruption of blood flow and O2 supply to the tissues, especially to the myocardial tissue of the heart, lack of O2 supply can cause myocardial infarction. That diabetes

mellitus in the long term will make the heart work harder. Where diabetes mellitus can cause atherosclerosis which can result in ischemia in the heart and trigger MI.

Obesity

Obesity is often a trigger factor for diabetes mellitus, hypertension and hyperlipidemia so that obesity can be used as a risk factor for coronary heart disease. According to the World Heart Federation, 58% of diabetes mellitus and 21% of ischemic heart disease are accompanied by an increase in body mass index above (AHA, 2014).

A lot of calorie intake and a bad lifestyle can trigger obesity (Haryuni, 2015). Obesity increases heart work and oxygen demand due to increased blood pressure (Price and Wilson, 2017). Increased work of the heart in pumping systemic blood increases resistance to left ventricular blood pumping, because it triggers an increase in myocardial oxygen demand which causes the heart's workload to increase and encourages angina and myocardial infarction (Aini, 2016).

This study is in accordance with the study of Haryuni (2015) where Acute Myocardial Infarction (AMI) occurs in the majority of obese respondents. Another suitable study is Wandari's study (2016) where there is a relationship between physical activity and BMI in clients with coronary heart disease. Researchers assume that obesity makes fat increase and triggers the heart to work harder to pump blood. In the long term the heart will experience fatigue and trigger AMI.

Activity

Physical activity is a cardiovascular risk factor that is often overlooked in Indonesian culture, especially among adults and the elderly, who tend to lead sedentary lifestyles (Fahmi et al., 2023). Research conducted at various Indonesian hospitals shows that most MI patients have low levels of physical activity before their attacks, and only a small proportion of respondents engage in moderate to vigorous activity (Ambari et al., 2025). This phenomenon is closely related to the demographic and cultural conditions of urban Indonesians, who frequently engage in non-physical work and prioritize regular exercise less in their daily lives (Anindya et al., 2022).

Furthermore, the prevalence of low physical activity in the Indonesian population has increased dramatically over the past decade, with middle-income and educated groups even more vulnerable to sedentary lifestyles due to changes in work and mobility patterns (Anindya et al., 2022). This contrasts with high-income countries, where wealthier populations tend to be more active. The lack of physical activity in Indonesian society is also influenced by cultural factors, such as traditional household chores that involve little aerobic activity, and the norm of communal eating without movement after meals (Fahmi et al., 2023).

These findings highlight the need for culturally based interventions in the prevention and promotion of heart disease-related health. Physical activity education must be tailored to the cultural context and habits of Indonesians to encourage a shift from a sedentary lifestyle to a more active one (Ambari et al., 2025). By emphasizing risk factor modification through optimizing physical activity in accordance with local cultural values and norms, efforts to reduce the incidence of AMI in Indonesian society can be more effective and sustainable (Anindya et al., 2022; Fahmi et al., 2023).

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