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The Relationship Between a History of Hypertension, Diabetes Mellitus, and Gout with the Incidence of Coronary Heart Disease at Lavalatte Hospital

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Abstract

Coronary heart disease is a disorder of heart function caused by a lack of blood supply to the heart muscle due to blockage or narrowing of the coronary arteries resulting from damage to the artery walls. Damage to the lining of the coronary arteries is caused by blockages or narrowing of the coronary arteries (blood vessels in the heart that supply food and oxygen to heart cells) due to fatty deposits that accumulate on the artery walls (plaque). According to data from the Malang City Health Office, there were 730 new cases of coronary heart disease in Malang City in the 2014–2015 period. Although specific data for 2019 appears to be less publicly available, this figure provides an indication that CHD has been a significant health burden in Malang City during that period. Based on a preliminary study conducted by researchers on October 10, 2025, using interviews in the Platinum 4 room at Lavalette Hospital, which is a cardiovascular room, data was obtained on patients with CHD who had no history of hypertension, no diabetes, but had a history of gout since 2019 and had experienced two recurrences in the past year. The purpose of this study was to determine how medical history affects the risk of CHD at Lavalette Hospital. This study used a case-control design with data collected directly through structured interviews and measurements of blood pressure, uric acid, and blood sugar. The results of this study show that the majority of respondents at Lavalette Hospital have a history of disease (hypertension, diabetes mellitus, uric acid) in the high category (84.6%), with the highest prevalence in the elderly age group, while coronary heart disease (CHD) in respondents is dominated by the highrisk category (82.1%)12. The conclusion is that there is a statistically significant relationship between medical history and the incidence of CHD at Lavalette Hospital (P = 0.025), with a weak positive correlation (r_s = 0.358)13.

Keywords: History of Hypertension, Diabetes Mellitus, Gout, Coronary Heart Disease Incidence, Lavalette Hospital

1. INTRODUCTION

Coronary heart disease is a disorder of heart function caused by a lack of blood supply to the heart muscle due to blockage or narrowing of the coronary arteries resulting from damage to the artery walls (P2PTM Kemenkes RI, 2021). Damage to the lining of the coronary arteries is caused by blockages or narrowing of the coronary arteries (blood vessels in the heart that supply food and oxygen to heart cells) due to the accumulation of fatty deposits on the artery walls (plaque) (Marniati et al., 2021). Cardiovascular diseases (CVDs) are a group of disorders that cause problems in the blood vessels and heart, including coronary heart disease (CHD), which is a disease that causes disorders in the coronary arteries that supply blood and oxygen to the heart muscle (Tsao et al., 2022).

According to the WHO (2021), CVDs are the leading cause of death globally compared

to other causes. The WHO estimates that 17.9 million people died from CVDs in 2019, with 21.6% of these cases occurring in Southeast Asia, while in Indonesia, approximately 24.8% of deaths were due to CVDs. In Indonesia, cardiovascular disease accounts for about one-third of all deaths, with CHD and stroke being the main causes. This makes CVDs the leading cause of death globally, accounting for 32% of all deaths. Of the deaths caused by CVDs, 85% are due to stroke and heart attack (WHO, 2022).

Coronary heart disease (CHD) is one of the leading causes of death in Indonesia, including in East Java Province. Based on the results of the 2019 Basic Health Research (Riskesdas) by the Indonesian Ministry of Health, the prevalence of CHD in East Java was recorded at 0.5% or around 144,279 people based on doctor's diagnosis, and increased to 1.3% or around 375,127 people when calculated based on doctor's diagnosis or symptoms (Indonesian Ministry of Health, 2019). The Ministry of Health also emphasized that the main risk factors contributing to the high CHD rate in East Java are in line with the national picture, namely smoking, hypertension, dyslipidemia, diabetes mellitus, obesity, lack of physical activity, stress, and unhealthy eating patterns (Kemenkes RI, 2020).

According to data from the Malang City Health Office, there were 730 new cases of coronary heart disease in Malang City in the 2014–2015 period. Although specific data for 2019 appears to be less publicly available, this figure provides an indication that CHD has been a significant health burden in Malang City during that period (Soegitarianto 2024).

Based on a preliminary study conducted by researchers on October 10, 2025, using interviews in the Platinum 4 room of Lavalette Hospital, which is a cardiovascular room, data was obtained on patients with CHD who had no history of hypertension, no diabetes mellitus, but had a history of gout since 2019 and had experienced two recurrences in the past year.

Hypertension, diabetes mellitus, and hyperuricemia are major risk factors that work synergistically to accelerate the process of atherosclerosis in the coronary arteries, thereby significantly increasing the likelihood of CHD (Yusuf S & Joseph P, 2020). These three conditions cause endothelial damage, chronic inflammation, and impaired vascular function, which facilitate the narrowing or blockage of coronary arteries, ultimately leading to CHD (European Society of Cardiology, 2020). Recent research indicates that individuals with diabetes have a 3.5 times higher risk of CHD compared to non-diabetics (Simanjuntak & Nugroho, 2025). Coronary heart disease (CHD) is closely related to medical history. Factors such as hypertension, diabetes, dyslipidemia, obesity, smoking, and family history have been shown to accelerate the formation of atherosclerosis (WHO, 2023).

Initially, this condition often does not cause symptoms, but over time it can develop into chest pain during activity and even acute heart attacks (Knuuti et al., 2019; Libby et al., 2022). A history of chronic diseases such as diabetes, kidney failure, or heart failure has also been shown to exacerbate complications and worsen long-term prognosis (Virani et al., 2020).

To reduce the risk of coronary heart disease (CHD) in individuals with a history of medical conditions such as hypertension and diabetes mellitus, comprehensive preventive measures are essential. Prevention begins with lifestyle modifications, such as adopting a balanced diet low in salt and saturated fat, maintaining an ideal body weight, exercising regularly, quitting smoking, and avoiding alcohol. Additionally, chronic diseases such as hypertension, diabetes, and dyslipidemia must be controlled with discipline, either through medication or regular monitoring. Regular health checkups are also important for early detection of signs of CHD, such as chest pain or shortness of breath. With a combination of a healthy lifestyle, management of chronic diseases, and early detection, the risk of CHD can be significantly reduced even if there is a history of medical conditions that increase risk (WHO, 2023).

Considering this background, this study focuses on analyzing the relationship between

medical history and the incidence of coronary heart disease. A quantitative approach using medical history data is expected to provide an accurate and valid picture. This study uses secondary data from medical records obtained from the records of coronary heart disease patients with the help of an observation sheet that has been prepared in accordance with the variables to be measured, namely the dependent variable in the form of medical history and the independent variable in the form of coronary heart disease.

The purpose of this study is to determine how medical history can affect the risk of CHD in Lavallate Hospital.

2. RESEARCH METHOD

1) Research Design

This study used a case control design with data collection conducted directly through structured interviews and measurements of blood pressure, uric acid, and blood sugar.

2) Population and Sample

The population consists of two groups, namely the case population and the control population. The case population consists of adult patients diagnosed with coronary heart disease with a history of diabetes mellitus, hypertension, and gout who were treated at Lavalette Hospital in Malang. The control population consists of patients who were hospitalized at Platinum 4 during the same period.

The sample used consists of two groups, namely the case group and the control group. The case group is part of the population of patients diagnosed with coronary heart disease who were treated at Lavalette Hospital in Malang in December 2025 and met the inclusion criteria. Meanwhile, the control group is part of the non-CHD patients who were treated during the same period.

In practice, the number of samples to be used will be adjusted according to the availability of data at Lavalette Hospital in Malang. This adjustment will be made while still considering the proportion between the case and control groups so that the analysis can be carried out in a balanced manner. The sample size is 33 people (using the Slovin formula).

The sampling technique is adjusted to the case-control study design and the characteristics of the population available in the field.

In the case group, research samples will be taken from patients diagnosed with coronary heart disease (CHD) who were treated at Lavalette Hospital in Malang during the period of December 2025 and who met the established inclusion criteria. Meanwhile, in the control group, samples will be selected from non-CHD patients treated during the same period using a sampling method in which the researcher selects all subjects who meet certain criteria sequentially until the required sample size is reached within a time limit of 1 month, namely in December 2025 (consecutive sampling).

3) Research Variables

The independent variables in this study are Hypertension, Diabetes Mellitus, and Gout, calculated based on and categorized according to the Asia-Pacific criteria (WHO, 2020). These variables were selected because nutritional status, as reflected in medical history, has the potential to be a risk factor for cardiovascular disease, including the dependent variable of Coronary Heart Disease. Meanwhile, the dependent variable in this study is Coronary Heart Disease (CHD). CHD includes diagnoses of STEMI, NSTEMI, and unstable angina as determined by a cardiologist and recorded in the patient's medical records (ESC, 2023). This variable is used as an outcome to assess the relationship with the Medical History status of inpatients at Lavalette Hospital in Malang.

4) Research Instruments

The instrument used was an observation sheet prepared by the researcher to record patient data directly in the inpatient ward. The medical history observation sheet included 9 statements. Meanwhile, the coronary heart disease observation sheet included 3 statements.

3. RESULTS AND DISCUSSION

Table 1. General Characteristics of Respondents

No	Indicator	Category	Frequency (n=39)	Percentage %
1	Age	<25 Years Old	0	0%
		26-35 Years Old	0	0%
		36-54 Years Old	11	28,2%
		> 54 Years Old	28	71,8%
2	Gender	Male	18	46,2%
		Female	21	53,2%
3	Marital Status	Not Married	0	0%
		Married	30	76,9%
		Widow/Widower	9	23,1%
4	Highest Level Of Education	Not In School	0	0%
		Elementary School	10	25,6%
		Junior High School	10	25,6%
		High School	14	35,9%
		University	5	12,8%
5	Occupation	Civil Servant	0	0%
		Private Employee	7	17,9%
		Entrepreneur	7	17,9%
		Farmer	9	23,1%
		Housewife	10	25,6%
		Others	6	15,4%
6	Ethnicity	Jawa	39	100%
7	Diagnosis	CHD	24	61,5%
		Non-CHD	15	38,5%

Based on table 1, General characteristics of respondents, it is known that of the total 39 respondents, most were in the >54 age group, namely 28 people (71.8%), while 11 respondents (28.2%) were aged 36–54 years. There were no respondents in the <25 and 26–35 age groups. This indicates that the majority of respondents were in the older age group, which epidemiologically has a higher risk of cardiovascular disease. Based on gender, female respondents dominated, numbering 21 (53.2%), while male respondents numbered 18 (46.2%). In terms of marital status, most respondents were married, namely 30 people (76.9%), followed by 9 respondents who were widowed (23.1%), and there were no respondents who were unmarried. This condition reflects that the majority of respondents have potential family support in their daily lives.

In terms of highest level of education, most respondents had a high school education, namely 14 people (35.9%), followed by elementary and junior high school education with 10 people each (25.6%), and college education with 5 people (12.8%). There were no respondents

who did not attend school. In terms of occupation, most respondents worked as housewives, namely 10 people (25.6%), followed by farmers, namely 9 people (23.1%), private employees and entrepreneurs, each with 7 people (17.9%), and other occupations, namely 6 people (15.4%). All respondents were of Javanese ethnicity (100%). Based on diagnosis, most respondents were diagnosed with CHD, namely 24 people (61.5%), while 15 people (38.5%) were diagnosed with non-CHD. These findings indicate that the majority of the research sample consisted of patients diagnosed with CHD, which is relevant to the research objective that focuses on factors related to the incidence of CHD.

Table 2. Characteristics of Respondents with a Medical History

Characteristics	Category	Medical History							
		Low		Medium		High		Total	
		F	%	F	%	F	%	F	%
Age	<25 Years Old	0	0	0	0	0	0	0	0
	26-35 Years Old	0	0	0	0	0	0	0	0
	36-54 Years Old	1	2,5	1	2,5	9	23	11	100
	> 54 Years Old	23	58	4	10	1	2	28	100
Gender	Male	0	0	2	5,1	16	41	18	100
	Female	3	7,6	2	5,1	16	41	21	100
Marital Status	Not Married	0	0	0	0	0	0%	0	0
	Married	2	5,1	2	5,1	26	66,6	30	100
	Widow/Widower	0	0	3	7,6	6	15,3	9	100
Highest Level Of Education	Not In School	0	0	0	0	0	0	0	0
	Elementary School	1	2,5	3	7,6	6	15,3	10	100
	Junior High School	0	0	1	2,5	9	23	10	100
	High School	1	2,5	1	2,5	12	30	14	100
	University	0	0	0	0	5	12,8	5	100
Occupation	Civil Servant	0	0	0	0	0	0	0	0
	Private Employee	0	0	0	0	7	17,9	7	100
	Entrepreneur	2	5,1	2	5,1	3	7,6	7	100
	Farmer	0	0	2	5,1	7	17,9	9	100
	Housewife	0	0	0	0	10	25,6	10	100
	Others	1	2,5	0	0	5	12,8	6	100
Ethnicity	Jawa	100	100	100	100	100	100	100	100
Diagnosis	CHD	2	5,2	4	10,2	18	46,1	24	100
	Non-CHD	1	2,5	0	0	14	35,8	15	100

Based on the data presented in the table, there is a significant correlation between age and the severity of medical history. Respondents in the late productive age group (36-54 years) tended to have a dominant prevalence of high medical history, namely 9 people (23%). Conversely, in the elderly group (>54 years), the majority of respondents were in the low disease history category, with a frequency of 23 people (58%). This indicates that the disease burden in this sample is concentrated in the pre-elderly age group. In terms of gender, the distribution of high disease history was evenly spread between men and women (16 people or 41% each). However, in the low disease history category, women showed a slightly higher number than

men. Meanwhile, in terms of marital status, married respondents dominated the high disease history category with a percentage of 66.6%, which is likely closely related to the age distribution of respondents in this study.

In terms of educational level, respondents with a high school education had the highest frequency in the high disease category (30%). In terms of occupation, housewives had the highest prevalence of high disease history (25.6%), followed by private employees and farmers. Finally, based on clinical diagnosis, there is a close relationship between a diagnosis of CHD (coronary heart disease) and a history of high-level disease, with 18 respondents (46.1%) from the CHD group falling into this category. Overall, these data illustrate that the health profile of respondents is greatly influenced by age, occupational activity, and specific medical diagnoses, with these factors interacting to determine the severity of an individual's health history.

Table 3. Statistics on the Characteristics of Respondents with Coronary Heart Disease

Indicator	Category	Frequency (n=39)	Percentage %
Diagnosis	CHD	24	61,5
	Non-CHD	15	38,5
History of Hypertension	Hypertension	19	48
	No Hypertension	20	51,3
History of Gout	Gout	20	51,3
	No Gout	19	48,7

Table 3 presents the frequency distribution and percentage of respondent characteristics based on three clinical health indicators with a total sample of 39 participants. Based on the main diagnosis indicator, the majority of respondents had been diagnosed with coronary heart disease (CHD), namely 24 people or 61.5%, while the remaining 38.5% were in the non-CHD group. Regarding the history of comorbidities, the data showed a prevalence of hypertension (Ht) of 48% (19 respondents), where the proportion of respondents who did not have a history of hypertension was slightly more dominant at 51.3%. Meanwhile, for the indicator of gout history, a prevalence of 51.3% (20 respondents) was found, which is higher than the group without a history of gout, which was 48.7%. Comprehensively, these data indicate that most of the research subjects were CHD patients with a significant prevalence of hypertension and gout, reaching almost half of the total study population.

Table 4. Lambda Statistical Test

			Value	***Approximate Significant***
Nominal By Nominal	*Lambda*	Systematic relationship between medical history and the occurrence of CHD	0,947	<,001
	Goodman and Kruskal Tau	Relationship between medical history and the occurrence of CHD	0,903	<,001

Based on the statistical data analysis presented, the following is an academic interpretation that integrates the descriptive profile of the respondents with the correlation test results. Analysis of 39 respondents shows that the majority of research subjects have been diagnosed with coronary heart disease (CHD), namely 24 people (61.5%), with a prevalence of comorbidities in the form of hypertension at 48% and gout at 51.3%. To test the strength of the relationship between these categorical variables, a Nominal by Nominal test was used, which

produced a Lambda coefficient value of 0.947. This Lambda coefficient value, which is close to 1.00, indicates a very strong and asymmetric relationship, in which knowledge of the disease history variable can significantly improve the accuracy of CHD prediction. This finding is reinforced by an Approximate Significance value of <.001, which is well below the significance threshold of alpha = 0.05, so it can be concluded that there is a statistically significant relationship between disease history (hypertension and gout) and CHD diagnosis in the study population. Clinically, the magnitude of this Lambda value confirms that metabolic and vascular disease history are the main predictive factors contributing to the clinical manifestation of coronary heart disease in patients.

Table 5. CHD Data

No	CHD	Frequency	Percentage
1	Low	3	7,6%
2	Medium	4	10,3%
3	High	32	82,1%
	Total	39	100%

Based on the statistical data presented, the following is an academic interpretation of the characteristics of respondents related to the distribution of coronary heart disease (CHD) and medical history. Data analysis shows a positive correlation between increasing age and the high frequency of CHD risk in the population studied. This phenomenon is clearly seen in the elderly group (>54 years) who dominate the Highrisk category with 23 respondents or 58.9%. In contrast, in the adult age group (36-54 years), the highrisk rate was recorded at 25.6%. In terms of gender, the female group showed a slightly higher prevalence of high risk (43.5%) compared to the male group (41%). Sociologically, marital status also shows a certain pattern of vulnerability, where married respondents have the highest representation in the high-risk category, reaching 69.2%, far exceeding the widowed/divorced group, which stands at 15.3%.

From a socio-economic perspective, secondary education (high school) showed the most prominent vulnerability rate in the Highrisk category at 30.7%. In terms of occupation, housewives recorded the highest frequency of High risk at 25.6%, followed by farmers and private employees at 17.9% each. This finding is reinforced by the distribution of ethnic groups, which is dominated by the Javanese ethnicity with a Highrisk level of 84.6%.

Clinically, the Diagnosis variable confirms that respondents who have been medically diagnosed with CHD have a Highrisk prevalence of 46.1%. This data is in line with the accumulation of Medical History in general, where the majority of respondents are in the High category with a percentage of 84.6%. This figure is very similar to the specific CHD risk profile, which shows a high category of 82.1% of the total 39 respondents. Overall, the data describes a health profile that requires intensive preventive attention, especially in the elderly and populations with a history of comorbidities.

Table 6. Cross-tabulation of Medical History

Medical History	Coronary Heart Disease								p-value
	Low		Medium		High		Total		
	F	%	F	%	F	%	F	%	
High	0	0	0	0	32	82	32	82	
Medium	0	0	4	10,2	0	0	4	10,2	0,025
Low	2	5,2	0	0	1	2,5	3	7,6	
Total	2	5,2	4	10,2	33	84,6	39	100	

Based on the compilation of statistical data presented, the following is an academic

interpretation of the characteristics of respondents related to the risk of coronary heart disease (CHD) and medical history: Analysis of the Prevalence and Clinical Correlation of Coronary Heart Disease (CHD) Demographic analysis shows a positive correlation between the age variable and an increased risk of CHD, with the elderly group (>54 years) dominating the high-risk category with a frequency of 23 respondents or 58.9%. Conversely, in the productive age group (36-54 years), the high-risk category was lower at 25.6%. In terms of gender, the prevalence of high risk was slightly more prominent in the female group (43.5%) than in the male group (41%). Sociologically, marital status showed that married respondents had a significant representation of high risk, reaching 69.2%. In terms of socio-economic parameters, those with a high school education recorded a vulnerability rate in the high-risk category of 30.7%. In terms of occupation, housewives showed the highest frequency of high risk at 25.6%, followed by farmers and private employees at 17.9% each. Clinically, the majority of the population diagnosed with CHD was in the high-risk category (46.1%), while the Javanese ethnicity was the dominant group in this sample, with a high-risk rate of 84.6%.

Macroscopically, the majority of respondents were in the High disease history (84.6%) and High CHD risk (82.1%) categories. The correlation test showed a statistically significant relationship between disease history and CHD incidence, as evidenced by a P-Value of 0.025 ($P < 0.05$). The strength of the relationship was positive, with a correlation coefficient (r_s) of 0.358. These findings confirm that demographic factors, occupational background, and past medical history are fundamental indicators in assessing cardiovascular risk in the study population.

Table 7. Relationship between Medical History and Incidence of Coronary Heart Disease

Variables	r_s (koefisien Korelasi)	P-Value
Relationship between Medical History and Incidence of Coronary Heart Disease	0,358	0,025

Based on the compilation of data above, data analysis shows an increasing trend in CHD risk along with increasing age variables. This was significantly identified in the elderly group (>54 years) who dominated the high-risk category with a frequency of 23 respondents or 58.9%. Conversely, in the young adult age group (36-54 years), the high risk category was lower at 25.6%. In terms of gender, the female group showed a slightly higher prevalence of high risk (43.5%) than the male group (41%). Sociologically, marital status showed that married respondents had the highest representation in the high-risk category (69.2%), while widows/widowers were at 15.3%. In terms of socio-economic parameters, secondary education (high school) showed the most prominent vulnerability in the high-risk category at 30.7%. In terms of occupation, the status of housewife recorded the highest frequency of high risk at 25.6%, followed by farmers and private employees at 17.9% each. This finding was clinically reinforced by the diagnosis variable, where respondents who had been diagnosed with CHD had a highrisk prevalence of 46.1%. Macro data shows that the majority of respondents are in the High disease history (84.6%) and High CHD risk (82.1%) categories. Inferentially, there is a significant relationship between medical history and the incidence of CHD, as evidenced by a P-value of 0.025 ($P<0.05$) and a weak positive relationship based on a correlation coefficient (rs) of 0.358. Overall, these results confirm that demographic factors and past medical history are important predictors in assessing cardiovascular risk in this population.

Discussion

1) Medical History

Based on the results of the study, the majority of respondents had a history of disease in the High category, namely 33 people (84.6%). This indicates that most patients treated in Platinum Room 4 at Lavalette Hospital had significant comorbidities, particularly hypertension, diabetes mellitus, and gout. The high prevalence of medical history in the elderly group (>54 years) reaching 58.9% is in line with the theory that increasing age increases the duration of exposure to metabolic risk factors that damage blood vessel walls.

2) Coronary Heart Disease (CHD)

Research data shows that 82.1% of respondents are in the high CHD risk category. This clinical condition was commonly found in female respondents (43.5%) and those whose occupation was housewife (25.6%). Medically, this was reinforced by the finding that patients who had been clinically diagnosed with CHD did indeed have a higher risk profile than non-CHD patients.

3) Relationship between Medical History and Coronary Heart Disease Incidence

Statistical test results show a significant relationship between medical history (hypertension, diabetes mellitus, and gout) and CHD incidence at Lavalette Hospital7. This is evidenced by a P-value of 0.025 ($P < 0.05$)8. The strength of the relationship between these variables is indicated by a correlation coefficient (r_s) of 0.358, which means there is a unidirectional relationship with a weak positive strength9. These findings support the hypothesis that the presence of comorbidities such as hypertension, which damages the vascular endothelium, diabetes, which accelerates atherosclerosis, and gout, which triggers inflammation, synergistically increase the risk of CHD manifestation in patients.

4. CONCLUSION

Based on the results of the study and discussion, it can be concluded that the majority of respondents at Lavalette Hospital had a history of disease (hypertension, diabetes mellitus, gout) in the high category (84.6%), with the highest prevalence in the elderly age group, and the incidence of coronary heart disease (CHD) in respondents was dominated by the high risk category (82.1%) 12. There was also a statistically significant relationship between medical history and the incidence of CHD at Lavalette Hospital ($P = 0.025$), with a weak positive correlation ($r_s = 0.358$)13.

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