Coronary Heart Disease Risk Factors among Women Aged Older than 45 Years Old in Makassar

Faktor Risiko Penyakit Jantung Koroner pada Perempuan Usia Lebih dari 45 Tahun di Makassar

Masriadi*, Hasta Handayani Idrus**, Arman***

*Department of Epidemiology, Public Health, Tamalatea School of Health Science, Makassar, Indonesia, **Faculty of Medicine, Universitas Muslim Indonesia, Makassar, Indonesia, ***Department of Epidemiology, Faculty of Public Health, Universitas Muslim Indonesia, Makassar, Indonesia

Abstract

Cardiovascular disease causes 8.6 million deaths of women every year, which is the major cause of death by one-third of all deaths of women in the world. Half of all deaths of women older than 50 years old is caused by cardiovascular and stroke diseases. This study aimed to analyze risk factors related to coronary heart disease among women aged older than 45 years at Dody Sarjoto Makassar Air Force Hospital 2016. The total of sample was 76 consisting of 64 cases of coronary heart disease and 12 non-coronary heart disease. Determination of sample used purposive sampling. Primary data were obtained through interview to respondents using questionnaire and direct interview. Data were analyzed by using contingency correlation coefficient (Exp (B)) test to identify significant relation between dependent and independent variables. Results found were hypertension (Exp (B) = 0.309), obesity (Exp (B) = 0.140), diabetes mellitus (Exp (B) = 0.164) and dyslipidemia (Exp (B) = 0.185), as proven having relation with coronary heart disease among women aged older than 45 years, and the factor which had the most significant relation was dyslipidemia.
Keywords: Cardiovascular disease, diabetes mellitus, dyslipidemia, hypertension, physical activities, smoking

Abstrak

Penyakit kardiovaskuler menyebabkan 8.6 juta kematian pada perempuan setiap tahun, yang merupakan penyebab kematian terbanyak, yaitu sepertiga dari seluruh kematian perempuan di seluruh dunia. Setengah dari seluruh kematian perempuan berusia di atas 50 tahun disebabkan oleh penyakit jantung dan stroke. Penelitian ini bertujuan untuk menganalisis faktor yang berhubungan dengan penyakit jantung koroner pada perempuan usia > 45 tahun di Rumah Sakit TNI AU Dody Sarjoto Makassar. Besar sampel sebanyak 76 sampel yang terdiri dari 64 kasus penyakit jantung koroner dan 12 kasus non penyakit jantung koroner. Penentuan sampel menggunakan metode *purposive sampling.* Data primer diperoleh melalui wawancara terhadap responden dengan menggunakan kuesioner dan wawancara langsung. Data dianalisis menggunakan uji koefisien korelasi kontingensi (Exp (B)) terhadap variabel independen dan dependen. Adapun hasil yang ditemukan adalah obesitas (Exp (B) = 0.140), diabetes mellitus (Exp (B) = 0.164), dan dislipidemia (Exp (B) = 0.185) terbukti memiliki hubungan dengan kejadian penyakit jantung koroner pada perempuan usia > 45 tahun dan faktor yang memiliki hubungan paling besar adalah dislipidemia.
Kata kunci: Penyakit jantung, diabetes melitus, dislipidemia, hipertensi, aktivitas fisik, merokok

Introduction

Cardiovascular disease (CVD) remains the leading cause of death among Europeans and around the world. The Global Burden of Disease study estimated that 29.6% of all deaths worldwide (15,616.1 million deaths) were caused by CVD in 2010, more than all communicable, maternal, neonatal and nutritional disorders combined, and double the number of deaths caused by cancers.[1]

Esselstyn mentioned that mortality caused by coronary heart disease had continuously decreased in industrial countries because level of primary, secondary prevention and medical treatment were relatively high.[2] Ades explained that cardiovascular disease caused 8.6 million deaths of women every year as the major cause of death by one-third of all women in the world. Half of all deaths of women aged older than 50 years are caused by cardiovascular and stroke diseases.[3]

Esselstyn,[2] mentioned that cardiovascular disease took the first place as causes of death in Indonesia. Household health survey periodically conducted by Health Ministry of the Republic of Indonesia showed that cardiovascular disease contributed 19.8% of all causes of death in 2011 and increased to 24.4% in 2011.

Ulfa,[4] explained that in the past, coronary heart disease was considered as a disease which mostly attacked men. Number of deaths showed that at least 250,000 women were died due to coronary heart disease. Study conducted in 2011 showed that 28% of all women older than 50 years old were died because of coronary heart disease, so the disease became the major cause of women's death in such group of age.

The Melbourne Women's Midlife Health Project in cohort study within eight years as conducted by Andreasson reported that among women aged older than 45 years, there was an increase of serum follicle stimulating hormone (FSH) levels more than twice exceeding the average serum FSH levels of 20 – 25-year-old women as well as the decrease of serum inhibin B levels and serum estradiol levels more than 60%, compared to serum inhibin B and serum estradiol levels on 20 – 25-year-old women.[5] The Melbourne Women's Midlife Health Project recommends checking of serum FSH levels, serum estradiol levels and serum inhibin B levels as signs of menopause period.

Christen explained that menopause is when menstrual periods stop permanently at least 12 months, marking the end of a woman's reproductive period.[6] Perimenopause is a period with the range 1 – 2 years before menopause and 1 – 2 years after menopause. Signs and symptoms arised as the result of such transition period are called signs and symptoms of perimenopause consisting of short-term and long-term symptoms.

Dody Sarjoto Air Force Hospital is a hospital owned by Indonesia's Ministry of Defense as managed by Makassar Air Force. Dody Sarjoto Air Force Hospital serves health supports needed in every air force operation and drill including health supports for the execution of emergency, then common, specific and preventive treatment as well as health supports and services for public. The Hospital serves general patients and patients with national health insurance scheme or *BPJS*. The total of coronary heart disease sufferers at Dody Sarjoto Air Force Hospital was 79 patients within January – February 2014. Therefore, it needed study to analyze risk factors of coronary heart disease among women aged older than 45 years at Dody Sarjoto Air Force Hospital 2016.

Method

This study as conducted on January 1st – 30th, 2016 was observational study by cross-sectional approach to analyze risk factors of coronary heart disease among women aged older than 45 years at Dody Sarjoto Air Force Hospital 2016.

Population and samples of study were all > 45-year-old women patients who came for medical treatment at Dody Sarjoto Makassar Air Force Hospital's internal disease clinic on January 1st – 30th, 2016 as many as 76 people both outpatient and hospitalized patients. Samples used in the study were all > 45-year-old women patients who made visits to Dody Sarjoto Makassar Air Force Hospital's internal disease clinic on January 1st – 30th, 2016 as many as 76 people. This study used total sampling technique in which all population were the samples. Data were obtained through interview to respondents by using questionnaire and direct interview.

Data were then analyzed by using contingency correlation coefficient to independent variables (hypertension, diabetes mellitus, dyslipidemia, smoking and physical activities) and dependent variable (coronary heart disease), and then proceed to the analysis by using multivariate logistic regression analysis to determine which variables had the strongest relation.

Results

Total of sample that would be analyzed in this study was 76 samples. Based on bivariate analysis in Table 1, there were four variables that had significant relation with coronary heart disease (p value < 0.05). There were hypertension, diabetes mellitus, dylipidemia and obesity.

Selection of the variables used multivariate analysis by using multiple logistic regression method Backward Likelihood Ratio. The results of data processing candidate variables were shown in the following table.

Variables hypertension, diabetes mellitus, dyslipidemia and obesity were included in the multivariate analysis for p < 0.025 (Table 2). After the selection of candidates, multivariate analysis performed multivariate

Table 1. Relation between Independent and Dependent Variables

Variable	CHD Status				p Value
	CHD		Not CHD		
	N	%	N	%	
Hypertension	49	76.6	5	41.7	5.983
Non-hypertension	15	23.4	7	58.3	0.014
Diabetes mellitus	47	73.4	5	41.7	4.712
Non-diabetes mellitus	17	26.6	7	58.3	0.030
Dyslipidemia	52	81.3	6	50	5.460
Non-dyslipidemia	12	18.7	6	50	0.019
Obesity	52	81.3	5	41.7	8.444
Non-obesity	12	18.7	7	58.8	0.040
Smoking	8	12.5	4	33.3	3.299
Non-smoking	56	87.5	8	66.7	0.069
Regular physical activities	11	17.2	1	8.3	0.596
Non-regular physical activities	53	82.8	11	91.7	0.440

Table 2. Results of the Multivariate Candidate Selection

Variable	Score	Df	p
Hypertension	5.983	1	0.014
Diabetes mellitus	4.721	1	0.03
Dyslipidemia	5.460	1	0.019
Obesity	8.444	1	0.04

Table 3. Modelling Stage 1

	Variable	B	Coef.	Exp (B)	95% CI	
					Lower	Upper
Step 1	Hypertension	-1.174	-1.174	0.309	0.055	1.726
	Diabetes mellitus	-1.667	-1.667	0.189	0.039	0.908
	Dyslipidemia	-1.915	-1.915	0.147	0.028	0.773
	Obesity	-1.451	-1.451	0.234	0.044	1.251
	Constant	2.227	2.227	9.275		
Step 2	Diabetes mellitus	-1.806	-1.806	0.164	0.035	0.762
	Dyslipidemia	-1.689	-1.689	0.185	0.040	0.853
	Obesity	-1.965	-1.965	0.140	0.032	0.624
	Constant	1.736	1.736	5.675		

analysis to get a multivariate model. Following multivariate model first.

Results of analysis showed that variable which had a very strong relation was variable dyslipidemia (Exp (B) = 0.185) (Table 3).

Discussion

Based on results of study, there was a significant relation between hypertension and coronary heart disease among women aged older than 45 years (p = 0.014). The result was in accordance with finding at field where respondents who suffered from coronary heart disease and hypertension had larger number than respondents who did not suffer from hypertension.

Such case was supported by theory stating that con-

tinuous high blood pressure could damage arterial blood vessels gradually. The artery was hardened because of fat accumulation in the artery wall, so constricted lumen in blood vessels that would make bloodstream hindered.

If coronary artery vessels were infected, it would result the incidence of coronary heart disease. The increase of systemic blood pressure due to hypertension enhanced resistance against blood pumping from the left ventricle, so the cardiac workload increased. According to American Heart Association (AHA), risk of cardiovascular disease increases in line with the increase of blood pressure, in which the systolic blood pressure 130 – 139 mmHg and diastolic 85 – 89 mmHg will increase the risk of cardiovascular and blood vessel diseases twice compared to blood pressure less than 120/80 mmHg.[7] The increase of blood pressure may raise atherosclerosis incidence that is the cause of coronary heart disease.

The results were supported by Burch,[8] explaining that of 300,000 number of population at the age of 45 – 65 years that were treated at elderly unit, prevalence of hypertension was obtained 32% when starting treated. Boedhi,[9] explained that hypertension incidence at elderly age was because the decrease of renin levels as the result of the decrease of nephron number due to aging process, so it caused the continuously ongoing vitiosus circulus. Moreover, at elderly age, the lowering of elasticity on peripheral blood vessels occurred, which caused an increase of resistance of peripheral blood vessels apparently resulting systolic hypertension.

Results of study conducted by Ismail,[10] on hospitalized patients of coronary heart disease and hypertension who were positive suffering from coronary heart disease and having hypertension records were found by 32%. The result of chi-square test showed significant relation between incidence of coronary heart disease and hypertension level (p = 0.0001 < p = 0.1).

That was contrary to results of study conducted by Jian Liu,[11] in which the result of chi-square showed p value = 0.101 which means that no significant relation was found between hypertension and coronary heart disease incidence, yet according to results obtained quantitatively, of all samples with hypertension, 72.5% suffered from coronary heart disease. Such result was also contrary to results of study conducted by Sulistyo,[12] that proved no significant relation of hypertension to coronary heart disease incidence.

Results of this study showed a significant relation between diabetes mellitus and coronary heart disease incidence among > 45-year-old women (p value = 0.03). That was in accordance with finding at field where respondents who suffered from coronary heart disease and diabetes mellitus had larger number than respondents who did not suffer from diabetes mellitus. This was supported by theory stating that diabetes mellitus, name-

ly high glucose levels in blood tend to increase cholesterol and triglyceride levels. The increase of diabetes risk was caused by lipid disorder. Mechanism was not clear yet, but there occurred an increase of type IV hyperlipidemia and hypertriglyceride, the form of abnormal platelet, so it triggered coronary heart disease incidence.

Burch,[8] mentioned that one of indicators of the high blood glucose levels in diabetes mellitus was if the blood glucose when reaching > 220 mg/dL and there would be emerged process of membran basalis thickening from capillary and coronary artery blood vessels, so constriction of bloodstream to heart might occur. The disease could be handled by maintaining blood glucose levels to stay normal. The incidence of suffering from coronary heart disease was increased by two to four times higher among diabetes-infected people. People with diabetes tend to quickly suffer from degeneration of tissue and dysfunction of endothelium.

Sulistyo,[12] proved a significant relation was found between diabetes mellitus and incidence of coronary heart disease. Furthermore, case control study conducted by Mamat,[13] obtained a proportion of respondents with fasting blood glucose > 126 mg/dL on the case group was 47.5% and 51.3% for the control group. Results of bivariate analysis showed a significant relation between fasting blood glucose levels and coronary heart disease (p = 0.0001).

Results of study found a significant relation between diabetes mellitus and coronary heart disease among > 45-year-old women. Insulin resistance syndrom at elderly age, diabetes was at risk to suffer from coronary heart disease in the future and the decrease of tolerance of glucose at elderly age in relation to the lowering of peripheral cell sensitivity to insulin effect (insulin resistance). There were also secondary factors, namely the change of lifestyle and the rise of increasing atherosclerosis as marked by hyperglycemia, yet the impact of its complications was different.

That was in line with study conducted by Kennel,[14] which found results that of 65 respondents with diabetes mellitus, 69.7% (23 people) suffered from coronary heart disease. According to Amsterdam,[15] the high blood glucose levels, diabetes mellitus proven had a relation with the incidence of coronary heart disease by using 346 respondents.

Lewis,[16] explained that coronary heart disease incidence increased twice to four times higher among diabetes mellitus-infected people because a person with diabetes mellitus disease more quickly suffered from malfunction of blood vessels and the increasing risk of heart attacks.[16] Diabetes mellitus would raise the process of membran basalis thickening from capillaries and coronary artery blood vessels, so the constriction of bloodstream to the heart occurred. This was not in line with

study conducted by Isabelle,[17] that found no significant relation between diabetes mellitus and coronary heart disease incidence (p = 0.161).

Results of study showed a significant relation between dyslipidemia and coronary heart disease incidence and the most influencing variable to dependent variable based on the result of multivariate analysis as seen from exp (B) was dyslipidemia.

That was in accordance with finding at field where respondents who suffered from coronary heart disease and dyslipidemia had larger number than respondents who did not suffer from dyslipidemia. Results of observation through patients' medical records showed that most respondents had low density lipropotein (LDL) levels > 130 mg/dL. In line with Gobel,[18] dyslipidemia had higher risk (OR= 1.4) to coronary heart disease mortality than patient without dyslipidemia.

Most respondents admitted that they came to hospital if they suffered from progressive chest pain. The most prominent checkup result on blood chemical checkup result was the increasing LDL level as quite significant over 13 mg/dl. Therefore, dyslipidemia was convincingly as the factor most related to coronary heart disease incidence among > 45-year-old women.

It proved that the high LDL cholesterol level had an important role in the incidence of coronary heart disease and there was reversed relation between high density lipoprotein (HDL) and LDL. The increasing level of fat correlated with atherosclerosis process. Factors related from the factor blood lipid were total of plasma cholesterol > 200 mg/dL, LDL > 130 mg/dL, triglyceride > 150 mg/dL, HDL < 40 mg/dL on men.[16]

The high cholesterol levels could be accumulated in the artery vessels, which caused the constriction and hardening, well-known as atherosclerosis or plaque. As a result of the increasing cardiac workload and hypertrophy, thus the heart's need of blood (oxygen) increased and caused dyslipidemia incidence believed as the major factor that could be modified for development and progressive change for coronary heart disease incidence. Cholesterol was transported in blood in the form of lipoprotein consisting of LDL (75%) and HDL (20%). The low HDL cholesterol level had a good role on coronary heart disease and there was reversed relation between HDL levels and coronary heart disease incidence.[16]

Fajri,[19] conducted study on 300 respondents in which the results showed that related factors proven influential were total cholesterol levels (p = 0.027), LDL (p = 0.010) and hypertension (p = 0.009). Between the total cholesterol levels, HDL cholesterol levels, LDL cholesterol levels, triglyceride levels, hypertension and diabetes mellitus, there could be seen that most frequency distribution was found on the low HDL level and hypertension.

Based on study results, there was a significant relation between obesity and coronary heart disease incidence among > 45-year-old women (p value = 0.04). That was in accordance with finding at field where the number of patient suffering from coronary heart disease and obesity had the larger number compared to those not suffering from obesity.

Common people assumed that having fat body showed the high social level in the eyes of other people as this situation generally occurred among respondents whom this study met. Respondents were very proud if they had fat bodies and exceeding body mass index. Then they tried to maintain their fat body shape to make other people impressed that they had quite a lot of money to pay anything they always wanted to consume.

A theory stated that coronary heart disease and other metabolic diseases well known as metabolic syndrome correlated with obesity. Aryana,[20] explained that prevalence of obesity on the subject with coronary heart disease among > 45-year-old women was found very high (51.1%) compared to the prior study. The high obesity prevalence that remained on > 45-year-old women would lead to a consequence of the increasing risk of coronary heart disease incidence. That was related to two mechanisms, namely direct mechanism through protein metabolic effect secreted from fatty tissue such as interleukin (IL) 1, IL 6, TNF, adiponectin and many other proteins to blood vessel endothelium and indirect effect as the impact of other factors which emerged as coronary heart disease risks as a result of the central obesity.

Such result of study was in accordance with theory stating that obesity would increase the heart's workload and especially fat accumulated in the central part of body would increase risk of coronary heart disease. Mamat,[13] stated that coronary heart disease was often suffered by people who had body mass index > 25 kg/m compared to those who had body mass index < 25 kg/m.

Folsom,[21] conducted a study on adult population in rural and urban areas in Bali which resulted that body mass index was very good predictor of metabolic syndrom in which body mass index was strongly related to other metabolic syndrome components. Body mass index was much better if used as predictor of metabolic syndrome compared to waist circumference. Study with elderly population of coronary heart disease found that body mass index was not related to other components of metabolic syndrom, but strongly related to plasma adiponectin. Central obesity had prevalence ratio five times higher to obtain hypoadiponectinemia than non-central obesity.

That was inversely with study of Gotto,[22] which resulted that the high body mass index did not have significant prediction among all cases of coronary heart disease and found that relative risk of cardiovascular disease related to an act of increasing body weight was higher between the age of 45 – 60 years.

Then results of study found no significant relation between smoking records and coronary heart disease among > 45-year-old women (p value = 0.069). Of 76 respondents, 64 respondents (87.5%) did not smoke and 9 respondents (12.5%) did smoke. It was assumed that the high number of respondents who did not smoke at Dody Sarjoto Makassar Air Force Hospital was because all respondents were women and a few of them had smoking records.

Respondents who did not have smoking records in results of questionnaire also admitted they were rarely exposed to smoke, so that coronary heart disease was unlikely caused by substances contained in cigarette. Results of questionnaire interview to the nine respondents who did smoke showed that cigarettes they consumed were cigarettes without filter they made by themselves from cigarette paper filled with tobacco and they consumed after having breakfast, lunch and dinner. Number of cigarette they smoked in a day was three cigarettes. Results of study showed no significant relation was found between physical activities and coronary heart disease among women aged older than 45 years because body protection system, well known as *makrofag* or part of leukocytes that digest all foreign invaders potentially damaging cells including poison contained in the cigarette itself.

Burch,[8] stated that smoking was risky resulting coronary heart disease twofold if compared to those who did not smoke. Effect of nicotine in cigarette caused the release of catecholamine by autonomic nervous system that caused injury on *tunika intima*, also this was not in accordance with study conducted by Mamat,[13] stating that there was a relation between smoking records and coronary heart disease incidence (p = 0.009).

That could have relation with incidence of atherosclerosis (artery wall calcification or thickening) and led to artery wall damage. Moreover, results of study conducted by Devaranavadgi,[23] showed that there were four respondents (12.9%) who did not have smoking habit, but suffered from coronary heart disease. That was possibly caused by other factors which affected on coronary heart disease, such as hypertension and high level of fat.

Jalowiec,[24] mentioned that hypertension, high level of fat and coronary heart disease were also influenced by other factors, such as age, sex, genetic, lack of activities and obesity. That was because smokers had different smoking intensity. A person who had a risk to suffer from coronary heart disease could be seen from smoking duration and cigarettes consumed per day. Isabelle,[17] mentioned that people who smoked in term < 10 years with number of cigarette consumed less than one pack (15 cigarettes) per day had lower risk to suffer from coronary

heart disease than people who smoked ≥ 10 years with number of cigarette consumed more than one pack (15 cigarettes) per day.

No significant relation between physical activities and coronary heart disease among > 45-year-old women was because of physical activities addressed by this study, namely physical exercise (sports) for 30 minutes every day within 3 – 4 days in a week, so a maximum result could be reached. Physical activity programs should be designed to improve physical strength by using FITT formula namely frequency (how often), intensity (how long), type (isotonic) and time (how long). American College of Cardiology recommended all Americans to do any physical activities for 30 minutes every day.

That was not in line with study conducted by Jaloweic,[24] which resulted that physical activities could increase HDL levels in blood and fix coronary collateral, so the risk of coronary heart disease could be reduced. Physical activities could lose body weight, so excessive fat decreased together with the decrease of LDL cholesterol. That was also inappropriate with results of study conducted by Jian Liu,[11] stating that there was a significant relation between physical activities/sports and coronary heart disease incidence. Sports could help to lose body weight, control cholesterol levels and drop blood pressure that were other factors related to coronary heart disease.

Such result of study was not in line with study conducted by Fajri,[19] that people who often did physical activities in their daily activities compared to people who rarely did physical activities had a risk of suffering from coronary heart disease 1 : 1 or equal.

Conclusion

In conclusion, based on the results of study concerning on factors related to coronary heart disease among women aged older than 45 years at Dody Sarjoto Makassar Air Force Hospital, factors that have relation with coronary heart disease among women aged older than 45 years are obesity, diabetes mellitus and dyslipidemia. Meanwhile, factors that do not have relation with coronary heart disease among women aged older than 45 years are hypertension, smoking and physical activities. Then the factor most related to coronary heart disease incidence women aged older than 45 years is dyslipidemia.

Recommendation

Based on the results of study concerning factors related to coronary heart disease among women aged older than 45 years at Dody Sarjoto Makassar Air Force Hospital, it is recommended to control blood pressure, blood glucose and body mass index at integrated healthcare service; maintain eating pattern to avoid hypertension and obesity; consume lower cholesterol food name-

ly food that are cooked, not fried, because fats contained in cooking oil should be reduced even though there is a lower cholesterol label written on the cooking oil packaging; and provide health counseling concerning on dangers of obesity because there are still many people who have understanding that having fat body is an indicator of wealth.

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