

Estimating Atherosclerosis Cardiovascular Disease Risk of 10-year with the Systemic Coronary Risk Estimation Method and Statin Use Recommendation

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Abstract

Stroke and heart disease belong to atherosclerotic cardiovascular diseases (ASCVD), which is one of the death causes in Indonesia. This study aimed to estimate the risk of atherosclerosis cardiovascular disease in the next 10 years using the Systemic Coronary Risk Estimation (SCORE) method. This research was an observational study with descriptive cross-sectional study design. Respondent data collection was taken prospectively which means direct data was collected through interviews, blood pressure measurement, and peripheral blood sampling. The results showed that respondents who were involved in this study were those with an average age of 49.70 ± 7.1 years. Respondents were more dominated by women (76.1%); BMI of respondents showed in the non-obese group 27.14 ± 4.6 kg/m²; total cholesterol, LDL, TG, and HDL levels respectively had an average of 152.17 ± 39.5 mg/dL; 91.28 ± 40.9 mg/dL; 117.24 ± 96.9 mg/dL; and 30.87 ± 8.8 . The number of respondents who smoke was 17.39% and that of those who have undergone physical activity in the form of sports was 60.87%. Based on the results of risk estimation using the SCORE method, it was found that the number of people who were in the low-risk category was 54.35% and the moderate risk category was 45.65%. This study concludes that the risk of ASCVD for the next 10 years in the community is at low and moderate levels. Non-pharmacological treatment is more recommended at this level and statins can be given to individuals if there is no improvement in cholesterol levels.

Keywords: Atherosclerosis Cardiovascular Diseases (ASCVD), SCORE, Statins

Introduction

Non-communicable disease (NCD) is one of the factors causing death in Indonesia. Based on statistical data from the World Health Organization (WHO), the percentage of deaths caused by NCD in Indonesia is 73% of the total population (258 million people).

One of the NCDs which can cause death is cardiovascular disease, with as many as 17.7 million people affected.¹ In Indonesia, the prevalence of death caused by cardiovascular is 17.3%.² On the other hand, the burden of costs that must be incurred by the Indonesian government to overcome the cardiovascular

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disease is very large. For example, the cost of treating heart disease during 2014-2016 covered by Indonesian government health insurance is Rp. 7.9 trillion.³

West Kalimantan is one of the provinces in Indonesia with high cases of cardiovascular disease. The prevalence of cardiovascular diseases is relatively high. For instance, heart disease (0.3%), stroke (0.08%), heart failure (5.8%), and hypertension (28.3%). Among many cases around the cities in Indonesia with four types of cardiovascular diseases, the number of cases for heart disease in West Kalimantan is the third highest figure.⁴ One of many causes of cardiovascular diseases is dyslipidemia. In addition, cholesterol levels in the population with ≥ 15 years of age in Indonesia vary. The proportion of very high low density lipoprotein (LDL) level (≥ 190 mg/dl) is 15.9%; high density lipoprotein (HDL level (< 40 mg/dl) is 22.9%; and very high triglycerides level (≥ 500 mg/dl) is 11.9%.⁴ People with high cholesterol level are at risk of atherosclerosis cardiovascular disease (ASCVD). Therefore, it is necessary to predict the risk of ASCVD.

We aimed to estimate the risk of ASCVD early so that an appropriate prevention and management program for ASCVD can be taken. Several methods can be used to predict the risk of cardiovascular diseases such as Framingham, Systemic Coronary Risk Estimation (SCORE), ASSIGN, Q-Risk, Prospective Cardiovascular Munsters Study (PROCAM), WHO/ISH, and the Pooled Cohort Equations.

All methods which assess cardiovascular disease risk have the same ability in predicting ASCVD. However, each clinical management guideline uses a system of cardiovascular risk estimation.^{5,6} In Indonesia, the risk prediction method for ASCVD used in clinical practice

is the SCORE method.⁷

The SCORE method is used to predict ASCVD for patients aged ≥ 40 years. The patients were known to have no evidence of suffering from coronary heart disease (CHD), diabetes mellitus (DM), chronic kidney disease (CKD), and familial hypercholesterolemia. ASCVD risk levels are grouped into four levels namely very high risk (10-years risk score $\geq 10\%$), high risk (10-years risk score $\geq 5\%$ and $< 10\%$), moderate risk (10-years risk score $\geq 1\%$ and $< 5\%$, and low risk (10-years score $< 1\%$). The results of the risk grouping will be adjusted to the recommendation of using statins based on dyslipidemia guidelines published by The Indonesian Cardiovascular Specialist Association (PERKI) 2017.⁷ So far, there have been some cases where statin is prescribed inappropriately in Asia, not to mention in Indonesia.^{8,9} This is due to the selection of statin has not yet consider the risk of ASCVD as stated in the guidelines of PERKI 2017. The proper prescription of statin could prevent the risk of ASCVD and it has a positive impact on the health care.¹⁰

Methods

Research Ethics

The study was conducted in Baru Village which is one of the working areas of the Sungai Raya Dalam Community Health Center, Kubu Raya Regency, West Kalimantan, Indonesia. This study has passed the ethical-clearance study from the Ethics Review Division of the Faculty of Medicine at Universitas Tanjungpura (No.3963/UN22.9/DL/2019).

Research Design

The research method used in this study was an observational method with descriptive cross-sectional study design. The respondents were community in Baru Village, Kubu Raya Regency, West Kalimantan, Indonesia.

Respondent Criteria

The inclusion criteria of respondents:

1. Aged 40-65 years,
2. Had been fasting for 8 hours before blood samples were taken,
3. Were ready to sign informed consent.

Exclusion criteria of respondents:

1. Had a history of previous cardiovascular disease, blood pressure measurement was not possible,
2. Were pregnant or unable to communicate verbally,
3. SBP > 220 mmHg,
4. A total cholesterol level > 310 mg/dl or < 130 mg/dl, and
5. Incomplete data.

*Data Collection*¹¹

Data collection was carried out by interviews with respondents using a case report form (CRF) sheet to obtain information about gender, age, hypertension drug use, and smoking status of the respondents, as well as to ensure that respondents who came were those who had truly fulfilled all inclusion and exclusion criteria from the study.

Furthermore, the respondents are measured for blood pressure by positioning them to sit upright in a chair and rest for about 5 minutes first. Blood pressure measurements were carried out on the respondent's left hand, first ascertained on the respondent's left arm. No objects or jewelry could affect the measurement results and made it difficult for researchers to take measurements. Then the left arm was positioned on a par with the heart and a digital sphygmomanometer was mounted on the respondent's arm then measurements of systolic blood pressure (SBP) and diastatic blood pressure (DBP) were performed. Measurement of blood pressure was done 2 times with an interval of 2 minutes. If the results of the second measurement differed by ≥ 10 mmHg, a third

measurement and two results close to the average will be measured.

In the next stage, the respondents had to undertaken peripheral blood samples by the clinician. The amount of blood sample needed was as much as 5cc to measure cholesterol levels. The blood sample used to measure the level of total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), and triglyceride was taken by a device from LipidPro®. After that, the result is analyzed by using The SCORE method in order to find the risk of ASCVD from each respondent. This method was carried out using the Heart SCORE High Risk at http://www.heartscore.org/en_GB.

Cardiovascular Risk Stratification

The atherosclerotic cardiovascular disease (ASCVD) risk score into four categories: very high risk (10-years risk score $\geq 10\%$), high risk (10-years risk score $\geq 5\%$ and $< 10\%$), moderate risk (10-years risk score $\geq 1\%$ and $< 5\%$, and low risk (10-years score $< 1\%$).

Results and Discussion

The number of respondents involved in this study was 46 respondents, with the characteristics of respondents that can be seen in Table 1.

Some factors which affect the risk of ASCVD can be seen from the lab data such as the total of cholesterol level, TG, HDL, LDL, and SBP. The data above shows the risk level of having ASCVD from each individual.¹² Data on total cholesterol levels indicate that respondents have total cholesterol levels below 200 mg/dL. Some studies explains that an increase in total cholesterol levels is associated with dyslipidemia.^{9,13} This is because with an increase in total cholesterol levels, there will be an increase in the number of monocytes in the blood. Monocytes are found in the walls

Table 1. Characteristics of Respondents (N=46)

Parameter	Value (%)
Age (Years)	49.70 ± 7.1
Gender	
Male	11 (23.9)
Female	35 (76.1)
BMI (kg/m ²)	27.14 ± 4.6
Total cholesterol (mg/dL)	152.17 ± 39.5
LDL (mg/dL)	91.28 ± 40.9
TG (mg/dL)	117.24 ± 96.9
HDL (mg/dL)	30.87 ± 8.8
SBP (mmHg)	142.13 ± 23.2
DBP (mmHg)	87.74 ± 14.7
Antihypertensive Consumption	9 (19.56)
Aspirin Consumption	1 (2.17)
Statin Consumption	4 (8.69)
Physical Activity	28 (60.87)
Smoked	8 (17.39)

Note:

BMI = Body Mass Index

LDL = Low Density Lipoprotein

TG = Triglyceride

HDL = High Density Lipoprotein

SBP = Systolic Blood Pressure

DBP = Diastolic Blood Pressure

of the inflamed arteries, which later turn into macrophages and phagocyte cholesterol. The process is the beginning of the formation of plaque in atherosclerosis which ultimately causes coronary heart disease. On the other hand, high total cholesterol levels affect free fatty acids that can cause free fatty acids to increase. The increase of fatty acids can trigger pancreatic beta-cell damage so that it can trigger the risk of diabetes mellitus.¹⁴

Overview of LDL Cholesterol Levels Based on ASCVD Risk Level

It can be seen in Table 2 that the people of Parit Baru Village, Kubu Raya Regency, after estimating the measurement of atherosclerosis cardiovascular risk for the next 10 years, were on mild risk of 56.52% and a moderate risk of 43.47%. Based on the dyslipidemia

guidelines issued by PERKI in 2017, it is stated that people with an estimated level of cardiovascular risk generally do not require lipid repair interventions. For those with low risk with LDL levels <70 mg/dL; 70-100 mg/dL; and 100-<155 mg/dL; 155- <190 mg/dL, lipid intervention is not necessary. However, it is different for those who have a low risk with LDL levels ≥ 190 mg/dL, in the case that they require lifestyle intervention and if there is no change then the community should be given additional statin drugs with low intensity.

People at moderate risk with LDL levels <70 mg/dL and 70-100 mg/dL do not need lipid repair interventions. However, people with moderate risk who have LDL levels of 100 - <155 mg/dL; 155 - <190 mg/dL; and>

Table 2. Overview of LDL Cholesterol Levels Based on ASCVD Risk Levels

ASCVD risk level	Cholesterol Value (LDL)					Total n	Percentage
	<70 (mg/dL)	70-100 (mg/dL)	100-<155 (mg/dL)	155- <190 (mg/dL)	>190 (mg/dL)		
Low (<1%)	n=10 21.74%	n=8 17.39%	n=6 13.04%	n=1 2.17%	n=1 2.17%	26	56.52%
Moderate (1-5%)	n=7 15.22%	n=5 10.87%	n=7 15.22%	n=1 2.17%	0	20	43.47%
					Total	46	100%

Table 3. High, Moderate, Low Intensity Statin Therapy⁷

LDL-C lowering	High Intensity ≥50%	Moderate Intensity 30-50%	Low Intensity <30%
Statin	Atorvastatin 40-80 mg Rosuvastatin 20-40 mg	Atorvastatin 10-20 mg Rosuvastatin 5-10mg Simvastatin 20-40 mg Pravastatin 40-80 mg Lovastatin 40 mg Fluvastatin XL 80 mg Fluvastatin 40 mg 2 times/day Pitavastatin 2-4 mg	Simvastatin 10 mg Pravastatin 10-20 mg Lovastatin 20 mg Fluvastatin 20-40 mg Pitavastatin 1 mg

190mg/dL, non-pharmacological treatment needs lifestyle improvement and statin administration. The selection of statin drugs in people with moderate risk can be seen in Table 3. The selection of statins in Table 3 must be attended to their availability in the National Formulary.

LDL cholesterol is the main factor of risk for having cardiovascular such as ASCVD.¹² The increasing level of LDL cholesterol may result in the accumulation of cholesterol in the blood vessel which can trigger atherosclerosis. Statin can be prescribed to the patients with the level of LDL ≥190 mg/dL.⁷ Therefore, it is essential to use statin and to make it the main option in reducing the level of LDL so that it can be done optimally. Statin slows down the enzyme HMG-CoA reductase. It also prevents

the conversion of HMG CoA reductase to mevalonate which cause the synthesis of LDL unable to be formed and catabolism of LDL will rise through LDL receptor. The prescription of statin can significantly avoid the risk of ASCVD and death due to cardiovascular disease. It also known that the use of statin is crucial for primer prevention of cardiovascular as much as 5% and 30% for secondary prevention.^{15,16}

Conclusion

It can be concluded that the community of Parit Baru Village, Kubu Raya Regency has a risk of ASCVD in the next 10 years with low and moderate levels. Non-pharmacological treatment is more recommended at this level and statins can be given to individu if there is no improvement in cholesterol levels.

Given these findings, further research should be carried out with large samples in different area of west Kalimantan, Indonesia. Thus, high risk or very high risk cardiovascular community and need intervention statin use to reduce morbidity and mortality.

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Conflict of Interest

None declared

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