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THE DESCRIPTION OF MODIFIABLE RISK FACTORS IN CORONARY HEART DISEASE AT DR. SOETOMO REGIONAL PUBLIC HOSPITAL

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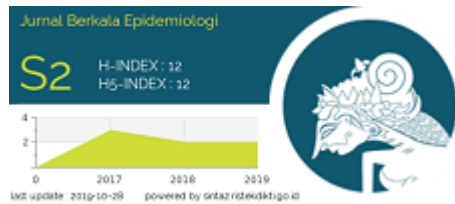
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THE DESCRIPTION OF MODIFIABLE RISK FACTORS IN CORONARY HEART DISEASE AT DR. SOETOMO REGIONAL PUBLIC HOSPITAL

Gambaran Faktor Risiko yang Dapat Dimodifikasi Pada Penderita Penyakit Jantung Koroner di RSUD Dr Soetomo

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ABSTRACT

Background: Coronary heart disease (CHD) is a non-communicable disease that causes the highest mortality in the world, including in Indonesia. Risk factors for CHD are divided into modifiable and non-modifiable risk factors. **Purpose:** This study aims to discover the description of risk factors that are modifiable in coronary heart disease patients at Dr Soetomo Regional Public Hospital. **Methods:** It was a descriptive observational study with cross sectional study design. The study population was coronary heart disease patients who were doing outpatient treatment at the Integrated Heart Service Center (PPJT) of Dr. Soetomo Regional Public Hospital. The number of study sample was 72 respondents using accidental sampling technique. Data sources used are primary data using questionnaires and secondary data using medical record. Data were collected during November 2018. The location of this study was Dr. Soetomo Regional Public Hospital. The data analysis technique chosen was univariate analysis and presented in the form of a frequency distribution table. **Results:** The results of the study showed that the characteristics of respondents were mostly between 56-65 years old (43,05%) and male (70,84%). Risk factors found on the respondents were smoking (84,72%), hypertension (72,22%), hyperlipidemia (68,05%), diabetes mellitus (81,94%) and poor physical activity (77,77%). **Conclusion:** Modifiable risk factor that was mostly found on coronary heart patients was smoking, while least one was hiperlipidemia.

ABSTRAK

Latar Belakang: Penyakit Jantung Koroner (PJK) merupakan penyakit tidak menular yang menyebabkan kematian tertinggi di dunia termasuk di negara Indonesia. Faktor risiko penyakit jantung

koroner dibagi menjadi faktor risiko yang dapat dimodifikasi dan tidak dapat dimodifikasi. **Tujuan:** *Penelitian ini bertujuan untuk mengetahui gambaran faktor risiko yang dapat dimodifikasi pada penderita penyakit jantung koroner di RSUD Dr Soetomo.* **Metode:** *Penelitian ini merupakan penelitian observasional deskriptif dengan desain penelitian cross sectional. Populasi penelitiannya adalah penderita penyakit jantung koroner yang berobat rawat jalan di Pusat Pelayanan Jantung Terpadu (PPJT) RSUD Dr Soetomo. Jumlah sampel penelitian sebanyak 72 responden dengan teknik pengambilan sampel menggunakan accidental sampling. Sumber data yang digunakan adalah data primer menggunakan kuisioner dan data sekunder menggunakan catatan rekam medis. Pengambilan data dilakukan pada bulan November tahun 2018. Lokasi penelitian ini adalah RSUD Dr Soetomo. Teknik analisis data yang dipilih adalah analisis univariat dan disajikan dalam bentuk tabel distribusi frekuensi.* **Hasil:** *Hasil penelitian menunjukkan karakteristik responden sebagian besar berusia antara 56-65 tahun (43,05%) dan jenis kelamin laki-laki (70,84%). Faktor risiko yang dimiliki responden adalah merokok (84,72%), hipertensi (72,22%), hiperlipidemia (68,05%), diabetes mellitus (81,94%) dan aktivitas fisik buruk (77,77%).* **Kesimpulan:** *Faktor risiko yang dapat dimodifikasi yang paling banyak dimiliki oleh penderita penyakit jantung koroner adalah merokok sementara paling sedikit adalah hiperlipidemia.*

INTRODUCTION

The highest mortality rate in the world is caused by non-communicable diseases (NCD). 38 of the 56 million deaths in the world are caused by NCD especially cardiovascular disease, cancer and chronic respiratory diseases. Most deaths from NCD occur in middle and low income countries with almost 75% of the population. The mortality due to NCD has increased in all countries since 2000 where the number of deaths due to NCD in the world reached 31 million. Deaths caused by NCD increased the highest in Southeast Asia from 6.70 million in 2000 to 8.50 million in 2012. Deaths due to NCD are expected to continue to increase until 2030 (WHO, 2014).

In 2012, deaths from NCD were at most 17.50 million deaths caused by cardiovascular disease (46.20%), 8.20 million deaths were caused by cancer (21.70%), 4 million deaths were caused by respiratory diseases including asthma and Chronic Obstructive Pulmonary Disease (COPD) (10.70%), and 1.50 million deaths were caused by diabetes mellitus (4%). The four types of diseases accounted for 82% of deaths from NCD, while other types of NCD caused the rest 18%. Cardiovascular disease and diabetes mellitus are the contributory diseases of more than half a million deaths from NCD in middle and low-income countries, including ones in Indonesia (WHO, 2014) .

Cardiovascular disease can be defined as all abnormalities that occur in the heart and blood vessels. Types of cardiovascular disease include hypertension, coronary heart disease (CHD), stroke, rheumatic heart disease, heart failure, congenital heart disease, heart valve disease, and others. There are two factors that cause cardiovascular disease. The first factor is modifiable risk factors including hypertension, dyslipidemia, physical activity, smoking, obesity, diet, stress and alcohol consumption. The second factor is non-modifiable risk factors including a history of cardiovascular disease in the previous family, gender and age (Ministry of Health RI, 2011).

The results of national basic health research in 2013 estimated that CHD patients in Indonesia amounted to 883,477 people based on doctors' diagnosis. However, based on diagnosis or symptoms according to the survey results using Rose Angina Quistionnaire (RAQ), the result is

estimated to be larger for 2,650,340 people. This occurs since there are people who experience symptoms of CHD but are not examined by a doctor so there are more than those with CHD diagnosed by a doctor. Age 65-74 years is the age group with the highest number of death from CHD, but CHD patients are also found at a young age of 15-24 years. CHD occupies the highest position in seven NCDs in Indonesia. East Java Province occupies the first position with the highest prevalence of CHD with 144,279 people. The city of Surabaya occupies the second highest position in East Java after Madiun City (Ministry of Health RI, 2013).

WHO has a target to reduce 25% of deaths in the world due to cardiovascular disease, cancer, respiratory diseases, and diabetes mellitus in 2025 (WHO, 2014). Reducing the incidence of the disease is one way that can be done to achieve WHO targets that have been set. This includes the incidence of CHD. Primary prevention of CHD is important to reduce the incidence of first CHD attacks. Primary prevention that can be undetaken is to change lifestyles including losing weight, regulating diet, stopping smoking habits, and carrying out regular physical activities. Important risk factors are controlled to prevent the occurrence of hypertension, diabetes mellitus, dyslipidemia and metabolic syndrome (Ministry of Health RI, 2011).

A number of previous studies have shown that most CHD patients have one or more risk factors that allow CHD to occur, especially modifiable risk factors. The purpose of this study is to discover the description of risk factors that can be modified in CHD patients at Dr Soetomo Regional Public Hospital.

METHODS

This type of study was a descriptive observational study employing a cross sectional study design. The population of this study were all patients with coronary heart disease (CHD) who were outpatient at the Integrated Heart Service Center of Dr. Soetomo Regional Public Hospital in 2018. The study sample was determined based on the formula of the cross-sectional study sample of 72 people. The population and sample of the research were determined based on established inclusion and exclusion criteria. The inclusion criteria for this study were patients diagnosed with CHD, willing to take part in study, and having a complete medical record. The exclusion criteria for this study were patients diagnosed with CHD

but having incomplete medical records. The study sample was 72 respondents and was taken using accidental sampling technique. This study used primary and secondary data sources. The primary data were obtained based on interviews with CHD patients using a questionnaire instrument. Secondary data were obtained based on the patient's medical record for several variables that could not be asked through interviews: hypertension, hyperlipidemia, and diabetes mellitus. Primary and secondary data were collected in November 2018. The location of this study was the Integrated Heart Service Center of Dr. Soetomo Regional Public Hospital.

The variables that were studied including the dependent variable (coronary heart disease) and the independent variables (smoking, hypertension, hyperlipidemia, diabetes mellitus and physical activity). Smoking and physical activity variables were obtained using primary data sources, while variables of hypertension, hyperlipidemia and diabetes mellitus were obtained from secondary data sources. Smoking variable was obtained from interviews and categorized as smoking and not smoking. A person is considered to be included in the category of smoking if he/ she has smoked one cigarette for life or was exposed to cigarette smoke in their circumstances. Physical activity variables were obtained from interviews and categorized as good and bad. A person is considered to be included in the category of bad physical activity if he/ she does not do moderate physical activity with a minimum duration of 30 minutes with a frequency of 3-4 times per week.

Hypertension variables were obtained from the results of blood pressure measurements and divided into two categories, namely hypertension and not hypertension. A person is categorized as hypertension if he has systolic blood pressure $\geq$ 140 mmHg or diastolic $\geq$ 90 mmHg. The hyperlipidemia variable was obtained from the blood test results and divided into two categories: hyperlipidemia and not hyperlipidemia. A person is categorized as hyperlipidemia if he has one or more of the following criteria: levels of Low Density Lipoprotein (LDL) $\geq$ 130 mg / dl, levels of High Density Lipoprotein (HDL) <40 mg/ dl, total cholesterol level $\geq$200 mg / dl and triglyceride levels $\geq$200 mg / dl. Diabetes mellitus variable was obtained from the blood tests results and divided into two categories: diabetes mellitus and not diabetes mellitus. A person is categorized as diabetes mellitus if he has one or more of the following criteria: fasting blood sugar $\geq$ 126 mg/ dl, blood sugar when $\geq$200 mg/ dl, post prandial

blood sugar 2 hours ≥200 mg / dl and hemoglobin A1C ≥ 6.5%. Data from the study results were analyzed by univariate analysis techniques which aimed to see the frequency distribution of each variable with a percentage size. Finally, the data displayed in the table are explained again in narrative way and compared with similar previous studies.

RESULTS

Description based on Respondent Characteristics

Table 1 showed that most of respondents were in the age range of 56-65 years which is 31 people (43.05%) and included in the final elderly category. The majority of respondents were male, which is 51 people (70.84%).

Table 1
Frequency Distribution based on Respondent Characteristics

Variable	Frequency (n)	Percentage (%)
Age (years)		
36-45	3	4.16
46-55	23	31.94
56-65	31	43.05
>65	15	20.83
Sex		
Female	21	29.16
Male	51	70.84
Total	72	100.00

Risk Factors in Patients with Coronary Heart Disease

Table 2 shows that the majority of CHD patients have smoking risk factors in the amount of 61 people (84.72%), hypertension for 52 people (72.22%), hyperlipidemia for 49 people (68.05%), diabetes mellitus for 59 people (81 , 94%) and bad physical activity for 56 people (77.77%). Based on these data, it can be seen the majority of the respondents own the risk factors that can be modified for the incidence of CHD. They who do not have risk factors are 6 people (8.33%), while the remaining 66 people (91.66%) have one or more risk factors.

DISCUSSION

Description based on Respondents Characteristics

Most of the respondents are the last elderly age group. The results of this study are in line with the study of Shoufiah (2016) that most respondents were CHD patients in the advanced adult age group >60 years (51.61%). The Marleni & Alhabib (2017) study also showed similar results that almost all respondents were CHD patients in the old category above 45 years old (96.89%).

Table 2
Frequency Distribution based on Chronic Heart Disease Risk Factor

Variable	Frequency (n)	Percentage (%)
Smoking		
Yes	61	84.72
No	11	15.28
Hypertension		
Yes	52	72.22
No	20	27.78
Hyperlipidemia		
Yes	49	68.05
No	23	11.95
Diabetes Mellitus		
Yes	59	81.94
No	13	18.06
Physical Activity		
Poor	56	77.77
Good	16	22.23
Total	72	100.00

CHD often occurs in the elderly group, although not to mention that young people also suffer from CHD. One risk factor for CHD that cannot be modified is age. When a person becomes older, the body's cells experience aging, including the heart muscle cells. These cells have susceptibility to atherosclerosis, which is narrowing of the arteries due to plaque buildup on the artery wall. The risk of developing CHD increases if a person experiences atherosclerosis for a long time. The risk of cardiovascular disease increased in male above 55 years old and in women over 65 years (Ministry of Health RI, 2011).

On the age of over 40 years, serious diseases start emerging; one of them is CHD. As people get older, the risk of suffering CHD also increases. In this case, the risk of suffering CHD increases for five times on the age of over 40 years. Whereas, the risk of developing plaque also increases as people get older. That plaque attaches to the walls of arteries and causes interference with blood flow. This circumstance also increases the risk of suffering CHD (Amisi, Nelwan, & Kolibu, 2018).

The majority of respondents are male with CHD. The results of the study are in line with the results of the study by Novriyanti, Usnizar, & Irwan (2014), which showed the ratio of male to female CHD sufferers, which is 2.69: 1 or as much as 72.91% with male. Yulsam, Oenzil, & Efrida (2015) showed that 75% of the study respondents were male CHD sufferers. Similar results were also obtained from the study of Marleni & Alhabib (2017) which showed almost all respondents with CHD were male (96.89%).

Men have a higher risk of cardiovascular disease. The reason is that men do something more often than women which is considered as one of the risk factors for CHD. Such behavior is smoking (Ministry of Health RI, 2011). Diastutik's (2016) research supported this statement. It showed that 100% of CHD patients who smoke are men. Men are expected to experience coronary heart disease 10 years earlier than women. Women who are still menstruating get protection from the estrogen hormone, but the incidence of female CHD increases after menopause. According to Marleni & Alhabib (2017) men experience stress more often, which is one of the risk factors for CHD. The possibility of experiencing greater stress occurs in men due to the pressure and burden they have when working outside home. Stress can trigger the secretion of catecholamines from the autonomic nervous system. Stress can also activate the serotogenic system in the brain and increase dopamine in mesoprefrontal. This increase in work on the autonomic nervous system can result in increased heart rate and blood pressure so that someone who experiences stress can increase the risk of developing CHD (Ministry of Health RI, 2011).

Risk Factors of Smoking in Patients with Coronary Heart Disease

The results showed the majority of respondents had smoking risk factors. These results are similar to the research of Shoufiah (2016) which showed that the majority of respondents were CHD patients who had smoking habits (67.74%). Nevertheless, different results were shown by the studies of Iskandar, Hadi, & Alfridsyah (2017) and Farahdika & Azam (2015) which had the opposite results. Most of the study respondents were non-smoking CHD sufferers. Smoking can increase the risk of cardiovascular disease by 2-4 times. Hazardous chemicals in cigarettes include nicotine, tar and carbon monoxide. Cigarettes can cause a decrease in oxygen supply to the heart, an increase in blood pressure and pulse, a decrease of HDL cholesterol level, an increase in the risk of blood clots, and a trigger to endothelial cell damage in the coronary arteries (Ministry of Health RI, 2011).

The nicotine contained in cigarettes when entering and flowing in the bloodstream can trigger the adrenal gland to produce adrenaline which can increase heart rate. An increase in heart rate occurs one minute after people start smoking. Nicotine can also increase blood pressure so that it can cause arterial wall injury. The increase in heart rate and blood pressure in smokers is directly proportional to the increased risk of heart disease. It can trigger heart to work harder. Not only the heart, other organs such as the kidneys can also experience damage due to high blood pressure (ASH, 2016).

Smoke from the burning of cigarettes containing carbon monoxide can bind to blood hemoglobin and form carboxyhemoglobin. Bonds produced by carbon monoxides are stronger than oxygen bonds with hemoglobin. Consequently, blood will contain more carboxyhemoglobin than oxyhemoglobin. Moreover, body tissues will experience a lack of oxygen in blood. If the condition occurs in the heart continuously, it will lead to heart attack (Ardina & Monica, 2018).

CHD are also influenced by smoking duration. Research conducted by Rahim, Kundre, & Malara (2016) showed 90.62% of respondents who experienced CHD had smoked for ≥ 10 years. Someone who smokes from a young age will be more at risk of experiencing death from cardiovascular disease. This is because smokers will experience a dose effect, which is a long-standing condition of smoking history that is marked by the younger people start smoking for the first time, the greater the risk of being affected by smoking. CHD is one of the diseases caused by smoking. Smokers who reduce their habits or even stop smoking will have a good effect, namely a reduced dose effect. Active smokers who have stopped one year reduce the risk of 50% of the incidence of CHD compared to active smokers (ASH, 2016).

Risk Factors of Hypertension in Patients with Coronary Heart Disease

The results showed that the majority of respondents had hypertension risk factor. This is in accordance with the study of Ariandiny, Afriwardi, & Syafri (2014) indicating that the majority of respondents were CHD patients with a history of hypertension (60.68%). Similar results were obtained from Bertalina & Suryani (2017) study

showing that as many as 51.04% of the study respondents were CHD patients who had risk factors for hypertension. Amisi, Nelwan, & Kolibu (2018) also showed 64% of the study respondents had hypertension. Similar results were obtained from the Farahdika & Azam (2015) study that 71.79% of CHD respondents had hypertension. Research conducted by Shoufiah (2016) showed similar results that 67.71% of CHD respondents had the hypertension risk factor.

The incidence of hypertension is directly proportional to the risk of cardiovascular disease. In this case, increased blood pressure can double its risk. The incidence of CHD is most often caused by hypertension (Ministry of Health RI, 2011). Whereas, decreased blood pressure can bring positive effects such as a decrease in the risk of experiencing atherosclerosis, a decrease in the risk of developing CHD, as well as a decrease in the risk of suffering complication of cardiovascular diseases (Novriyanti, Usnizar, & Irwan, 2014).

Endothelial cells of the coronary artery walls can be damaged by high blood pressure occurring continuously. If there is a part of a blood vessel that experiences lesions, plaque will form. In time, the plaque will be bigger. The plaque can break or rupture and it will be carried by the bloodstream. Consequently, it blocks the blood flow and reduces blood supply to the heart. If this happens, CHD can occur. High blood pressure can increase the burden of coronary arteries. Arterial blood vessels can be hardened, become thick and stiff, thus reducing elasticity. Age addition is another factor that can reduce the elasticity of blood vessels beside being caused by hypertension (Ariandiny, Afriwardi, & Syafri, 2014).

Increased blood pressure will provide an additional burden for the heart to pump blood harder, causing ventricular hypertrophy. An overworked heart will show dilatation and heart failure, as a result of the continuous pumping of blood from the left ventricle. If atherosclerosis occurs continuously on the arterial wall along with the increasing age factor, the oxygen supply of heart cells will decrease, while the oxygen demand for heart cells continues to increase due to ventricular hypertrophy and increased workload of the heart. This imbalance between supply and the need for oxygen can trigger a heart attack (Yulsam, Oenzil, & Efrida, 2015). High blood pressure that occurs continuously can cause mechanical stress, endothelial dysfunction, and left ventricular hypertrophy. It causes plaque to rupture and the coronary arteries suddenly become

tense or go into spasm. If this kind of condition does not immediately get reperfusion, it may lead to myocardial infarction (Qodir, Soeharto, & Kristianto, 2014).

Risk Factors of Hyperlipidemia in Patients with Coronary Heart Disease

The results showed that the majority of respondents had risk factors for hyperlipidemia. This is in accordance with the research of Shoufiah (2016) which showed that as many as 58.06% of patients with CHD had dyslipidemia. Besides, Farahdika & Azam's (2015) study showed that most of respondents with CHD had risk factors for dyslipidemia (70.79%).

Low LDL levels and high HDL have a good role in preventing the incidence of CHD. LDL can penetrate the arterial wall and then experience oxidation. If there is LDL oxidized, it will trigger the emergence of macrophages. Foam cells will form due to these macrophages catching LDL. Atheroma plaque is formed, beginning with the formation of foam cells. If atheroma plaque is continuously formed, it will get bigger and clog the coronary arteries. This is called atherosclerosis. HDL has a role to provide protection to blood vessels against the occurrence of atherosclerosis. HDL has many roles for blood vessel health including transporting cholesterol that accumulates in endothelial cells in blood vessel walls to the liver, reducing the risk of foam cell formation, preventing LDL oxidation and preventing damage to arterial walls by inhibiting monocytes from penetrating endothelial cells caused by adhesion molecules (Lee, Rotty, & Wantania, 2015).

Cholesterol deposition occurs due to the accumulation of cholesterol in the walls of blood vessels. One reason is high cholesterol levels in the blood. This can increase the risk of CHD, although other cholesterol content is more dominant in causing CHD such as LDL. High LDL levels increase the risk of developing CHD. HDL levels act to absorb cholesterol in macrophages to return to the liver through Intermediate Density Lipoprotein (IDL) and Very Low Density Lipoprotein (VLDL). Low HDL levels cause a decrease in the ability to absorb cholesterol, thus cholesterol in endothelial cells cannot be returned to the liver. Cholesterol deposits in endothelial cells of the arteries can result in plaque formation or atherosclerosis. HDL acts to absorb cholesterol that accumulates in endothelial cells, prevents oxidation of LDL as well as injury or inflammation in the arterial wall which can initiate atherosclerosis. As a result of

the role of HDL, it is considered to be able to prevent the occurrence of atherosclerosis (Zahara, Syafri, & Yerizel, 2013).

High levels of triglycerides in the blood increase the risk of developing CHD. Triglycerides are called the main fatty foods. Triglycerides will be stored in the liver into liver triglycerides. Through the digestive system, triglycerides contained in the food consumed will be converted in the form of chylomicrons. The lipoprotein lipase enzyme is in charge of hydrolyzing the chylomicrons into free fatty acids. These free fatty acids will be stored in the liver. Cholesterol and triglycerides in the liver will be converted into VLDL and will flow into the blood. LDL is formed from VLDL which was previously converted into a form of IDL first. It has been previously explained that LDL starts atherosclerosis. Through this explanation, it is known that indirectly the more triglycerides consumed in food will increase LDL levels in the blood, thus increasing the risk of CHD (Zahara, Syafri, & Yerizel, 2013).

Risk Factors of Diabetes Mellitus in Coronary Heart Disease Patients

The results showed the majority of respondents had risk factors for diabetes mellitus. This is consistent with the research conducted by Marleni & Alhabib (2017) which showed that most of the respondents were CHD sufferers who had diabetes mellitus (95.34%). Shoufiah (2016) actually showed different results where the majority of respondents did not have risk factors for diabetes mellitus (58.06%). The same thing is known from the study of Yulsam, Oenzil, & Efrida (2015) which showed that almost all respondents were CHD patients who did not have a history of diabetes mellitus (89.51%). Research by Novriyanti, Usnizar, & Irwan (2014) showed that almost all respondents suffering from CHD had normal random blood sugar (81.25%).

Some previous studies have shown that someone who has diabetes mellitus has a higher risk of cardiovascular disease than someone who does not have diabetes. The framingham study showed that people with diabetes mellitus had damaged blood vessels, so that one in two people with diabetes mellitus had a risk of having a heart attack. Efforts to prevent CHD in people with diabetes mellitus is to control blood sugar levels within normal limits. Control of blood sugar levels is done by keeping fasting blood sugar levels <110 mg / dL, HbA1C level ≤6, or post prandial 2 hour

blood sugar levels <135 mg / dL (Ministry of Health RI, 2011).

Suffering from diabetes mellitus can increase the risk of developing CHD. This is because people with diabetes mellitus experience changes in lipid metabolism so that it can improve the process of atherogenesis. People with diabetes mellitus have a concentration of saturated blood due to containing sugar, this condition can make heart function not optimal because blood vessels become stiff. Blood containing sugar can cause blood vessel wall injury. When blood vessels undergo lesions, it will trigger an inflammatory reaction in the form of deposition of platelets, macrophages and fibrous tissue to form plaques. The thickening of the arterial wall will trigger hypertension. Hypertension will further aggravate endothelial cell damage. Plaque will form continuously and get bigger if the arterial endothelial cells continue to be injured (Marleni & Alhabib, 2017).

Risk Factors of Physical Activity in Patients with Coronary Heart Disease

The results showed the majority of respondents had risk factors for poor physical activity. According to study by Iskandar, Hadi, & Alfridsyah (2017), some of the major respondents did moderate physical activity (43.33%). Bertalina & Suryani (2017) showed that almost all respondents had mild physical activity (92.70%) and only 7.30% of respondents had heavy physical activity. The results of this study are not in accordance with the study of Shoufiah (2016), instead it showed different results that most of CHD respondents had good activity (61.29%).

Physical activity is related to cardiovascular disease. Doing physical activity can be useful to improve the work of blood vessels and the heart through the mechanism of increasing the work of the heart to be more efficient, reducing complaints of pain in the chest or angina pectoris, widening blood vessels, forming new or collateral paths if the coronary arteries have narrowed or atherosclerosis, reducing the formation of blood clots and increasing the body's abilities such as physical fitness. Physical activity can show maximum results in preventing cardiovascular disease by doing it for 3-4 days a week at least 30 minutes every time you do it. Physical activity is recommended to be done in one day intervals. Doing exercises for 4 to 6 weeks is useful for increasing the physical ability of the body by 30-33%. If physical activity is carried out routinely

within 6 months, it will provide more optimal results (Ministry of Health RI, 2011).

Physical activity or exercise carried out regularly is useful for reducing blood pressure, reducing cholesterol and LDL levels, preventing obesity and increasing HDL levels, thereby reducing CHD risk factors. Both female and male are at risk of developing CHD if they are not actively engaged in or physically active. Someone who does physical activity or regular exercise has a heart with a larger and stronger volume, thus affecting the amount of blood and oxygen supplied to the heart to be more numerous (Iskandar, Hadi, & Alfridsyah, 2017). Physical activity can reduce the plasma concentration of fibrinogen. The plasma concentration of fibrinogen in someone who is doing good physical activity is lower than someone who has a sedentary activity. When the plasma fibrinogen concentration is low, the risk of thrombus formation will decrease, tissue plasminogen activator will increase, plasminogen activator inhibitor-1 will decrease, and platelet adhesion or aggregation will decrease, resulting in reduced risk of CHD. A person with routine physical activity has a more effective fibrinotic profile and low risk of thrombus formation, when compared to someone who has less physical activity. Regular physical activity can increase the inner diameter of the coronary arteries and improve endothelial function. The antithrombotic effects obtained from routine physical activity can reduce the risk of occlusion or narrowing of the inside of the coronary arteries due to plaque buildup by a mechanism to reduce plasma volume, reduce blood vikicity, and platelet aggregation, as well as improve thrombolytic ability (Setyaji, Prabandari, & Gunawan, 2018).

Physical activity can delay the incidence of hypertension in someone who has normotension, decrease systolic and diastolic blood pressure in someone with hypertension, increase HDL levels, control body weight so it prevents obesity, decrease the risk of diabetes mellitus by a mechanism to increase insulin sensitivity and glucose tolerance, and also play a role in increasing muscle strength and mobility that support quality of life. Physical activity carried out routinely with a frequency of one week as many as 3 to 5 times with a minimum duration of 30 minutes each time can reduce about 10 mg/ dl LDL levels and increase about 4 mg/ dl HDL levels. Decreased LDL levels followed by increased HDL levels will provide benefits for the health of the heart and blood vessels. Physical activity can reduce the risk of CHD (Setyaji, Prabandari, & Gunawan, 2018).

Research Limitation

The limitation of this research lies in the free publications that define smoking in too general definition. Active smokers defined by having one cigarette for life and passive smokers defined by ever exposed to secondhand smoke in the environment, therefore this study cannot explain the correlation between the effects of doses and the incidence of CHD.

CONCLUSION

Most CHD patients in Dr Soetomo Regional Public Hospital have modifiable risk factors such smoking, hypertension, hyperlipidemia, diabetes mellitus and poor physical activity. The most common risk factor for CHD patients is smoking and the least one is hyperlipidemia.

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