

Original Research

PREVALENCE AND RISK FACTORS OF THE ISCHEMIC HEART DISEASES IN INDONESIA: A DATA ANALYSIS OF INDONESIA BASIC HEALTH RESEARCH (RISKESDAS) 2013

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ABSTRACT

Background: The Cardiovascular disease (CVDs) is leading in the world as a number one cause of death. Ischemic Heart Disease (IHD) part of CVDs which is often also called coronary artery disease.

Objective: The purpose this study is to know the risk factors for ischemic heart disease in Indonesia, 2013.

Methods: The risk assessment analyzes was used to exam the risk factor IHD around 721,427 people from data of Basic Health Research (RISKESDAS) 2013 in Indonesia.

Results: The finding of this study was former smoker (Adj. OR= 4.09, 95% C.I=3.78-4.43), hypertension (Adj. OR= 3.80, 95% C.I=3.60-4.10), obesity (Adj. OR= 1.96, 95% C.I=1.84-2.08), low consumption of fruits and vegetables (Adj. OR= 0.70, 95% C.I=0.57-0.87), and low physical activity (Adj. OR= 1.14, 95% C.I=1.06-1.23) are risk factor of IHD in Indonesia, 2013.

Conclusion: The central, regional, and even village level special attention have a need for reducing IHD. Cross-program and sector collaboration are also needed collaboration with NGOs and the private sector to control risk factors outside the health sector and improve the environment.

Keywords: cardiovascular disease, ischemic heart disease, RISKESDAS 2013, Indonesia

BACKGROUND

Heart and blood vessel disease (cardiovascular) accounts for about half of deaths from non-communicable disease and mostly occurs in low and middle-income countries ([Benziger, Roth, & Moran, 2016](#)). Base on the report from WHO (World Health Organization), the Cardiovascular disease (CVDs) is leading in the world as a number one cause of death ([World Health Organization, 2020a](#)). Ischemic Heart Disease (IHD) part of CVDs which is often also called

coronary artery disease is a narrowing of the blood vessels caused by the accumulation of fat, cholesterol, calcium and other substances (plaque) on the walls of blood vessels. Plaque can block blood flow and reduce oxygen supply to the heart, often causing chest pain could reducing the patient's activity and increased disability. Plaque can also cause blood clots and blocked blood flow, which can trigger a heart attack then causing death ([Center for Diseases Control, 2019](#)).

Sustainable Development Target (SDG) 3.4 by 2030 is the reduction premature mortality of NCD by one-third from its level in 2015. Ischemic heart disease is responsible for the highest risk of premature death in half of all countries ([Countdown, 2020](#); [Tosepu et al., 2016](#)) and has major impact on developing countries ([Sanyahumbi, Colquhoun, Wyber, & Carapetis, 2016](#)). Institute for Health Metric and Evaluation predicts the global incidence of people with IHD in 2015 were 7287 persons (95% UI 6798–7808) with age standard mortality rate per 100 000 : 142.1 (95% UI 139.5 to 145.2) ([Feigin, 2016](#)).

There are two types of health summary measures in the population: health expectations (HALE) and health disparities ([Schroeder, 2017](#)). Disability-adjusted life-years (DALY) is a widely used measure of health disparities, representing the number of years of life lost (YLL) due to premature death and years of life with disabilities (YLD). DALY can be easily separated to examine the contribution of morbidity and relative mortality, individual disease, injury, and associated risk factors ([Wang et al., 2016](#)). The prediction of global DALY due to IHC is 164.0 million (95% UI 159.6 million to 169.0 million) ([Roth et al., 2017](#)).

Epidemiological studies such as identification of risk factors in their predictive ability are very useful in disease prevention efforts. High blood pressure, high cholesterol levels, smoking; diabetes; being overweight or obese; lack of physical activity; unhealthy diet and stress are modifiable risk factors for IHD. Two risk factors for IHD, hypertension and diabetes mellitus, were predicted to have a strong association with the occurrence of unrecognized myocardial infarction ([Hajar, 2017](#)). Control of risk factors such as decreased total cholesterol (24%), systolic blood pressure (20%), smoking (12%), and lack of physical activity (5%) can reduce deaths from IHD by half ([Sanchis-Gomar, Perez-Quilis, Leischik, & Lucia, 2016](#)). Ischemic heart disease, which has the strongest association with heart failure (HF), is critical for understanding risk or predisposing factors. It should be noted that the risk factors for heart failure vary widely in different regions of the world ([Paul & Mukherjee, 2018](#)). This study aims to determine

the risk factors for coronary heart disease in Indonesia, as well as the impact if the risk factors are controlled.

METHODS

Design, Population, and Sampling

This risk assessment analyzes conducted to explore the risk factor of ischemic heart disease in Indonesia. This study used national data (RISKESDAS 2013) which had received permission from the NIHRD, Ministry of Health Indonesia. In this study ischemic heart disease is someone who has been diagnosed by a health worker with coronary heart disease, and has felt pain / discomfort in the chest, when climbing / climbing stairs or walking. The number of IHD sufferers based on the criteria in this study is around 1,492,909 people of productive age (16-64 years). After cleaning the data was only 721,427 respondents which used for the sample.

Instrument

The aged group in this study is 16-64 years old with sex male and female. Respondents who having hypertension have blood pressure > 140 mmHg. Respondents who are having obesity those who have the BMI > 25. Low vegetables and fruit consumption are people who do not consume fruits and vegetables in one day. Physical activity behavior was collected data on the frequency of physical activity in the last week for residents aged > 10 years. Measurement of physical activity is divided into 3 categories, namely heavy, moderate and light, according to WHO GPAQ 2012 and WHO STEPS 2012 standards. Consuming foods at risk are people who usually consume fast food, junk food and other foods that are at risk for IHD based on national standards and the smoking status of the respondent divided in three criteria: former smoker, smoking, and never.

Data Analysis

Descriptive, inferential, and PAR (population attributable rate) are employed to answer the research question and research hypothesis. The following statistical procedures are used to analyze the data by SPSS 15.0, NIHRD, Ministry of Health Indonesia license.

RESULTS

The prevalence of IHD was 1.5% or equal to 1,492,909 sufferers and 85.2% of patients were in the productive age group (15-64 years). The number of sufferers was mostly women in each age group. The graph shows that the trend of increasing cases had started at the age of 25 years

and began to decline at the age of 55 years (Figure 1). Characteristics of people with coronary heart disease; Most of the female sufferers (56.11%), 60.1% were workers or productive groups, and 43.3% of the sufferers did not have health insurance (such as Askes, Jamsostek, private insurance, company health benefits, Jamkesmas or Jamkesda).

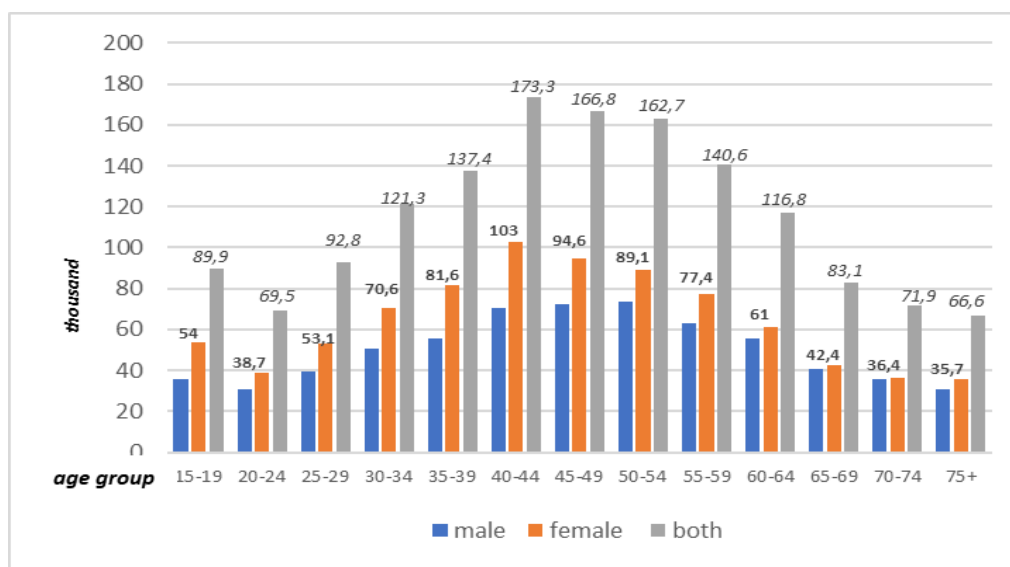


Figure 1 Overview of people with ischemic heart disease in Indonesia based on age group and gender

Table 1 The relationship between risk factor variables with ischemic heart disease in Indonesia

Variables	IHD		Non IHD		Total		P value	PR (95%CI)
	n	%	n	%	n	%		
Hypertension								
Yes (>140 mmHg)	2,099	1.33	155,237	98.67	157,336	100	<0.001	3.80 (3.60-4.10)
No	1,964	0.35	562,127	99.65	564,091	100		
Obesity								
Yes (BMI>25)	1,592	0.89	177,134	99.11	178,726	100	<0.001	1.96 (1.84-2.08)
No	2,471	0.46	540,230	99.54	542,701	100		
Low vegetables and fruit consumption								
Yes (< 35 portion/mg)	3,973	0.56	706,115	99.44	710,088	100	<0.001	0.70 (0.57-0.87)
No	90	0.79	11,249	99.21	11,339	100		
Low physical activity								
Yes < 150 minute/mg)	3,134	0.58	536,150	99.42	539,284	100	<0.001	1.14 (1.06-1.23)
No	929	0.51	181,214	99.49	182,143	100		
Food at risk								
Yes	2,048	0.55	370,614	99.45	372,662	100	0.110	0.95 (0.89- 1.01)
No	2,015	0.58	346,750	99.42	348,765	100		
Smoking status								
Former smoker	767	2.34	31,957	97.66	32,724	100	<0.001	4.09 (3.78-4.43)
Smoking	641	0.28	224,415	99.72	225,056	100		0.50 (0.46-0.54)
Never	2,655	0.57	460,992	99.43	463,647	100		

Table 1 showed the results of the bivariate analysis of correlated risk factors ($p < 0.001$) on

IHD were: former smokers (PR 4.09), hypertension (PR 3.8) and obesity (PR 1.96).

Former smoker has the strong correlation to increase the risk of IHD, after hypertension. With PR 4.09, it means that people who smoke only suffer from IHD 4 times compared to non-

smokers. Lack of physical activity and intake of vegetables & fruits correlate with the incidence of CHD but with less significant PR.

Table 2 Combination of PAR (population attributable rate) risk factors for IHD in Indonesia in 2013

hypertention	obese	smoker	cases	non cases	total	prevalence	PR	PAR
(or) Yes	Yes	Yes	3 006	291 886	294 892	0.01	4.11	0.56
Yes	Yes	No	2 762	276 043	278 805	0.01	3.37	0.48
Yes	No	Yes	2 468	175 653	178 121	0.01	4.72	0.48
No	Yes	Yes	2 063	200 834	202 897	0.01	2.64	0.31
(and) Yes	Yes	Yes	171	3 684	3 855	0.04	8.18	0.04
Yes	Yes	No	929	56 328	57 257	0.02	3.44	0.16
Yes	No	Yes	398	11 541	11 939	0.03	6.45	0.08
No	Yes	Yes	296	8 257	8 553	0.03	6.55	0.06
(Reff) No	No	No	1 057	426 535	0.002**	1		
Sum			4 063	717 364	0.005***			

In Table 2, the highest number of patients with ischemic heart disease (IHD) with a variation of only one risk factor, namely hypertension or obesity or smoking as many as 3006 cases. IHD with 3 risk factors (hypertension and obesity and smoking) there were 171 cases. The results of the PAR analysis of the combination of risk factors related to IHD showed that the intervention that combines one risk factor individually was predicted to reduce the incidence more than the intervention simultaneously. Combination of

three risk factors for hypertension or obesity or smoking with PAR 56%. The combination of hypertension or obesity had a PAR of 48%, while the combination of hypertension or smoking had a PAR of 48% (PR 4.72). If intervening with three risk factors at once (hypertension and obesity and smoking) the chance of success in reducing IHD was high (PR 8.1), but the intervention only affects 4% of individual risk factor interventions, in smokers or with hypertension or obesity; PAR 56% (PR 4.11).

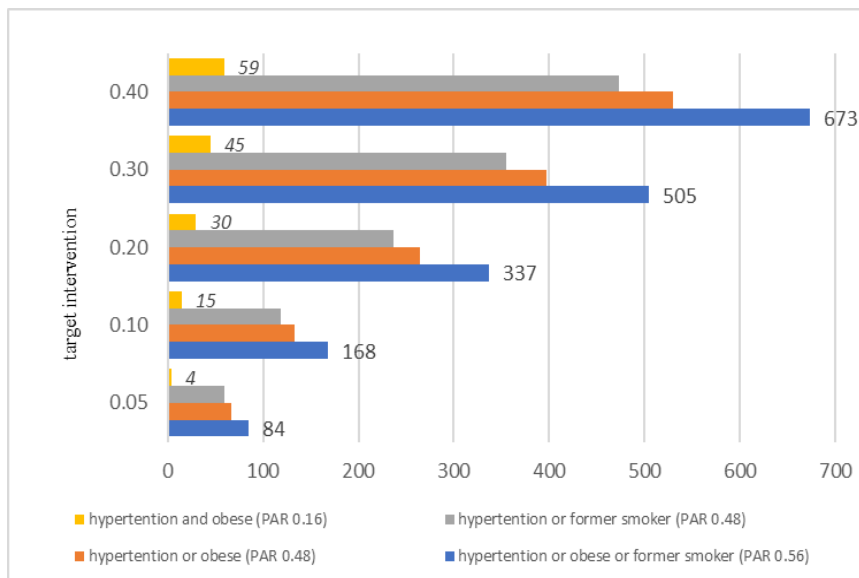


Figure 2 Predictions of reduced incidence of IHD with a variety of PAR

Figure 2 shows the predicted reduction in the incidence of IHD with the intervention of several associated risk factors. Analyzes with various intervention targets were carried out, to see the predictive results of reducing the incidence of IHD. The results of the analysis show that the combination of risk factor intervention for hypertension or obesity or in smokers is proven to have the highest impact on reducing the incidence of IHD in Indonesia in 2013 (PAR 0.56). By planning to reduce the risk factors for hypertension or obesity or in smokers by 5%, it is predicted that it will reduce the incidence of IHD by 84 people. If intervention on risk factors for hypertension or obesity, it was predicted to reduce the incidence of IHD in 66 people. Meanwhile, if the intervention is carried out on risk factors for hypertension or smoker, it is predicted that the incidence of 59 people with IHD will decrease. Intervention of two risk factors for hypertension and obesity simultaneously (PAR 0.16), proved less effective because of a small reduction in the incidence of IHD.

DISCUSSION

The results of this study indicate that former smokers have 4 times more likely to have IHD. Meanwhile, people who smoke 0.5 times the risk of getting IHD. Other studies have shown that the risk of IHD in active smokers is significantly higher than that of never smokers and smokers ([Oshunbade et al., 2019](#)). However, basically people who come into contact with cigarettes will get a loss for their physical health. Both as active and passive smokers, light smokers and heavy smokers, because tobacco is very bad for our healthy.

Although the prevalence of smokers in Indonesia tends to decline from 68.1% ([Badan Statistik Pusat, 2016](#)) and to be 62.9% ([Kementerian Kesehatan Republik Indonesia, 2018](#)) but we know that the prevalence of adolescent smoking (10-18 years) has increased by around 7.2% in 2013 ([Departemen Kesehatan Republik Indonesia, 2013](#)). It was because the growth in national cigarette sales from 2005 to 2012 has

increased sharply and is in accordance with the increase in the number of smokers. The year 2005 showed the number of sales of 222 billion cigarettes and the trend continues to increase until 2012 as many as 300 billion cigarettes ([Bentoel group, 2015](#)). The impact of exposure to tobacco smoke causes IHD and other catastrophic diseases. Many researches exposed that the cost of services for smoking-related diseases is much higher than state revenue from the cigarette industry. Compared to increasing the amount of production, efforts to increase cigarette excise are considered to be more effective in increasing state revenue while simultaneously controlling tobacco consumption ([World Health Organization, 2020b](#)).

Based on this study we found whom the respondent had the hypertension status 3.8 times risk having IHD. This is in line with studies showing that hypertension is a risk factor for IHD disease in women ([Ghaemian, Nabati, Saeedi, Kheradmand, & Moosazadeh, 2020](#); [Mehta, Wei, & Wenger, 2015](#)). Besides that, based on a report from Fujian, China, it also shows that hypertension is one of the main risk factors for IHD in its region ([Xie et al., 2016](#)). Therefore, it is necessary to pay special attention to the handling and inter-regional innovation programs on hypertension in the community so that it can reduce one of the risk factors for IHD.

Obesity also has a significant effect on IHD. The results of this study indicate that obese people suffer from IHD 1.9 times. It is seriously related to the incidence of IHD in various countries around the world ([Cleven, Krell-Roesch, Nigg, & Woll, 2020](#); [Imai et al., 2019](#)). In line with a study showing that people who have a high BMI or low aerobic fitness are associated with a higher risk of IHD and adjust for family history and socioeconomic factors ([Crump, Sundquist, Winkleby, & Sundquist, 2017](#)). Therefore, the increase in physical activity for people in both cities and villages and applies to all age levels so that every Indonesian has an ideal body so as to reduce the level of obesity which is increasing every day.

People who consume low vegetables and fruit consumption will have a significant risk of IHD even though they only have a PR value of 0.70, but this also needs to be considered because what we eat will affect human emotional and physical. These results are supported by a study that confirms that consuming fruits and vegetables is a risk factor for IHD in humans ([Chiu et al., 2019](#); [Mehta et al., 2015](#)). Therefore, the fulfillment of food intake, especially fruit and vegetables every day, needs to be supported by various parties in Indonesia. although there are abundant vegetables, people's habits need to be considered and directed to consume vegetables every day. Then is the fruit, which in Indonesia we know that the fruit will only exist according to the season. Constraints on the consumption of vegetables and fruits are very important for the health of the people in villages and cities.

The results of this study show information about Indonesian people have low PA (Physical activity) 1.14 times having risk IHD. In line with the research conducted by [Cleven et al. \(2020\)](#) showed information about PA (Physical activity) had a high correlation as a risk factor of IHD. With good physical activity, people will avoid hypertension and obesity because it is obvious that with good metabolism, one's mental and physical condition will also be good ([Cleven et al., 2020](#)).

The results of this study indicate that former smokers have 4 times more likely to have IHD. Meanwhile, people who smoke 0.5 times the risk of getting IHD. Other studies have shown that the risk of IHD in active smokers is significantly higher than that of never smokers and smokers ([Oshunbade et al., 2019](#)). However, basically people who come into contact with cigarettes will get a loss for their physical health. Both as active and passive smokers, light smokers and heavy smokers, because tobacco is very bad for the body.

Based on the PAR table (population attributable rate), it is found that the three priority factors for treating IHD are hypertension, obesity, and smoking. The Indonesian government needs to conduct a special study of the results of this research. Hope in the future IHD can be

eliminated with innovative programs like reducing hypertension and obesity levels by increasing the physical activity of the community, and reducing the level of smokers by making wise policies on the power of cigarette companies in Indonesia.

LIMITATIONS OF THE STUDY

The RISKESDAS 2013 data was with a cross-sectional design. The dependent variable for IHD patients was determined based on the respondent's admission that a doctor had diagnosed IHD and experienced several specific symptoms. Thus, while we can report the strength of the relationship between the independent and dependent variables, it cannot evaluate the causal nature of this relationship.

CONCLUSION

In sum, smoking, hypertension, obesity, low consumption of fruits and vegetables, and low physical activity are risk factors for IHD in Indonesia, 2013. It is recommended that the central, regional, and even village level special attention is needed in reducing IHD. Efforts to socialize understanding the dangers of risk factors for IHD must be started early (in adolescents and children). Cross-program and sector collaboration is needed even with NGOs and the private sector to control risk factors outside the health sector and improve the environment.

Declaration of Conflicting Interest

There is no conflict of interest to declare.

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