



Research article



Cardiovascular Disease, Comorbidities, and Late Adult in Indonesia: a Cross-Sectional Population-Based National Survey

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Abstract

The aging population is predominantly predisposed to heart illness. Age is an autonomous danger factor for cardiovascular disease (CVD) in adults, but this risk is exacerbated by additional factors, including comorbidities. This study aimed to determine the prevalence of cardiovascular disease and the association between comorbidities and cardiovascular disease among late adults in Indonesia. This cross-sectional research utilizes the data national population survey from the Indonesia Family Life Survey wave 5 (2015). Multistage stratified random sampling was utilized to choose the respondents to respond to a structured questionnaire interview, laboratory test, and anthropometric measurements. Multivariable logistic regression was utilized to determine the association. The result was respondents' age mean was 48.31 (± 5.83) years. CVD prevalence was 2.36% (95% CI: 2.07 – 2.70). The final model of a multivariable analysis using multiple logistic regression indicated that CKD (adj. OR = 3.04, 95%CI 1.76 – 5.24, $p < 0.001$), hyper cholesterol (adj. OR = 2.77, 95%CI 1.20 – 3.90, $p < 0.001$), stroke (adj. OR = 2.66, 95%CI 1.36 – 5.24, $p = 0.004$), having hypertension (adj. OR = 1.83, 95% 1.35 – 2.49, $p < 0.001$), high blood sugar (adj. OR = 1.82, 95%CI 1.17 – 2.86, $p = 0.008$), were significantly associated with CVD among late adults. Other significant covariate was age (adj. OR = 1.04, 95%CI 1.01 – 1.06, $p = 0.003$) and sex (adj. OR = 1.43, 95%CI 1.07 – 1.92, $p = 0.015$). The conclusion was comorbidities, age, and sex was associated with CVD among late adults in Indonesia.

INTRODUCTION

Age has a significant function in the decadence of heart function, yield in an intensified jeopardy of cardiovascular disease (CVD) in late adults. Heart's aging adult changes function has been reported, reports diastolic and systolic collapses, and electrical malfunction, including the cultivation of arrhythmias [1]. In Indonesia,

adults aged ≥ 40 years, has a high risk of cardiovascular is common, and averages of deterrent care are low population-based, and preventive methods to avoiding CVD must be a precedence in municipal and remote regions [2].

Cardiovascular disease (CVD) is a global disease. The eighth target in the NCD Global Action Plan states that leastwise 50% of

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electable people have to accept medication treatment and counseling (as well as glycemic supervision) to avert heart attacks and strokes. [3]. Worldwide, heart illness is the prime cause of passing away from NCD every year [4]. Data from WHO revealed that 17.9 million people die each year from CVDs, a predictable 31% of all pass away universal, over than 75% of CVD demises happen in low- and middle-revenue nations, as well as 85% of all CVD demises, are owed to heart attacks and strokes [5].

Indonesia is a low- and middle-income country (LMIC) with CVD load and risk factors are high [6]. In 2017 Burden of Disease research revealed that stroke and ischemic heart illness are the leading induces of death and incapacity. Basic Health Research (Riskesdas), a countrywide demonstrative health survey, shows that the occurrence of stroke diagnosis in the population aged 15 years and over escalated by 56% (from 0.7 to 1.1%) throughout 2013-2018. The predominance of high blood pressure in the elderly aged 18 years and over also escalated by 32% (from 26 to 34%), and obesity, gained by 47% (from 15 to 22%) throughout 2013-2018 [7]. Approximately one-third of all bereavements in Indonesia are induced by cardiovascular disease (CVD), with stroke and coronary heart disease (CHD) as the main foremost death in the nation [8,9]. The purpose of this study was to determine the predominance of cardiovascular disease and the association between comorbidities and cardiovascular disease among late adults in Indonesia.

METHOD

Study Design and Sampling

This cross-sectional study utilizes secondary data obtained from Rand Corporation, on the Indonesia Family Life Survey (IFLS) wave 5. IFLS5 was fielded in late 2014 and early 2015 on the same set of IFLS households and split-offs. There were 16,204 households and 50,148 persons

were questioned. The IFLS used stratified random sampling to choose the respondents from provinces, both urban and rural areas strata. There were 13 provinces included. Then randomly selected samples from these strata [10]. Our study selected the respondents using the inclusion criteria as followings: people who were 40 - 59 years old and the exclusion criteria of people who had incomplete data or unknown data. A total of 8,938 respondents were included for analysis. The sample size has been tested for the power of the test by using PASS. The result was 1 indicating a sufficient number of respondents. In this study, CVD referred to a person who has a heart attack, coronary heart disease, angina, or other heart illness diagnosed by a medic/paramedic/nurse/midwife. Late adult in Indonesia referred to the person aged 40-59 years old.

Data Collection

The dependent variable was cardiovascular disease (CVD). The independent factors were comorbidities including hypertension, diabetes, high blood sugar, chronic kidney disease, hyper cholesterol, and stroke. Our association analysis controlled the effect of covariates. Covariates were 1) demographic and socioeconomic factors involved age, sex, marital status, education, residence, and ethnicity, 2) health status include anemia and body mass index (BMI), BMI was deliberate as heaviness in kg alienated by tallness in meter squared and classified according to Asian standards categorical (polychotomous): underweight (<18.5kg/m²), normal weight (18.5 to 22.9 kg/ m²), overweight (23.0 to 24.9kg/ m²), obesity (≥25 kg/ m²) [11], anemia was distinct as hemoglobin ≥12 gr/dl (No) and hemoglobin <12 gr/dl (Yes) [12], 3) medicine taken factors to include medications taken for hypertension, diabetes, cholesterol and traditional medicine for self-treatment, 4) health-risk behavior included smoking.

Statistical Analysis

The baseline characteristics were analyzed using descriptive statistics. Inferential statistics were used to analyze identify the factors associated with the main outcomes of which simple logistic regression was for bivariate analysis and multiple logistic regression for multivariable analysis. Backward regression modeling was used to identify factors associated with chronic kidney disease. Individual independent variables that had a p-value of Wald test < 0.25 [13] in bivariate analysis were entered into an initial model of the multivariable analysis utilizing multiple logistic regression. Multicollinearity amid the independent variables was checked by using the STATA version 10 software package.

Ethical considerations

The IFLS has been studied and accepted by Institutional Review Boards, the United States, and Gajah Mada University, Indonesia. This study got approved by the Rand IFLS to use the data.

RESULT

Demographic Characteristics

There was a total of 8,938 late adults in Indonesia who approved our inclusion and exclusion standards with an almost equal proportion of males and females. Their average age was 48.31 (± 5.83) years old and 87.75% were married, 60.19% stayed in an urban area. (Table 2)

Prevalence of chronic kidney disease

Table 1 showed CVD prevalence among late adults in Indonesia (2.36%, 95% CI: 2.07 – 2.70). And the number of people who have no CVD among late adults in Indonesia was (97.64%, 95% CI: 97.30 – 97.93). (Table 1)

Table 1
Prevalence of Cardiovascular Disease (CVD) among Late Adults in Indonesia (n=8,938)

Characteristics	f	%	95%CI
Cardiovascular Disease (CVD)			
No	8727	97.64	97.30 – 97.93
Yes	211	2.36	2.07 – 2.70

Analyses the associated factors with CVD among late adults in Indonesia

Simple logistic regression was utilized to analyze each factor that was probably significant with CVD. The individual influences that had a p-value ≤ 0.25 were managed into the initial model of the multivariable analysis. The bivariate analyses designated that comorbidities factors including chronic kidney disease, hyper cholesterol, stroke, hypertension, and diabetes or high blood sugar, socio-demographic factors counting age, sex, wedded status, and education; health status factors including; anemia and body mass index (BMI); medicine taken included; taking medicine for hypertension, for diabetes, for cholesterol, traditional medicine; health risk behaviors included; smoking was possibly associated with CVD among late adults in Indonesia (see table 2).

The final model of a multivariable analysis using multiple logistic regression indicated that CKD (adj. OR = 3.04, 95%CI 1.76 – 5.24, $p = <0.001$), hyper cholesterol (adj. OR = 2.77, 95%CI 1.20 – 3.90, $p = <0.001$), stroke (adj. OR = 2.66, 95%CI 1.36 – 5.24, $p = 0.004$), having hypertension (adj. OR = 1.83, 95% 1.35 – 2.49, $p = <0.001$), diabetes or high blood sugar (adj. OR = 1.82, 95%CI 1.17 – 2.86, $p = 0.008$), were significantly associated with CVD amongst late adults. Other significant covariate was age (adj. OR = 1.04, 95%CI 1.01 – 1.06, $p = 0.003$) and sex (adj. OR = 1.43, 95%CI 1.07 – 1.92, $p = 0.015$). (Table 2)

Table 2
Factors Associated with Cardiovascular Disease (CVD) amid Late Adults in Indonesia with using Simple Logistic Regression and Multivariable Analysis using Multi Logistic Regression (n=8,938)

Indicators	Number (%) Mean (\pm SD)	% CVD	COR	95% CI	p	AOR	95% CI	p
Comorbidities								
Chronic Kidney Disease					<0.001			<0.001
No	8,737 (97.75)	2.22	1			1		
Yes	201 (2.25)	8.46	4.07	2.43-6.82		3.04	1.76-5.24	
Hyper cholesterol					<0.001			<0.001
No	8,207 (91.82)	1.86	1			1		
Yes	731 (8.18)	7.93	4.54	3.32-6.20		2.77	1.20-3.90	
Stroke					<0.001			0.004
No	8,852 (99.04)	2.25	1			1		
Yes	86 (0.96)	13.95	7.05	3.77-13.19		2.66	1.36-5.24	
Hypertension					<0.001			<0.001
No	7,253 (81.15)	1.74	1			1		
Yes	1,685 (18.85)	5.04	3.00	2.27-3.98		1.83	1.35-2.49	
Diabetes or High blood sugar					<0.001			0.008
No	8,559 (95.76)	2.14	1			1		
Yes	379 (4.24)	7.39	3.65	2.42-5.11		1.82	1.17-2.86	
Sociodemographic								
Age	48.31 (\pm 5.83)	2.36	1.06	1.04-1.09	<0.001	1.04	1.01-1.06	0.003
Sex					0.001			
Male	4,389 (49.10)	1.80	1			1		0.015
Female	4,549 (50.90)	2.90	1.63	1.23-2.16		1.43	1.07-1.92	
Marital Status					0.096			
Married	7,843 (87.75)	2.26	1			-	-	-
Single	1,095 (12.25)	3.11	1.39	0.96-2.02				
Education					0.120			
Senior High School and higher	5,670 (63.44)	2.17	1					
Junior High School and lower	3,268 (36.56)	2.69	1.25	0.95-1.65				
Residence					0.392			
Rural	3,558 (39.81)	2.19	1					
Urban	5,380 (60.19)	2.47	1.13	0.85-1.50				
Ethnicity					0.551			
Javanese	6,225 (69.65)	2.30	1					
Others	2,713 (30.35)	2.51	1.09	0.82-1.46				
Health Status								
Anemia					0.023			
No	7,253 (81.15)	2.18	1					
Yes	1,685 (18.85)	3.15	1.46	1.06-2.00				
Body Mass Index					0.001			
Overweight and lower	5,131 (57.41)	2.05	1					
Obese	3,807 (42.59)	2.52	1.45	1.11-1.91				
Medicine Taken								
Medicine was taken for hypertension					<0.001			
No	8,541 (95.56)	2.10	1					
Yes	397 (4.44)	8.06	4.10	2.77-6.05				
Medicine was taken for diabetes					0.001			
No	8,764 (98.05)	2.27	1					
Yes	174 (1.95)	6.90	3.19	1.74-5.83				

Indicators	Number (%) Mean (\pm SD)	% CVD	COR	95% CI	p	AOR	95% CI	p
Medicine was taken for cholesterol					<0.001	-	-	-
No	8,767 (98.09)	2.19	1					
Yes	171 (1.91)	11.11	5.58	3.39-9.19				
Traditional Medicine for self-treatment					0.068	-	-	-
No	6,993 (78.24)	2.20	1					
Yes	1945 (21.76)	2.93	1.34	0.99-1.82				
Health Risk Behavior								
Smoking					0.020	-	-	-
No	3,606 (40.34)	1.91	1					
Yes	5,332 (59.66)	2.66	1.40	1.05-1.88				

DISCUSSION

This study found that 2.36% of late adults in Indonesia had CVD. It was different from previous studies among population in Asia country such as Cambodia 1357 (15.4%), Indonesia 981 (11.1%), Laos 806 (9.1%), Malaysia (1023,11.6%), Myanmar 491 (5.6%), Philippines 782 (8.9%), Singapore 891 (10.1%), Thailand 1658 (18.8%), and Vietnam 817 (9.3%) [14]. It might be because the previous study was conducted in a different country with different cultures and behavior.

Chronic kidney disease (CKD): is a chronic illness with a great case, and is often linked with a high load of heart illness [15]. Compared to the general population, patients with chronic disease (CKD) experienced a dramatic escalation in cardiovascular illness and death. That occurrence escalates as CKD develops [16].

CVD and CKD complications are the main causes of death triggered by cardiometabolic risk. CVD and CKD are closely related because damage to one organ can lead to dysfunction of the other, which in turn leads to the failure of the two body parts. Patients with end-stage renal disease (ESRD) have a greater risk of demise from CVD [17]. When the renals are not operated accurately, the hormone system which controls blood pressure has to work firmer to escalate the blood supply to the kidneys. When this condition occurs, the heart has to pump stronger, which could

induce heart illness [18]. However, higher knowledge scores were associated with a reduced risk of CKD improvement [19].

Hyper cholesterol: The previous study stated that escalate cholesterol levels and diminished cholesterol contents in young adults were related to raised and abridged risk of CVD, successively. These results were more intense in males aged >30 years regardless of statin treatment escalated cholesterol contents in their 30s were related to raised risk of CVD (aHR=1.28; 95% CI=1.09-1.51 in the low-high group for Ischemic Heart Disease) and diminished cholesterol contents were associated with decreased risk of CVD (aHR=0.62; 95% CI=0.54-0.72 in the high-low group for IHD) [20].

Stroke: Cardiovascular complications often occur in the early stages of the post-stroke period [21]. Cardiovascular disease (CVD) includes a variety of conditions that affect the heart and blood vessels. The most general and severe types of CVD contain coronary heart disease, heart failure, and stroke [22]. Heatstroke patients had an ominously higher occurrence of CVD development than other heat-related diseases and supervise patients (32.67% vs 23.33% vs 16.67%, p = 0.005) [23].

Hypertension (high blood pressure): This causes hardening and thickening of the walls of the arteries, and narrowing of the arteries will slow down blood flow [24]. The most significant jeopardy factor for

cardiovascular disease (CVD), and the foremost reason for passing away is high blood pressure. Previous studies revealed that stage 2–3 hypertension, SBPs ≥ 160 mm Hg, or DBPs ≥ 90 mm Hg ominously escalate the CVD and broaden-CVD death risk [25].

Diabetes: Having diabetes more possible to evolve heart illness and have a grander possibility of having a heart attack. Over time, the high blood glucose caused by diabetes could decay the blood vessels and nerves that regulate the heart and blood vessels. The extensive people have diabetes, the bigger risk of rising heart illness [26]. High glucose levels and left unrestrained can escalate the risk of heart illness attack. The rationale is, surplus glucose graceful in the blood can impair blood vessels and eventually activate heart attack. The destruction caused, amid others, by the gathering of fat owed to cholesterol or plaque is called atherosclerosis [27–29].

Age: Intuitively, if age is an independent jeopardy factor for emerging CVD, the lifetime risk of CVD for a person will keep on to escalate with age [30]. Age-related longitudinal changes in the structure and function of the heart. There are cellular and molecular mechanisms that explain the alterations in heart composition and function that convoy aging [31]. Prior research found that higher age is an uncontrolled risk (OR for 30-39 years vs. 70-79 years 4.01, 95% CI 1.94–8.31) [32].

Sex: Sex differences can affect cardiovascular disease (CVD). The number of adults diagnosed with fatal heart or coronary attacks heart disease (CHD) escalates with age, with less proxy than women who disappear because of aging. In the middle-aged population, males often experience heart failure at a younger age than females. Thus females are less susceptible to cardiovascular disease during the pre-menopausal life phase [33]. Hypertension is a primary donor to CVD and is the strongest risk factor for heart failure in females [34]. Previous studies have found

that an increased incidence of CVD occurs in postmenopausal females due to a deficiency of estrogen which is a major factor in the development of coronary heart illness in females, and estrogen has an anti-atherosclerotic consequence. Thus, it needs to be done discover the consequence of estrogen replacement therapy on coronary events heart disease in postmenopausal females, which is an efficacious interference measure, but there is possible to escalation the risk of tumors, so applications must be made alert [35].

CONCLUSION

This study obtained a slender prevalence of cardiovascular disease (CVD) in a representative sample of the late adult population in Indonesia. CKD, hyper cholesterol, stroke, having hypertension, and diabetes or high blood sugar were statistically significant with cardiovascular illness. Another significant covariate was age and sex.

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