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Obesity and Hypertension in Postmenopausal Women

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Abstract

Hypertension is a public health problem that has a high prevalence. The increase in prevalence with age, especially in women who have been entering menopause. Obesity is frequent in middle-aged women than men; this is the reason why weight often affects blood pressure. This study objective was to determine the association of obesity with hypertension in postmenopausal women using secondary data analysis: The Baseline Cohort Study of risk factors for non-communicable diseases in Kebon Kalapa, Central Bogor, Bogor City in 2011.The cross-sectional study was used in this study. Prevalence Ratios (PR) hypertension was 1.51 times greater in obesity (95 % CI: 1.12 to 2.04, p value = 0.003). Multivariate analysis used Cox Regression after controlled by confounding variables, they were: age, family income and a history of chronic disease, the prevalence rate of hypertension in obese respondents was 1.38 times higher compared with they who had normal weight (95 % CI is 0.92-2.07). Obesity in postmenopausal women may increase blood pressure, so it needs to be early anticipation by increasing healthy behavior and health education for the community.

Keywords: Hypertension; obesity; postmenopausal; women

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1. Introduction

The prevalence of hypertension in Indonesia is quite high, and the consequences thereof become a public health problem. Hypertension is one of the risk factors that most influence on the incidence of Cardiovascular disease (MoHRI 2008).

Based on a result of Basic Health Research in 2013, it showed that the proportion of women who are obese (BMI> 25 kg/m^2) there was an increase in the amount of 32.9%, while 19.7% of men. Similarly, figures for the rise in the incidence of central obesity proportion reached 26.6%. The prevalence of hypertension is based on interviews tendency of 9.5%, while the prevalence of hypertension based on the measurement was equal to 25.8% (MoH RI 2013).

In the Framingham study, it found that the weight gain of 15% could increase systolic blood pressure by 18% compared to those with average weight. In addition to people who were overweight and 20% were at eight times higher risk more likely to suffer from hypertension (NIH 1998).

Large cross-sectional studies showed an association between body mass index and hypertension in women aged 46 to 59 years. In a prospective population-based study in Finland to 9485 perimenopausal women who did not receive anti-hypertensive therapy by considering the weight at the beginning of the education, weight gain and post-menopausal status were expected to have hypertension after five years of observation (Coylewright 2008). Estrogen had an essential role in increasing blood pressure after the menopause, as a result of decreased estrogen production in the ovaries. They were clinically shown that estrogen could regulate blood pressure responses to stress stimulation.

This study aimed to determine the relationship of obesity with hypertension in post-menopausal women at Kebon Kalapa, District Central Bogor, Bogor City, in 2011.

2. Methods

This study was based on the cross sectional secondary data obtained from Riskesdas. The design of the study was cross-sectional, conducted by comparing groups of postmenopausal women exposed to BMI>23 kg/m^2 with a group of postmenopausal women not exposed by BMI <23 kg/m^2, associated with hypertension based on JNC 7 classification.

2.1. Population and sample

The study population was all postmenopausal women that came from secondary data. The data belonged to an institution of research and health development of Ministry of Health Indonesia was baseline data of a cohort study of risk factors of noncommunicable diseases in 2011. The sample was selected population according to the inclusion criteria, including post-menopausal women and minimum BMI by18.5 kg/m^2 (standard) while the exclusion criteria were the respondents with a BMI of 18.5 <kg/m^2 (underweight) and who had not the blood pressure data.

Samples were available based on a data set provided consisting of of332 people; five samples that had not a blood pressure data thus were excluded in the analysis. There were 16 people with a BMI <18.5 kg/m^2 (underweight), becoming a consideration for

exclusion. Overall samples that met the inclusion criteria that could be analyzed were 311 people.

3. Results

The frequency distribution table of the main variables in respondent was shown in Table 1.

Table 1: Frequency Distribution of Respondents by Main Variables (N=311).

Variables	Categories	Frequency	%
BMI (Body Mass Index)	Overweight (BMI > 23 kg/m^2)	232	74.6
	Normal (BMI < 23 kg/m^2)	79	25.4
	Total	311	100.0
Blood Pressure	Hypertension	163	52.4
	Normal	148	47.6
	Total	311	100.0

Table 1 showed that the WHO categories were based on BMI for an adult population of Asia, showing BMI> 23 kg / m^2 was already included in the group of overweight, the prevalence of obesity was 74.6% and based on the JNC7 hypertension classification, the incidence of hypertension was 52.4%.

Table 2: The Association between Obesity Based on Body Mass Index (BMI) with Hypertension (N=311).

BMI Variables	Hypertension				Total	PR	CI 95%		p-value
	Yes		No				Lower	Upper	
	N	%	N	%					
Overweight	133	57.3	99	42.7	232	1.51	1.12	2.04	0.003
Normal	30	38	49	62	79	*Reff*			

Table 2 showed that the proportion of respondents who were obese (BMI> 23 kg / m^2) were more likely to have hypertension (57.3%) compared with a healthy weight (BMI <23 kg / m^2). The prevalence ratio (PR) of hypertension in those who were obese was1.51 times higher than non-obese, and those relationships were statistically significant.

The association between demographic characteristics of respondents and hypertension given in Table 3 showed an association between demographic characteristics of respondents and hypertension who were statistically significant: The prevalence ratio (PR) of hypertension in those aged> 62 years was 1.40 times higher than those aged <62 years. The prevalence ratio (PR) of hypertension in those with a low family income was 1.28 times higher than that of higher family income. The prevalence ratio (PR) of

hypertension in those with a history of chronic disease was 1.96 times higher than those with no history of chronic disease.

Table 3: Association between demographic characteristics of respondents with hypertension.

Variables	Hypertension				Total	PR	CI 95%		p value
	Yes		No				Lower	Upper	
	N	%	N	%					
Age									
- >62 years	15	71.4	6	28.6	21	1.40	1.04	1.88	0.071
- <62 years	148	51	142	49	290	*Reff*			
Education									
- Primary school	141	53.8	121	46.2	262	1.20	0.86	1.67	0.251
- Advanced	22	44.9	27	55.1	49	*Reff*			
Income									
- Low	98	58.3	70	41.7	168	1.28	1.03	1.60	0.023
- High	65	45.5	78	54.5	143	*Reff*			
Work status									
- No	127	54.5	106	45.5	233	1.18	0.90	1.54	0.201
- Yes	36	46.2	42	53.8	78	*Reff*			
History of Chronic Diseases									
- Yes	90	75	30	25	120	1.96	1.59	2.42	0.000
- No	73	38.2	118	61.8	191	*Reff*			
Hypertension treatment									
- Yes	76	89.4	9	10.6	85	1.39	0.70	2.78	0.349
- No	9	64.3	5	35.7	14	*Reff*			
- *Missing*	78	36.8	134	63.2	212	0.57	0.29	1.14	0.113
Have a spouse									
- No	42	57.5	31	42.5	73	1.13	0.89	1.43	0.316
- Yes	121	50.8	117	49.2	238	*Reff*			

In Table 4, it seemed to have a significant relationship statistically only one variable, prevalence ratio (PR) hypertension that was 1.49 times higher in those with abdominal circumference> 80 cm than < 80 cm. The relationship between risk factors relating to the reproductive system and diet as a risk factor in the results of the analysis had relationships that were not statistically significant.

Multivariate analyzes were performed to obtain the fittest models. Variables included in the initial modeling was qualified as a confounder and aligned substantially with the primary variable. Rate confounder was the final step multivariate analysis and it found no variable confounder, but with consideration of the substance of the few fixed variables, it was included in the model that was the last model to explain the relationship of exposure

Table 4: Relationship between Risk Factors Related to Lifestyle with Hypertension.

Variables	Hypertension				Total	PR	CI 95%		p value
	Yes		No				Lower	Upper	
	N	%	N	%					
Mental status									
- Stress	41	58.6	29	41.4	70	1.16	0.92	1.46	0.241
- No	122	50.6	119	49.4	241	*Reff*			
Abdominal Circumference									
- > 80 cm	121	59	84	41	205	1.49	1.15	1.93	0.001
- < 80 cm	42	39.6	64	60.4	106	*Reff*			
Physical Activity:									
- Low (<600MET)	26	50	26	50	52	0.96	0.63	1.46	0.844
- Moderate (600-1499MET)	17	58.6	12	41.4	29	1.12	0.68	1.87	0.653
- High (>1500MET)	120	52.2	110	47.8	230	*Reff*			
Active Smoker:									
- Yes	36	43.9	46	56.1	82	0.79	0.60	1.04	0.072
- No	127	55.5	102	44.5	229	*Reff*			
Passive Smoker									
- Yes	123	55.7	98	44.3	221	1.07	0.68	1.66	0.782
- No	23	52.3	21	47.7	44	*Reff*			
- *Missing*	17	37	29	63	46	0.71	0.38	1.32	0.278

to significant with hypertension after being controlled by a confounder i.e. age, income and a history of chronic disease. So, the final model of multivariate analysis was table 5.

Table 5: Multivariate Modeling Final Stage.

Variables	PR	95% CI	
		Lower	Upper
Obesity	1.38	0.92	2.07
Age	1.49	0.88	2.54
Income	1.37	1.00	1.88
Chronic diseases history	1.90	1.39	2.60

The above table showed that of all independent variables were suspected to affect the incidence of hypertension in postmenopausal women, which was a history of chronic disease, in which the value of greatest prevalence ratio was 1.90 and statistically significant with a 95% CI: 1.39 to 2.60. It showed that a history of chronic disease (coronary heart disease, stroke and diabetes mellitus) prevalence ratio (PR) of hypertension was 1.9 times higher than patients with no history of chronic disease.

The prevalence of hypertension in the ratio of respondents who were overweight was 1.38 times higher than the respondents who had an average weight, after controlled by age, family income, and chronic disease history but the relationship had not been proven statistically significant (95% CI 0.92 to 2.07).

4. Discussion

In this study had limitation. The data set was available allowing the occurrence of selection bias in determining the incidence of hypertension. For the diagnosis of hypertension, it was only based on the measurement of blood pressure alone. Supposedly diagnosis of hypertension was supported by historical data for the treatment of hypertension, but it could not be done because of a lot of historical evidence for the treatment of hypertension unallocated (missing), as much as 68.2%. So it was difficult to determine whether the respondents were not hypertensive because they were getting treatment-resistant hypertension (misclassification of disease).

Information bias could occur from recall bias. Some data susceptible to bias the information was a question relating to the variables: physical activity, history of passive smoking, history of oral contraceptive use, the age of menarche and information about the 24 hours food recall. Information bias due to memory could be nondifferential since it was assumed as limitations of respondents, the same mind.

Researchers controlled the confounding effect by performing multivariate analysis. Therefore, the results of the final study were already considering the confounding impact on the association of obesity with hypertension in postmenopausal women.

The results showed that the prevalence ratio hypertension was 1.51 times greater in the group of respondents who had a BMI> 23 kg/m^2 compared to BMI<23 kg/m^2 (p-value = 0.003). Once controlled by the potential confounding variables are age, family income and a history of chronic disease, the prevalence of hypertension in the ratio of respondents who were overweight was 1.38 times higher than the respondents who had an average weight with a value that was 95% CI 0.92 - 2.07. The magnitude of this association was relatively small but reliable. In the substance of the variables, what included in the final model were risk factors associated with and could increase the prevalence of hypertension although 95% CI had lower limit close to 1.

Selection bias in determining the diagnosis of hypertension could produce the relatively small size of the association. Determination of hypertension diagnosis carried out by researchers was based only on data available in data sets, blood pressure data, while a history of hypertension treatment was not available. In determining the diagnosis of hypertension, it should be clarified to see whether the respondent took medication or

didnot. Thus, it could be seen on the respondents about who were not hypertensive whether because they were taking antihypertensive medication or not. When determining the diagnosis carried out correctly, it was possible that the association might be higher.

The was consistent with the study on the relationship between BMI and incident hypertension in adult women in rural areas of China with a retrospective cohort study. Observation time of 28 months to 11.468 adult women, it could prove the magnitude of the incidence of hypertension in those with BMI > 25.4 kg/m^2, 1.785 times higher (95% CI 1.584 to 2.012, p trend <0.001) than its lower BMI (as a referent group from 18.5 to 21.1 kg/m^2).

Likewise with similar studies (cross-sectional) conducted in 2012 in Punjab India against women, it showed that a total of 33.9% of the population were overweight or obese, and the prevalence of hypertension was higher in women. The proportion of patients with hypertension was more common in obese postmenopausal women (30.25%), compared to non-obese postmenopausal women (14.8%). BMI was positively and significantly correlated with systolic blood pressure (r = 0.261, p <0.001) and diastolic blood pressure (r = 0.268, p <0.001) in postmenopausal women. But from the chi-square test results, it showed that the results were not significant between groups of postmenopausal women who were obese and non-obese. The was probably because obesity wa not the only factor that affected the occurrence of hypertension.

5. Conclusions

Relations weight based on indicators BMI with hypertension after being controlled by confounding variables, namely income and a history of chronic pain was 1.38 (95% CI 0.92 to 2.07). This study conducted cross-sectional whereas the exposure variable with outcome information was taken at the same time, so that if the obesity preceded hypertension, it could be not known with certainty.

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