

# Correlation Between Body Mass Index and Risk of Obesity with Blood Pressure Women

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**Abstract.** Obesity is one of the epidemic diseases in most developed countries. According to the WHO report states that more than 1.9 billion adults worldwide are overweight and more than 600 million people are obese, corresponding to 39% overweight and 13% obesity rates for the adult population in the world. Obesity has great side effects on health. Obesity is associated with increased mortality, BMI over 30 has a risk of death caused mainly by cardiovascular causes. The purpose of this study: to determine the correlation of BMI with the risk of obesity with Blood pressure women. The results showed that the chi-square test between BMI with the risk of obesity to systolic blood pressure was 0.021 where p value <0.05. Then BMI risk of obesity to systolic blood pressure is 0.021 where p value <0.05, so that means that there is a relationship between BMI risk of obesity with systolic and diastolic blood pressure.

**Keywords:** *body mass index at risk of obesity, obesity, blood pressure*

## I. INTRODUCTION

Obesity is one of the epidemic diseases in most developed countries. According to the WHO report states that more than 1.9 billion adults worldwide are overweight and more than 600 million people are obese, corresponding to 39% overweight and 13% obesity rates for the adult population in the world [1] In the United States, 69% of adults are overweight and 35% are obese. The increase in obesity continues to escalate into a global crisis because many cause serious chronic health conditions, including various forms of breast cancer which also show worse outcomes with obesity. These combined factors drive the 2013 American Medical Association's decision to recognize obesity as a disease. [2] . Obesity has great side effects on health. Obesity is associated with increased mortality, BMI over 30 has a risk of death caused mainly by cardiovascular causes. In addition, other risks are insulin resistance and type 2 diabetes

mellitus, metabolic syndrome, disorders of the reproductive system, cardiovascular disease, pulmonary disease, gallstones (gallstones), bone, joint and skin diseases [3]. Obesity is at risk of dyslipidemia, hyperinsulinemia, coronary artery disease, cardiovascular disease, osteoarthritis, chronic renal failure and several cancers (for example, endometrial, esophageal, kidney cells, pancreatic, ovarian, breast, colon and rectal, thyroid and melanoma), as well as cancer (eg, endometrial, esophageal, kidney cells, pancreatic, ovarian, breast, colon and rectal, thyroid and melanoma). can cause cognitive decline [4]

According to the results of basic health research in 2018 the level of obesity in adults in Indonesia increased to 21.8 percent [5]. This prevalence increased from the results of *Riskesdas* 2013 which states that the obesity rate in Indonesia only reached 14.8 percent. Obesity itself refers to conditions where the body mass index is above 27. Likewise, the prevalence of excess body weight with a body mass index between 25 to 27, also increased from 11.5 percent in 2013 to 13.6 percent in 2018 [6] Like hypertension, obesity is also a risk factor for degenerative diseases such as heart disease, stroke and other vascular diseases. Early detection of obesity is expected for all visits to primary care facilities. The number of visitors to the health center and its network (aged > 15 years) in 2017 was reported to be 14,541,825 people, of which the number of obesity examinations reported was 2,830,756 people or 19.47 percent, consisting of 1,210,498 men ( 17.98 percent) and 1,620,258 women (20.75 percent). From the measurement of obesity obtained by the percentage of obesity by 6.04 percent. the incidence of obesity in women is greater than in men. There are 4 districts / cities that do not report the results of obesity measurements, namely Sukoharjo, Karanganyar, Pati and Jepara. Regency / City with the highest percentage of obesity is Magelang City, which is 100 percent of the obesity checks. Regency / city with the lowest percentage of obesity is Kendal (0.05 percent), and Banyumas Regency is in the sequence 7 (13.6%) [7]

Kembaran Community Health Center is one of the Community Health Centers in Banyumas Regency. The health profile of the twins 2 health center in 2017 states that patients entering the age of more than 15 years with a total of 856 measured body mass index in women and stated that 100% are obese, this makes researchers interested to know the prevalence of obesity in 2018.

**II. METHOD**

This research is included in the explanatory study (explanatory research), namely research conducted to explain the relationship between independent and bound variables through hypothesis testing. While the method used is a sample survey that is research that takes samples from a population using a questionnaire as a primary data collection tool. The approach used is cross sectional where the subject is only observed once and measurements are made on the character or variable of the subject at the time. population is all objects to be studied that have certain characteristics. Population in this study is mothers who measure obesity in the period of 2016 with secondary data, namely 856 samples using purposive sampling method with a minimum sampling calculation, the amount obtained is Determination the size of the sample using the formula of minimum sample size, i.e. [8]

$$n = \frac{Z_{2 \cdot 1-\alpha/2} P(1-P)N}{d^2 (N-1) + Z_{2 \cdot 1-\alpha/2} P (1-P)}$$

Information:

- n = minimum size
- N = Number of population
- Z 1-α / 2 = confidence level (95% = 1.96)
- d = precision (0.05) 95 95% accuracy
- P = target population proportion is 50% or 0.5
- 1-P = 0.5

Obesity sample calculation:

$$n = \frac{1,96^2 \times 0,5 \times (1-0,5) \times 146}{0,05^2 (146-1) + 1,96^2 \times 0,5 \times (1-0,5)}$$

$$n = \frac{0,3625 + 0,9604}{0,0025 + 0,9604} = 105,9$$

= rounded to 106

**III. RESULTS AND DISCUSSION**

**Table 1. Characteristics of respondents**

No	Variabel	f	%
1	Age		
	Late adulthood	71	67
	Early elderly	15	14,2
	Late elderly old man	12	11,3
2	body mass index		
	Risky	27	25,5
	Obesity 1	48	45,3
3	Obesity 2	31	29,2
	Blood pressure		
	Systolic	46	39,3
	Normal	60	51,3
4	Pre hypertension First degree	6	5,1
	hypertension	5	4,3
	2nd degree		
	hypertension	46	39,3
4	Diastolic	60	51,3
	Normal	6	5,1
	Pre hypertension First degree	5	4,3
	hypertension 2nd degree		

Table 1 shows the age category seen in table 1 which is 67% most in late adulthood. Body mass index category is seen in table 4.4, the largest is type 1 obesity, which is 45.3%. While the blood pressure from table 1 shows that 51.3% of respondents experienced pre-hypertensive blood pressure both systolic and diastolic.

**Table 2 correlation of Body Mass Index at Risk with Blood Pressure (Systolic and Diastolic)**

BMI	Blood Pressure				P value
	Normal	Pre Hypertension	Hypertension stage 1	Hypertension stage 2	
Obesity Risk	19	9	1	2	0,021
Obesity 1	21	27	3	1	
Obesity 2	6	24	2	2	

From the cross tabulation table between risky body mass index and blood pressure, it is seen that the highest is Obesity level 1 (26.7%) has hypertension, while 20.4% has Normal blood pressure and 17.4% who have 2nd degree Obesity has prehypertension.

From the p value it can be seen that the value is 0.021, so that the P value  $<0.05$ , which means that  $H_0$  is rejected, so there is an influence between BMI at risk of blood pressure in elderly women. This is in line with research [9] that body mass index is closely related to systolic and diastolic blood pressure in men and women conducted in 3 groups. This is also consistent with Obesity research, this is due to fat can cause blockages in blood vessels so that it can increase blood pressure [10]. This study is in line with research in 22,354 Korean men and physiological disorder that occurs in regulation of blood flow causing hypertension are disorders of the cardiac output and peripheral resistance, interference with rennin-angiotensin system, and disorders of the autonomic nervous system to 31 kg / m<sup>2</sup> [11].

The estimated risk attributable to the Framingham Offspring Study of 2,027 men and 2,267 women aged 20 to 49 years followed for 8 years shows that obesity can cause 78% hypertension in men and 65% hypertension in women. There women, there is a relationship between body mass index and systolic and diastolic blood pressure in the range of body mass index 16 are several factors that cause hypertension, including genetic factors and environmental factors such as obesity, stress, excessive salt intake, smoking, and alcohol.

There is relationship between the onset of hypertension and hypertensive complications. During this long period, a series of changes occur in the cardiovascular system, including the cerebral circulation. Changes such as vascular remodeling, inflammation, oxidative stress and dysfunction baroreflex contribute to the pathogenesis of stroke caused by hypertension.

Changes in body fat for 8 years are associated with changes in systolic and diastolic blood pressure. Very obese women in the fourth decade had a 7-fold increase in hypertension compared to thin women of the same age. The second Nurse Health Study was a prospective cohort study of 83,882 women aged 27 to 44 years with normal blood pressure followed for 14 years to 2005 for the incidence of hypertension. The strongest risk factor for developing hypertension is an increase in body mass index with obese women having an incidence of hypertension 4.7 times higher than women with a body mass index of less than 23.0 kg / m<sup>2</sup>. In this study, 40% of new hypertension cases were associated with being overweight or obese, and

50% of new hypertension cases were associated with a body mass index of 23 kg / m<sup>2</sup> or higher, recommendation for women with obese to implementing a healthy lifestyle with diet and exercise for balance always check the vital sign especially blood pressure. [12]

#### IV. CONCLUSION

Conclusion in this research that age of respondent seen 67 % most in late adulthood, the largest body mass index is obesity type 1 by 45.3 %, Blood pressure 51.3 % of respondent's experience pre hypertensive blood pressure both systolic and diastolic and there is an influence of body mass index at risk of obesity on blood pressure in late adult women.

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