The Relation Of Nutritional Status And Fat Percentage Towards Blood Pressure Women Aged 45-65 Years Old In Posbindu, Klaten, Central Java, Indonesia

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Abstract

Hypertension is a Non-Communicable Disease (NCD) and is included as the ten main death factor in the world. Hypertension is caused by genetics, gender, age, stress, smoking habits, consuming alcohol, unhealthy eating, obesity, and sedentary lifestyle. Obesity is one of the factors causing hypertension because the body increases the distribution of nutrients and oxygen, which causes dilation of wall vessels and affects the increase of blood pressure. Moreover, obesity causes fat buildup in the body and creates plaques, causing blockage of blood vessels. This research is observational research using the cross-sectional approach. The total number of subjects is 75, chosen from multistage sampling with criteria of women aged 45-60 years old, members of posbindu, having systolic blood pressure ≥120, and agreeing to sign informed consent. Relation analysis used *Kolmogorov-Smirnov* testing because the sample is > 50. If the data is normally distributed, it is proceeded to *Pearson* testing, and if the data is not distributed normally, then it is proceeded to *Spearman testing*. Based on the result of *Spearman testing*, there is a significant relation between nutritional status and blood pressure with the result of p = 0,006 (p<0,05). Meanwhile, the result of *Spearman testing* regarding the relation between fat percentage and blood pressure resulted in p = 0.01 (p<0,05). It can be concluded that there is a significant relationship between body fat percentage and blood pressure. Nutritional status and fat percentage have significant relations to blood pressure.

Keywords: Blood Pressure, Fat percentage, Hypertension, Nutritional Status

Introduction

Non-communicable diseases (NCDs) are currently the leading cause of mortality worldwide. According to WHO (2014), Non-Communicable Diseases account for two of the top 10 causes of mortality (WHO, 2019). As a result, the World Health Organization (WHO) created the Package of Essential Interventions for Non-Communicable (PEN) Diseases program in 2010, effective for treating Non-Communicable Diseases in middle- and low-income countries. With the establishment of WHO's PEN program, Indonesia formed Pos Kesehatan Terpadu (Integrated Health Unit), widely known as Posbindu, in response to said program. Posbindu NCD's primary objectives are healthy, at-risk groups and persons with NCDs over 15. According to the literature, the bulk of Posbindu visitors are women over the age of 50 (Widyaningsih *et al.*, 2022).

Posbindu is an Indonesian Ministry of Health initiative that conducts NCD screening and preventive activities. Diabetes mellitus, hypertension or blood vessels, heart disease, acute obstructive pulmonary disease, and cancer are the integrated Non-Communicable Diseases that the Posbindu program focuses on. Early identification was accomplished through blood pressure, blood sugar, and body mass index measurements, risk behavior interviews, and imparting knowledge on healthy living behavior (Kemenkes, 2019). According to Basic Health Research (RISKESDAS) 2013, the prevalence of NCDs such as hypertension, stroke, diabetes mellitus, and joint disease continues to rise, and these occurrences are expected to rise further (Kesehatan, 2013). Following that, based on statistics from the 2016 National Health Indicator Survey (Sirkesnas), hypertension has risen to 30.9% (Kemenkes RI, 2016). This indicates that one-third of Indonesians are diagnosed with hypertension, but two-thirds are not. Meanwhile, someone with hypertension may not have any symptoms and may be unaware that they have hypertension.

Numerous risk factors, including genetics, gender, age, stress, smoking, alcohol consumption, bad eating habits, obesity, and a sedentary lifestyle, can contribute to hypertension. Meanwhile, age is an unchangeable risk factor for hypertension. A person above the age of 50 is at risk of acquiring hypertension (Zekewos *et al.*, 2019). Aging is a risk factor for hypertension that cannot be addressed because as you become older, changes in the blood vessels occur, resulting in a decrease in the flexibility of the blood vessels (Safitri, 2020). Meanwhile, if a person is overweight at a pre-elderly age, the likelihood of developing hypertension increases. This is because the more weight a person has, the more blood will be utilized to transfer nutrients and oxygen throughout the body, resulting in higher blood volume, dilatation of blood vessel walls, and increased blood pressure. (Farahdini 2020) Obesity and overweight are directly

related to the excessive amount and kind of food consumed. If the results of the Body Mass Index classed as nutritional status is 25.0, one is considered overweight or obese (Fajar, 2019). Excess body fat has a significant impact on the occurrence of hypertension. According to said notion, this is caused by the buildup of fat in the blood vessels, which causes plaque development and blockages in the blood vessels. Based on this theory, the researchers sought to investigate the efficacy of administering plantains to hypertension patients' blood pressure.

Methods

Field Overview

Klaten is a district in the province of Central Java. Klaten Regency is between 7032'19" South Latitude and 7048'33" South Latitude, and 110026'14" East Latitude and 110047'51" East Latitude. The Regency's administrative boundaries are as follows :

North : Boyolali;
East : Sukoharjo;
South : Gunungkidul (DI Yogyakarta); and
West : Sleman (DI Yogyakarta).

Klaten covers 70,152.02 hectares or 2.15% of the total land area of Central Java Province (3,254,412 ha). Klaten consists of 26 sub-districts, namely: Prambanan, Gantiwarno, Wedi, Bayat, Cawas, Trucuk, Kalikotes, Kebonarum, Jogonalan, Manisrenggo, Karangnongko, Ngawen, Ceper, Pedan, Karangdowo, Juwiring, Wonosari, Delanggu, Polanharjo, Karanganom. , Tulung, Jatinom, Kemalang, South Klaten, Central Klaten and North Klaten (BAPPEDA KLATEN, 2021).

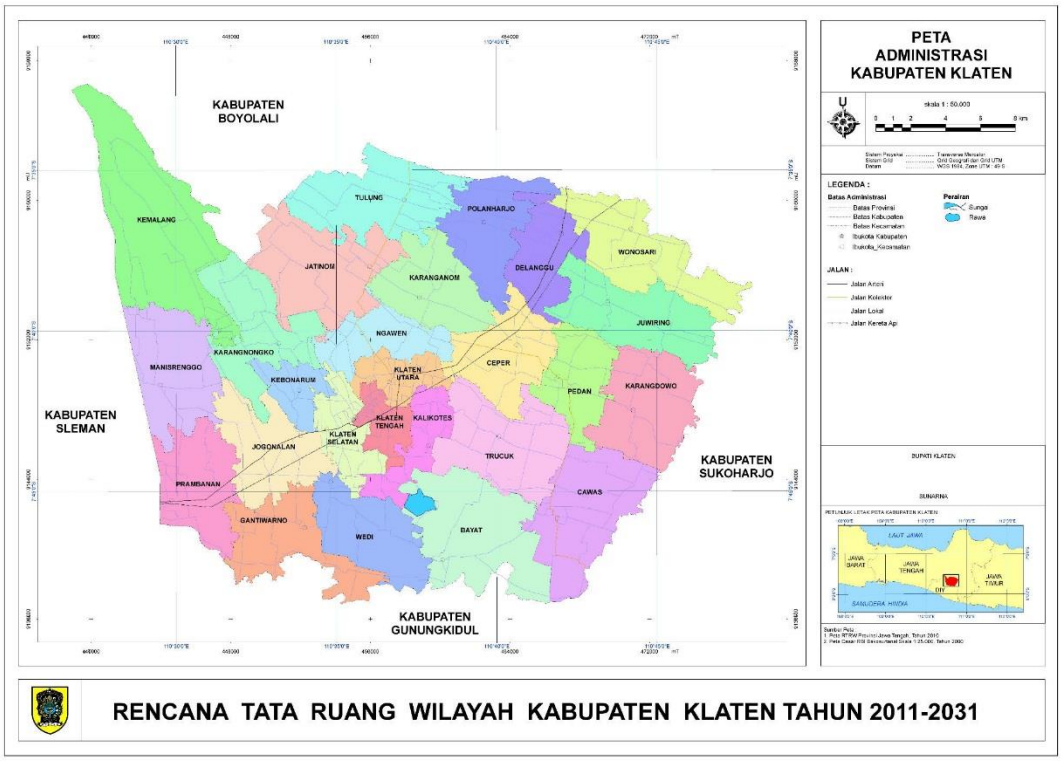

Figure 1. Sampling location

Research's Design

This research is an observational study that employs a cross-sectional approach. This study was carried out in Klaten in July 2023, utilizing three health centers, namely Juwiring Health Center, Bayat Health Center, and Wedi Health Center. The total number of subjects in this study is 75. Subjects were withdrawn using *multistage sampling*, with the requirements being that they were *Posbindu* members, the gender is female, had a systolic blood pressure of ≥120, and were prepared to sign informed consent.

Data Analysis

Based on the BMI guidelines for Asia Pacific, nutritional status was divided into three categories: underweight (BMI < 25% results and overweight/obese with ≥ 25 results. According to JNC VII, blood pressure is categorized as usual when the systolic pressure is ≤120 mmHg, prehypertension when the systolic pressure is >120 mmHg, and hypertension when the systolic pressure is >140 mmHg. For data analysis, SPSS version 26 was employed. The features of the subjects were analyzed by descriptive analysis (averages and percentages). Because the sample size was more than 50, bivariate analysis was employed to establish the link between the dependent and independent variables using the *Kolmogorov-Smirnov* test. The Pearson test should be performed if the data are typically distributed —if they are not, the Spearman test should be performed instead.

Results and Discussions

Table 1. Illustrates the characteristics of respondents. The gender in this study was 75 people female. This is because the research criteria state that the research sample is female. The age category in this study was 75 samples aged 45-65 years old. This is also because the research criteria state that the research sample is 45-65 years old. Most of the professions in this research sample are housewives and farmers. The number of research samples with the profession of housewives was 27, farmers were 23, businesswomen were 13, private employees were 7, and government employees were 5.

Table 1. Characteristic of Respondent

Gender	Total	Age	Total	Proffesion	Total
Female	75	< 45	0	Housewife	27
Male	0	45-65	75	Farmer	23
		>65	0	Government employees	5
				Private employees	7
				Business	13
Total	**75**	**Total**	**75**	**Total**	**75**

Table 2. Illustrates the distribution based on nutritional status, percentage of body fat, and blood pressure level. According to the findings, there were 6.7% of respondents who were underweight, 20.0% who were average weight, and 73.3% who were obese. According to the distribution of respondents based on body fat percentage, 75 were overweight/obese. Meanwhile, looking at the findings of systolic blood pressure, it was discovered that 40% of respondents had normal blood pressure, 33.3% of respondents had prehypertension, and 26.7% of respondents had hypertension.

Table 2. Respondents Distribution Based on Nutritional Status, Percentage of Body Fat and Blood Pressure

Variable Nutritional Status	Frequency	%	Variable Precentage of Body Fat	Frequency	%	Variable Blood Pressure Level	Frequency	%
Underweight	5	6,7	Obese	75	100,0	Normal	30	40,0
Normal	15	20,0				Prehypertension	25	33,3
Obese	55	73,3				Hypertension	20	26,7
Total	**75**	100,0	**Total**	**75**	100,0	**Total**	**75**	100,0

Table 3. Illustrates the findings of the *Kolmogorov-Smirnov test* analysis because the study sample had more than 50 respondents. The *Kolmogorov Smirnov test* analysis shows that the three research variables have not a normal distribution, with p = 0,059 (asymp. Sig. 2 sided) ≥ 0,05 for nutritional status, p = 0,075 for percent body fat, and p = 0,080 for blood pressure.

Tabel 3. Test of Normality with *Kolmogorov-Smirnov Test* Analysis

Variable	Kolmogorov-Smirnov
	Statistic
Nutritional Status	0.059
Prencentage of Body Fat	0.075
Blood Pressure	0.080

Table 4. Exhibits the *Spearman test* analysis findings since the *Kolmogorov-Smirnov test* results reveal that each variable is not normally distributed. The *Spearman test* study of the correlation between nutritional status and blood pressure produced a p = 0,006 (p<0,05), indicating that the nutritional status variable is significantly linked to the blood pressure variable. The *Spearman test* study of the correlation between the percentage of body fat and blood pressure likewise revealed a significant link with a p = 0.01 (p<0,05).

Table 4. The Correlation Between Nutritional Status and percentage of Body Fat on Blood Pressure Level

Test	Variable	p	Blood pressure
Spearman's rho	Nutritional Status	p	0.006
	Prencentage of Body Fat	p	0.010

The nutritional well-being of the individuals in this study was dominated by those who were categorized as overweight/obese. The Asia Pacific BMI categorization standards were used to assess nutritional status in this study. If the subject has a BMI of ≥23, he or she meets the overweight criterion, and if the subject has a BMI of ≥25, the subject meets the obesity criteria. The high proportion of overweight/obesity in this study might be attributed to several risk factors, one of which was the employment of female individuals aged 45-65 years. Women are more prone to obesity than men because they have higher fat stores than males, resulting in a slower metabolism. Fewer muscles in women contribute to slow metabolism because muscles burn more fat in cells, which causes a woman's body to prefer to store more food as fat (Lubis *et al*., 2020).

According to the *Spearman test*, there is a substantial correlation between nutritional status and blood pressure, with a p = 0,006 (p<0,05) for the link between the two variables. According to Merdianti *et al.* (2019) study, persons with excessive nutritional status had blood pressure that falls into the high normal range. This incidence occurred due to obesity and high dietary status, which raised cardiac arterial pressure and, in turn, increased sympathetic nerve activity, which raised blood pressure. The findings of this study are also corroborated by Mantuges *et al.* (2018) research showing nutritional status has a link with blood pressure because excess nutritional status has a tight connection with blood fat levels. Increased nutritional status raises blood fat levels and creates deposits on the lining of blood vessel walls. When these deposits accumulate, the blood arteries constrict. Blood flow to the heart is reduced by narrowed blood arteries, resulting in elevated blood pressure (Beck, 2011).

However, other studies report different things, that nutritional status has no relationship with the incidence of hypertension. This is because high nutritional status figures cannot describe the overall proportions of the body. High nutritional status or excess body weight can mean large muscle mass and no measurable fat mass (Yoeniske *et al*., 2019).

The findings of this study reflect the percentage of body fat in the research participants; it was discovered that all 75 research individuals had an excess body fat percentage. Body fat percentage is measured using a categorization derived from Fauziyah and Afiani (2020) research, which states that women with a body fat percentage of ≥25% are classified as having extra body fat or being overweight. Obese body fat is a body fat proportion of ≥30% (Mukiwanti & Muwakhidah, 2017). Because this study was done on female individuals, the body fat percentage in all subjects was excessive. Women have 10% more subcutaneous fat in the belly and gluteofemoral than males. Furthermore, women retain more fat because they are impacted by a hormone called estrogen, which increases obesity or fat accumulation. Women over 45 will lose 30 to 50 percent of their muscular mass, which will be replaced by body fat, delaying the body's metabolic processes and the accumulation of calories and fat in the body (Sri, 2015).

According to the *Spearman test*, the relation between the body fat percentage and blood pressure is p = 0.01 (p<0,05), indicating a significant relationship. Fat in the body influences blood pressure because fat creates proteins and hormones such as angiotensinogen, adipokines, inflammatory agents, and cortisol, particularly in the intra-abdominal region. *Adiponectin* is a protein that is released by adipose tissue and induces atherogenesis. Adiponectin's role is to prevent leukocytes from adhering to the endothelium and to limit the effect of TNF- α in expressing adhesion molecules on the endothelium, hence slowing the onset of atherogenesis. Adiponectin levels fall in those who are overweight, making atherosclerosis more likely. *Atherosclerosis* is a disorder in which the blood vessels in the artery walls enlarge and stiffen due to fatty lesions in the artery walls. Blood pressure rises when the flexibility of the artery walls declines, making it difficult for blood to flow to the heart (Khairana Sari *et al*., 2016; Herinasari *et al*., 2022).

However, other studies report different things, that percent body fat has no relationship with the incidence of hypertension. This is likely due to the accumulation of body fat in the subcutaneous area, not in the abdominal or

visceral areas. Apart from that, high blood pressure can also be caused by other things, such as lifestyle and sleep quality (Herinasari *et al*., 2022).

Conclusions

With a p = 0.006 (p<0,05), nutritional status shows a significant relation with blood pressure level. With a p = 0.01 (p<0,05), body fat content is significantly linked to blood pressure. People are required to regulate their weight, restrict their fat and sodium intake, increase their fiber intake, and attend Posbindu regularly in order to enhance their health, particularly those suffering from prehypertension and hypertension. Researchers intend to conduct further studies on risk factors that may induce hypertension in the future.

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