ANALYSIS OF THE INFLUENCE OF OBESITY RISK FACTORS ON THE INCIDENCE OF HYPERTENSION IN ADULTS AT THE KREJENGAN SUB-DISTRICT HEALTH CENTER, PROBOLINGGO DISTRICT

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Abstract. Hypertension is defined as an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg, measured twice at 5-minute intervals in a resting/quiet state. Obesity is defined as excessive fat accumulation that can interfere with health. According to research conducted by Sapitri in 2016 shows that people with obesity (BMI > 25) are at risk of suffering from hypertension by 6.47 times compared to people who are not obese. This type of research is an analytical type of research using quantitative methods with purposive sampling techniques. The population in this study amounted to 354 adults aged 45-54 years who had been diagnosed with hypertension by a doctor at the Krejengan Probolinggo District Health Center. This study was conducted on adults at the Krejengan Probolinggo District Health Center using a questionnaire and observation of antopometry, blood pressure. From the results of the bivariate test analysis, the results showed that there was an influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan Probolinggo District Health Center. It is expected from the results of this study, adults who experience hypertension and obesity to maintain a healthy lifestyle by eating regularly balanced with taking medication regularly, adequate physical activity and good stress management.

Keywords : Risk factors, obesity, hypertension, adults

1 INTRODUCTION

Hypertension is defined as an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg, measured twice with an interval of 5 minutes in a resting/quiet state. Obesity is defined as excessive fat accumulation that can impair health. According to research conducted by Sapitri in 2016, it shows that people with obesity (BMI > 25) are 6.47 times more likely to suffer from hypertension than people who are not obese (Herdiani et al., 2021; Antza et al., 2018). One of the factors influencing obesity is a lifestyle that includes diet and activity patterns. A bad lifestyle can result in hypertension complications such as stroke, diabetes and even death. Therefore, hypertension is usually also called the silent killer (Probolinggo District Health Service, 2021). An estimated 1.28 billion adults aged 30-79 years worldwide suffer from hypertension, 46% of adults with hypertension are not aware that they have the condition (WHO, 2021).

Based on Basic Health Research, the prevalence of hypertension in Indonesia is 34.1% and hypertension sufferers diagnosed by doctors in East Java are 36.3% with the age group 45-54 years being 17.98% (Riskesdas, 2018). In Probolinggo Regency, in 2020 the estimated number of people suffering from hypertension was 282,854 with

26,633 people receiving services or only 9.4% (East Java Provincial Health Service, 2021). Meanwhile at the Krejengan District Health Center in 2020 the number of hypertension sufferers in the 45-54 year age group reached 354 people or around 6.03% of 2,137 people and the number of obese people with a BMI ≥ 25 reached 317 people or around 13% of the 4,183 people examined (Krejengan Community Health Center, 2021).

Currently, society has begun to experience a shift in modern lifestyle which leads to fast food and preserved foods which we know contain a lot of salt, and a lack of consumption of fruit and vegetables, apart from that, most people also lack regular physical activity and also because of the stress factors and the tendency for physical activity to decrease due to the effects of government policies to reduce the incidence of Covid-19 with lockdowns during the current Covid-19 pandemic. Lifestyle changes, such as changes in diet, which result in ready-to-eat dishes that are high in fat, protein and salt, but low in dietary fiber, are one of the factors in the development of degenerative diseases such as hypertension. The development of hypertension is influenced by many factors, one of which is obesity. People with less physical activity and less controlled appetite result in excessive energy consumption resulting in increased appetite which ultimately results in weight gain and can lead to obesity. If a person's weight increases, the blood volume will also increase, so that the burden on the heart to pump blood also increases, causing hypertension (Herdiani et al., 2021; Cheung et al., 2017; Cuspidi et al., 2018).

Efforts to control hypertension can be made by maintaining body weight, increasing physical activity such as exercising, swimming, cycling, reducing salt consumption, having a high fiber diet, consuming fruit and vegetables and living a healthy life (Alvita, 2018; Colantonia et al., 2017). Based on this background, researchers want to conduct research on the analysis of the influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo Regency. The general aim of this research is to analyze the influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo Regency, while the specific aim of this study is to identify the incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo Regency, to identify the incidence of obesity in adults in Krejengan District Health Center, Probolinggo Regency, Analyzing the influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo Regency.

2 METHOD

In this research, it is a type of analytical research using quantitative methods which emphasizes theory testing through measuring research variables with numbers and analyzing data using statistical procedures. This research uses a correlative design, where the research aims to determine whether there is an association between variables that allows the nature of the relationship to be causal (Ngatno, 2015). Researchers want to know the analysis of the influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo Regency. Data

collection techniques in this study were respondents diagnosed with hypertension who came to the Krejengan District Health Center, anthropometric observations including body height and weight to determine the respondent's BMI, measuring the respondent's blood pressure to determine the respondent's blood pressure, then the respondent was asked to fill out a questionnaire, before the respondent asked to fill out a questionnaire sheet, the researcher explained informed consent and the researcher explained in advance how to fill it out. The data processing technique in this research uses 2 analyses, namely, univariate analysis which is carried out to describe the frequency distribution of research subjects and proportion distribution, both for independent variables, dependent variables as well as descriptions of respondent characteristics and bivariate analysis which is carried out to find out the relationship between the independent and dependent variables which were analyzed using the Chi-Square statistical test and using SPSS for windows with a significance level of $a = 0.05$.

3 RESEARCH RESULT

Univariate analysis

Client Characteristics.

Table 1. Frequency Distribution of Client Characteristics at the Krejengan District Health Center, Probolinggo Based on General Data, July 2023.

No.	Characteristics	Category	Amount	Percentage (%)
1.	Age (Years)	45	15	8
		46	15	8
		47	14	7,4
		48	21	11.2
		49	17	9
		50	14	7,4
		51	19	10.1
		52	19	10.1
		53	35	18,6
		54	19	10, 1
	Total		**188**	**100**
2.	Gender	Man	38	20,2
		Woman	149	79.3
	Total		**188**	**100**
3.	Education	Didn't go to school /didn't finish elementary school	10	5,3
		SD	79	42
		Junior High School	39	20,7
		Senior High School	43	22.9
		College	17	9
	Total		**188**	**100**
4.	Work	Civil servants/ retired	4	2.1
		Employee Private	22	11.7
		Managing the Household	8	4.3
		Trader	13	6,9

		Not Working	94	50
		Other	47	25
	Total		**188**	**100**
5.	Genetics	Yes	95	50.5
		No	93	49, 5
	Total		**188**	**100**

Source: Primary data 2023

General characteristics of clients who are at the Krejengan Probolinggo District Health Center, a small proportion of them are 53 years old, 35 people (18.6%), then almost all of them are female, 149 people (79.3%), almost half of them graduated from elementary school, 79 people (42%) , most of them have genetic hypertension 95 people (50.5%) and half of them do not work 94 people (50%). Complete data can be seen in Table 1.

Univariate Analysis

Frequency Distribution of Hypertension Events in Adults at the Krejengan District Health Center, Probolinggo.

Table 2. Frequency Distribution of Hypertension in Adults at the Krejengan District Health Center, Probolinggo, July 2023.

No.	Hypertension	Frequency	Percentage (%)
1.	Uncontrolled	160	85.1
2.	Controlled	28	14,9
	Total	**188**	**100**

Source: Primary data 2023

Almost all of the 160 people (85.1%) had uncontrolled hypertension in adults at the Krejengan Probolinggo District Public Health Center had hypertension, and a small proportion of 28 people (14.9%) had controlled hypertension. Complete data can be seen in Table 2.

Frequency Distribution of Obesity Incidents in Adults at the Krejengan District Health Center, Probolinggo

Table 3. Frequency Distribution of Obesity Incidents in Hypertensive Adults at the Krejengan District Health Center, Probolinggo, July 2023.

No.	BMI	Frequency	Percentage (%)
1.	Obesity	159	84.6
2.	Not Obese	29	15,4
	Total	**188**	**100**

Source: Primary data 2023

The distribution of the frequency of occurrence of obesity in adults at the Krejengan Probolinggo District Health Center, almost all of them were obese, 159 peo-

ple (84.6%), and a small proportion were not obese, 29 people (15.4%). Complete data can be seen in Table 3.

Bivariate analysis

Bivariate analysis was carried out to determine the relationship between the independent and dependent variables which were analyzed using the Chi-Square statistical test and using SPSS for windows with a significance level of a = 0.05. Following are the results of bivariate analysis :

Table 4. Distribution of the analysis of the influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo Regency, July 2023.

No.	Incident Obesity	Hypertension events				Total		P-Value
		Not controlled		Controlled				
		F	%	F	%	F	%	0.00
1.	Obesity	149	93.7	10	6.3	159	100	
2.	Not Obese	11	37,9	18	62,1	29	100	
	Total	160	85,1	28	14,9	188	100	

Source: Primary data 2023

Based on Table 4, it is known that 149 respondents (93.7%) had obesity and uncontrolled hypertension, 11 respondents (37.9%) were not obese and had uncontrolled hypertension. Meanwhile, there were 10 respondents with obesity and controlled hypertension (6.3%), 18 respondents (62.1%) who were not obese and controlled hypertension. The results of the bivariate test analysis showed that there was an influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan Probolinggo District Health Center with a P-value of 0.00 and found an expectation value of <5, so H_0 was rejected and H_1 was accepted, meaning that there is an influence of obesity risk factors on the incidence of hypertension in the Krejengan District Health Center, Probolinggo.

4 DISCUSSION

The incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo Regency

Based on the results of research conducted on adults at the Krejengan Probolinggo District Health Center using questionnaires, anthropometric observations and blood pressure observations from 188 respondents, it was found that a small proportion aged 53 years, 35 people (18.6%) had hypertension. Various studies have shown the influence of several causal factors on the incidence of hypertension, one of which is age. According to the theory cited by Akbar, et al (2020), hypertension occurs because changes in the elasticity of the aortic wall decrease, heart valves thicken and become stiff, the heart's ability to pump blood decreases, so that its contractions and volume also decrease. The results of this study are in line with research conducted by Febrianti and

Mustakim (2019) which shows that the age factor has an influence on causing hypertension (Akbar et al., 2020; Febrianti & Mustakim, 2019).

From the data obtained by researchers, a small proportion of adults with hypertension are aged 53 years where increasing age causes physiological changes in the body such as thickening of the arterial walls due to the buildup of collagen in the muscle layer, so that starting at the age of 45 years the blood vessels will experience narrowing. and become stiff. The aging process is at risk for hypertension due to stiffness in the aorta, increased afterload which requires more power to pump blood from the vertical and increased vascular pressure. Based on the results of the description above, it is hoped that all adults will increase activities such as sports, always pay attention to a healthy lifestyle by adopting a regular diet, taking medication regularly, having a high-salt diet, reducing smoking habits and so on, in order to prevent hypertension in the elderly (Nuraini, 2015; Sari et al., 2019).

Based on the results of the study, almost all respondents, 149 people (79.3%), female and 38 people (20.2%), male, experienced hypertension. Men have the same prevalence of hypertension as women. However, women have the hormone estrogen which changes in quantity according to the woman's age naturally, which generally begins to occur in women aged 45-55 years Nuraini, (2015). According to the theory from Novitaningtyas (2014) cited by Akbar et al., (2020) Women who have not yet reached menopause are protected by the hormone estrogen which plays a role in increasing High Density Lipoprotein (HDL) levels. Low levels of HDL cholesterol and high LDL cholesterol (low-density lipoprotein) influence the development of atherosclerosis and cause high blood pressure. The results of this study are in line with research conducted by Kusumawaty, et al (2016) which said that gender is closely related to the incidence of hypertension where women are at higher risk of experiencing hypertension because during menopause women experience a decrease in the hormone estrogen which protects blood vessels from damage. From the data obtained by researchers, the majority of respondents are female, where in the age range of 45-54 years, women begin menopause and experience a decrease in the production of the hormone estrogen which plays a very important role in protecting blood vessels so that, if it is not followed by a good lifestyle, then The impact that will occur when HDL is low and Low Density Lipoprotein (LDL) is high, which causes atherosclerosis and high blood pressure (Ozkan et al., 2018). Based on the results of the description above, it is hoped that women aged from 45 years will organize a better healthy lifestyle to prevent atherosclerosis which causes high blood pressure (Nuraini, 2015; Kenny et al., 2017).

The results of this research analysis showed that half of the 95 respondents (50.3%) had hypertension because they had hypertension from their previous family, and almost half of the 93 respondents (49.5%) did not have hypertension from their previous family. According to the theory of Yunis Tri, et al (2012) quoted by Nuraini (2015), the existence of genetic factors in certain families will cause that family to be at risk of suffering from hypertension. This is associated with increased intracellular sodium levels and a low ratio of potassium to sodium. Individuals whose parents have high blood pressure have twice the risk of developing high blood pressure compared to those who do not have a family history of high blood pressure Bell et al., 2015; Echouffo-Tcheugui et al., 2019). In addition, 70-80% of essential hypertension cases are found

with a family history of hypertension. This is in line with the results of research by Sari, et al (2019) which states that genetic factors also largely influence the occurrence of hypertension, where most parents, grandparents and siblings of the respondent are also at risk of developing hypertension. If one of our parents has a history of hypertension then throughout our life we have a 25% chance of getting it too and if both of our parents have a history of hypertension then we are most likely to get hypertension 60%.

From the data obtained by the researchers, most of the respondents had hypertension from previous families. This occurred when an individual was born to two healthy individuals carrying the damaged gene, but it can also occur when the damaged gene is the dominant gene. However, every genetic disorder does not always appear in the family tree, in other conditions the disorder only appears after there is a trigger factor. Based on the results of the description above, it is recommended to always improve and maintain a healthy lifestyle, especially by increasing physical activity by exercising so that cell regeneration takes place properly and taking medication regularly to reduce the incidence of hypertension (Nuraini, 2015; Sari et al., 2019; Stefan et al., 2018).

The incidence of obesity in adults at the Krejengan District Health Center, Probolinggo Regency

Based on the results of this study, almost all adults in the Krejengan Probolinggo sub-district were obese, 159 people (84.6%), and a small proportion were not obese, 29 people (15.4%). Obesity can cause hypertension either directly or indirectly from various mechanisms. Obesity can directly cause an increase in cardiac output. This is because the greater the body mass, the greater the amount of circulating blood and this causes cardiac output to increase (Tiara, 2020; Kotsis et al., 2018). The results of this study are in line with the results of Herdiani et al. (2021) which stated that there was a relationship between obesity and the incidence of hypertension in adults with a p-value of 0.009 and an OR of 6.7. So, obese elderly have a risk of suffering from hypertension by 6.7 times greater than adults who are not obese. From the data obtained by researchers, obesity is the most common cause of hypertension. Obesity occurs due to many trigger factors. If one of the parents is obese, then the chance increases to 40-50%. And if both parents suffer from obesity, the chance of heredity is 70–80%, irregular meal schedules, not breakfast, snacking and not balanced with sufficient physical activity so that the energy expended is not optimal, thus increasing the risk of obesity. From the description above, it is expected to regulate a healthy lifestyle by eating regularly, and balanced with physical activity and taking medication regularly so that the energy expended is maximized in order to reduce the risk of obesity (Herdiani et al., 2021; Tiara et al., 2020).

The Effect of Obesity Risk Factors on Hypertension in Adults at the Krejengan District Health Center, Probolinggo Regency.

Based on the results of research conducted on adults at the Krejengan Probolinggo District Health Center using questionnaires and anthropometric observations, blood pressure showed that almost all adults were obese with uncon-

trolled hypertension 149 people (93.7%), almost half of adults were not obese with 11 people (37.9%) had uncontrolled hypertension, a small proportion of obese adults and 10 people (6.3%) controlled hypertension, most of the adults were not obese and 18 people (62.1%) controlled hypertension.

Based on the results of the chi square test, it shows that the P-Value is 0.000 <0.05, meaning that there is an influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan District Health Center, Probolinggo. According to the theory of Sheeps (2005) quoted by Tiara (2020), obesity can lead to hypertension from various mechanisms, namely directly or indirectly. Obesity can directly cause an increase in cardiac output (Natsis et al., 2020). This is because the greater the body mass, the greater the amount of circulating blood and this causes cardiac output to increase. Meanwhile, indirectly, obesity stimulates the activity of the sympathetic nervous system and the renin-angiotensin-aldosterone system (RAAS) through mediators such as cytokines, hormones, and adipokines. Aldosterone is a hormone that is closely related to water and sodium retention, which can increase blood volume (Seravalle & Grassi, 2017). People who are obese or overweight need more blood to provide food and oxygen to the body's tissues. This increases the volume of blood circulating through the blood vessels, increases the work of the heart and this causes blood pressure to also increase. This is in line with research conducted by Rohkuswara and Syarif, (2017) which showed that obesity has a relationship with the incidence of hypertension with obesity having a risk of 1.681 times for suffering from hypertension compared to those who are not obese after controlling for age variables, family history of hypertension and physical activity. Based on the results of the description above, in someone with an obese BMI, blood flow in the body will increase to provide oxygen and nutrient supply throughout the body. This causes the volume of blood circulating in the blood vessels to increase, so that blood pressure will also increase. It is recommended for all adults to maintain a healthy lifestyle by eating regularly balanced by taking medication regularly, sufficient physical activity and good stress management (Tiara, 2020; Rohkuswara & Syarif., 2017).

5 CONCLUSION

Based on the results of research on adults at the Krejengan Probolinggo District Health Center, it can be concluded that the results of adults in the Krejengan Probolinggo District Health Center who experience hypertension are a small proportion aged 53 years, adults in the Krejengan Probolinggo District Health Center who experience hypertension are almost entirely female, adults in Most of the Krejengan Probolinggo District Health Centers have hypertension from previous families. The results of the bivariate test analysis showed that there was an influence of obesity risk factors on the incidence of hypertension in adults at the Krejengan Probolinggo District Health Center with a P-value of 0.00 and found an expectation value <5, so that H_0 is rejected and H_1 is accepted, meaning that there is an influence of obesity risk factors on the incidence of hypertension at the Krejengan District Health Center, Probolinggo. For further researchers, it is hoped that this research can be used as a reference for further research regarding the influence of obesity factors on hypertension, it is hoped that it

can also add other variables such as coffee drinking habits, stress levels, smoking habits, and so on.

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