

## **FACTORS ASSOCIATED WITH HYPERTENSION AND OBESITY AND THEIR IMPACT ON THE OCCURRENCE OF DIABETES MELLITUS IN BANJARMASIN HOSPITAL**

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### **ABSTRACT**

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Hyperglycemia, a metabolic disorder characterized by deficient insulin production, decreased insulin function, or both, is a defining feature of diabetes mellitus. Age, gender, nationality, ethnicity, heredity, history of delivering babies weighing over 4000 grams at birth, history of gestational diabetes, obesity, inactivity, hypertension, stress, diet, pancreatic diseases (pancreatitis, neoplasms, cystic fibrosis), and alcohol consumption are risk factors associated with the development of diabetes mellitus. Diabetes mellitus is a prevalent health concern throughout the globe, particularly in Indonesia and specifically at the Internal Medicine Polyclinic at Banjarmasin Hospital. Conducting research on the relationship between characteristic factors, obesity, hypertension, and the prevalence of diabetes mellitus is of utmost importance. The aim of this research is to determine the relationship between the prevalence of diabetes mellitus among outpatients at the Internal Medicine Polyclinic, Banjarmasin Hospital, and certain characteristics, such as obesity and hypertension. Methodology of Research: This work is characterized by its explanatory research aspect. The research was conducted in the Internal Medicine Polyclinic of Banjarmasin Hospital using a cross-sectional survey approach, which included conducting face-to-face interviews with patients and collecting data on blood pressure, weight, height, and laboratory test results. The study's population consisted of all outpatients in the Internal Medicine Polyclinic at the Banjarmasin Hospital starting in October 2022. The sample consisted of 69 people. A quota sampling approach is used as long as individuals consent to participate in the sampling procedure. The Chi Square test findings revealed a lack of statistically significant link between the occurrence of diabetes mellitus and gender, hypertension and the occurrence of diabetes mellitus, as well as fat and the occurrence of diabetes mellitus. There is a notable correlation between the occurrence of diabetes mellitus and age ( $p$  value  $< 0.05$ ), but there is no significant correlation between gender ( $p$  value  $> 0.05$ ). Overall, no substantial link has been shown between the occurrence of diabetes mellitus and factors such as gender, age, hypertension, and obesity. Nevertheless, a significant association has been shown between age and the occurrence of the condition.

Keywords : Family Support, Hypertension, Hypertension Management

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### **INTRODUCTION**

Diabetes mellitus refers to a collection of metabolic disorders marked by high blood sugar levels due to either insufficient insulin production, ineffective insulin function, or a combination of both. This metabolic disorder is characterized by its chronic nature and its potential to produce enduring harm, particularly in the form of damage to vital organs such as the eyes, kidneys, nerves, heart, and blood vessels. The numbers are 1 and 2. Diabetes mellitus is categorized into four distinct types: type 1 diabetes mellitus, type 2 diabetes mellitus,

gestational diabetes, and other forms of diabetes. The numbers 2 and 3. The risk variables linked to the development of diabetes include age<sup>1,4,5</sup>, gender<sup>6</sup>, nationality, and ethnicity.<sup>1,4</sup>, genetic inheritance<sup>1,2,7</sup>, maternal history of delivering infants with birth weight over 4000 grams<sup>4, 8</sup>, gestational diabetes history. The numbers 4, 5, and 8 are related to the topic of obesity. The numbers 2, 5, and 9 represent a lack of physical activity. The numbers 4, 5, and 6 are associated with the medical condition known as hypertension. The factors contributing to the development of pancreatic disorders include the

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numbers 4, 8, and 10, as well as stress, poor diet, pancreatitis, neoplasms, cystic fibrosis, and alcohol use.<sup>11</sup> After reaching the age of 40 years, humans undergo a physiological deterioration. As one ages, the likelihood of developing diabetes mellitus, particularly beyond the age of 45 (considered a high-risk group), increases. The numbers 1, 4, and 5 are given. Research conducted in the United States indicates a higher prevalence of diabetes mellitus in women compared to males. Hypertension, or high blood pressure, is an unmodifiable risk factor for diabetes mellitus. Hypertension, a condition characterized by high blood pressure, may lead to insulin resistance, which is the primary cause of elevated blood glucose levels. Consequently, individuals with hypertension are at a greater risk of developing diabetes mellitus. Obesity carries a chance of developing diabetes mellitus. The numbers are 2, 5, and 9. Diabetes mellitus is a prevalent health issue globally, including in Indonesia. According to statistics from the World Health Organization (WHO), the global prevalence of diabetes mellitus is estimated to be between 30-40%. Indonesia ranks fourth globally in terms of the number of individuals affected by diabetes mellitus, behind India, China, and the United States. The prevalence of this condition among the overall population is 8.6%. According to the Riskesdas 2007 statistics, the occurrence rate of diabetes mellitus in Indonesia, as determined by health professionals or based on symptoms, is 1.1%. DKI Jakarta had the greatest frequency at 2.6%, whilst Central Java had a prevalence of 1.3%. The numbers 7, 9, and 12 are given. According to a study completed by researchers, the number of patients who received outpatient care in the Internal Medicine Polyclinic at Banjarmasin Hospital in May 2011 was 1859. There were 450 individuals (24.2%) diagnosed with diabetes mellitus. According to this description, the prevalence of diabetes mellitus is significant both globally and in Indonesia, including the Internal Medicine Polyclinic at Banjarmasin Hospital. Therefore, it is essential to undertake research on the correlation between characteristic characteristics, hypertension, and obesity with the occurrence of diabetes mellitus in outpatients at the Internal Medicine Clinic, Banjarmasin Hospital. The objective of this research was to establish the correlation between characteristic variables, namely hypertension

and obesity, and the occurrence of diabetes mellitus in outpatients at the Internal Medicine Clinic at Banjarmasin Hospital. This research is expected to provide scientific insights into the correlation between characteristic factors, hypertension, obesity, and the occurrence of diabetes mellitus. The findings can serve as informative material for the public to take preventive measures against diabetes mellitus.

## **METHODS**

The study was carried out in the Internal Medicine Polyclinic of Banjarmasin Hospital from October 2011 till its conclusion. The research methodology used is explanatory research. The survey technique used included direct interviews with patients, as well as measurements of blood pressure, weight, height, and laboratory exams. This strategy followed a cross-sectional design. Thirteen The population of interest for this research consisted of all outpatient individuals who sought medical care in the Internal Medicine Polyclinic at Banjarmasin Hospital, beginning in October 2011. The sample size for this study was determined to be 69 individuals based on calculations using the formula. The inclusion criteria for the study were new outpatients at the Internal Medicine Polyclinic at Banjarmasin Hospital starting from October 2011, who refused to undergo examination and were therefore eligible to be included in the sample. Fourteen The sample approach used is quota sampling, with the prerequisite that individuals be willing to participate as responders. The research examined characteristic parameters (age, gender), hypertension, and obesity as independent variables. The dependent variable is the occurrence rate of diabetes mellitus. The gathered data consists of primary data acquired via interviews, measurements of blood pressure, weight, height, and laboratory testing. The materials and tools utilized in this research encompass a mercury tensimeter (specifically, a mercurial sphygmomanometer brand), a stethoscope, a weighing device, a height meter, a blood glucose meter (specifically, a Nesco brand glucose meter), a piercing device (also known as a lancing device), test strips, cotton, 70% alcohol, an awl (commonly referred to as a Lancet), a calculator, and stationery. The analysis employed univariate analysis to examine the characteristics of the respondents

based on the variables studied, using a frequency distribution table. Additionally, bivariate analysis was conducted to investigate the relationship between the independent variables and the dependent variable. The analytical approach employs the Chi Square statistical test. Computer aids are used throughout the whole process of data processing and analysis.

## RESULTS AND DISCUSSION

### Univariate analysis

#### Characteristics of Respondents

##### Age

The study's participants had an average age of 53.55, ranging from 18 to 74 years. The age variable was categorized into two groups: low risk (< 45 years) and high risk ( $\geq$  45 years) for diabetes mellitus. The frequency distribution of age among the participants is presented in table 1.

Table 1. Age Frequency Distribution of Respondents

Age	Frequency	Percentage (%)
Low risk (<45 years)	14	20,3
High risk ( $\geq$ 45 years)	55	79.7
<b>Amount</b>	69	100.0

The frequency distribution analysis of age in this study revealed that the majority of the respondents, specifically 55 individuals (79.7%), were classified as having a high risk ( $\geq$  45 years) of developing diabetes mellitus.

##### Gender

The gender breakdown of the respondents is shown in table 2 below. Table 2 presents a frequency distribution of the gender of the respondents.

Gender	Frequency	Percentage (%)
Man	28	40,6
Woman	41	59,4
<b>Amount</b>	69	100.0

The frequency distribution based on the gender of the respondents in this study indicated that

there were more female respondents than male respondents, namely 41 respondents (59.4%).

### Hypertension

Hypertension, often known as high blood pressure, is a medical disease characterized by a Systolic Blood Pressure (TDS) of 140 mmHg or higher, or a Diastolic Blood Pressure (TDD) of 90 mmHg or higher. The blood pressure was assessed by using a mercury sphygmomanometer and stethoscope on two occasions, and subsequently, the mean result was documented. Blood pressure measures were conducted for participants between the hours of 09:00 and 12:00 WIB.

Hypertension, as defined by JNC-7, is categorized into four groups: Normal blood pressure (TDS < 120 mmHg and TDD < 80 mmHg), Prehypertension (TDS 120-139 mmHg or TDD 80-89 mmHg), stage 1 hypertension (TDS 140-159 mmHg or TDD 90-99 mmHg), and stage 2 hypertension (TDS  $\geq$  160 mmHg or BP  $\geq$  100 mmHg). The numbers 15 and 16. In this research, the blood pressure categories were condensed into two groups: hypertension and non-hypertension. Hypertension is defined as having a TDS (systolic blood pressure) of 140 mmHg or higher, or a BP (diastolic blood pressure) of 90 mmHg or higher. Conversely, if the TDS is less than 140 mmHg or the BP is less than 90 mmHg, it is not considered hypertension. The table below shows the frequency distribution of respondents' hypertension.

Table 3 Frequency Distribution of Respondents' Hypertension

Hypertension	Frequency	Percentage (%)
Hypertension	31	44.9
Not hypertension	38	55,1
<b>Amount</b>	69	100.0

The frequency distribution based on the incidence of hypertension in respondents in this study indicated that there were 38 respondents (55.1%) who did not suffer from hypertension.

## Obesity

Obesity is a medical condition characterized by an individual with a body mass index (BMI) equal to or more than 25 kg/m<sup>2</sup>, as classified by the Asia Pacific criteria. Seventeen, eighteen.

Participants' body weight was assessed using a weighing scale for two measures. After each instrument was used to measure the weight of five participants, the measurement of the tool was conducted, while the height was assessed using a height meter.

The BMI (Body Mass Index) classification based on Asia Pacific standards is as follows: individuals with a BMI less than 18.5 are classed as underweight, those with a BMI between 18.5 and 22.9 are categorized as normal, those with a BMI equal to or greater than 23.0 are classified as overweight, those with a BMI between 25.0 and 29.9 are classified as obesity 1, and individuals with a BMI equal to or more than 30.0 are classified as obesity 2. The number is 19. In this research, the BMI category was dichotomized into obese and non-obese. An individual is classified as obese if their Body Mass Index (BMI) is equal to or more than 25.0, and not obese if their BMI is less than 25.0. The number is 19.

The table below displays the frequency distribution of respondents' obesity rates, as shown in Table 4.

Table 4 Respondents' Obesity Frequency Distribution

Obesity	Frequency	Percentage (%)
Obesity	38	55,1
Not Obese	31	44,9
<b>Amount</b>	69	100.0

The frequency distribution of obesity incidence among the respondents of this research revealed that the number of obese respondents exceeded the number of non-obese respondents, namely 38 respondents (55.1%).

## Diabetes mellitus

Diabetes mellitus is a collection of metabolic disorders marked by high levels of glucose in the blood due to either a deficiency in insulin production, a malfunction in insulin function, or a combination of both. This metabolic condition is characterized by its chronic nature and its

potential to cause persistent harm, particularly to the eyes, kidneys, nerves, heart, and blood vessels. It may also lead to unexplained weight loss and abnormal blood sugar test results. Blood glucose level assessments were conducted between  $\pm$  09:00 – 12:00 WIB for the participants. Diabetes mellitus is diagnosed when the blood sugar level is equal to or more than 200 mg/dL, and it is not diagnosed as diabetes mellitus when the blood sugar level is less than 200 mg/dL.

The frequency distribution of diabetes mellitus among the respondents is shown in table 5 below.

Table 5 Frequency Distribution of Respondents Diabetes Mellitus

Diabetes Mellitus	Frequency	Percentage (%)
Diabetes mellitus	20	29.0
Not diabetes mellitus	49	71.0
<b>Amount</b>	69	100.0

The frequency distribution in this research indicates that the number of respondents suffering from diabetes mellitus is fewer than those who do not have the condition. Specifically, there are 20 respondents (29.0%) who have diabetes mellitus.

## Bivariate Analysis

### The correlation between age and the prevalence of diabetic mellitus

The analysis revealed that among the 14 respondents under the age of 45 who had a low risk, none of them had diabetes mellitus. On the other hand, out of the 55 respondents aged 45 or older who had a high risk, 20 of them (36.4%) had diabetes mellitus.

The association between age and the occurrence of diabetes mellitus was examined using the Chi Square test, as shown in table 6 below.

Table 6. The Relationship Between Age and the Incidence of Diabetes Mellitus

Age	Incidence of Diabetes Mellitus						<i>P</i>
	No DMs		DM		Total		
	n	%	n	%	n	%	
Low Risk (<45 years)	1	10	0	0	1	10	0.00
	4	0			4	0	
High risk (≥ 45 years)			2	36,			
	3	63,	0	4	5	10	
	5	6			5	0	
Amount	4	71.	2	29.	6	10	
	9	0	0	0	9	0	

The results of the statistical test obtained a value of  $p = 0.007$  ( $p < 0.05$ ) meaning that there is a significant relationship between age and the incidence of diabetes mellitus.

### The Correlation Between Gender and the Occurrence of Diabetes Mellitus

The relationship between gender and the incidence of diabetes mellitus was carried out through the Chi Square test as shown in table 7 below.

Table 7 Relationship Between Gender and Diabetes Mellitus

Gender	Incidence of Diabetes Mellitus						P
	No DMs		DM		Total		
	n	%	n	%	n	%	
Man woman	2	81.	5	17,	2	10	0.15 7
	3	1	1	9	8	0	
	2	63	5	36,	4	10	
	6	4		6	1	0	
Amount	4	71.	2	29.	6	10	
	9	0	0	0	9	0	

The results of the analysis of the relationship between gender and the incidence of diabetes mellitus were obtained from 28 respondents with the type

There were 5 male respondents (17.9%) who had diabetes mellitus, and of the 41 female respondents, 15 respondents (36.6%) had diabetes mellitus.

The statistical test results obtained  $p$  value = 0.157 ( $p > 0.05$ ) meaning that there was no significant relationship between gender and the incidence diabetes mellitus.

### Relationship Between Hypertension and Incidence Diabetes Mellitus

Connection between hypertension with incident diabetes mellitus done by test Chi Square like Which listed in table 8 under This.

Table 8 The relationship between hypertension and the incidence of diabetes mellitus

Gender	Incidence of Diabetes Mellitus						P
	No DMs		DM		Total		
	n	%	n	%	n	%	
Not Hypertension	2	73,	1	26,	3	10	0.784
	8	7	0	3	8	0	
Hypertension	2	67,	1	32,	3	10	
	1	7	0	3	1	0	
Amount	4	71.	2	29.	6	10	
	9	0	0	0	9	0	

Results analysis obtained relationship between hypertension with incident diabetes mellitus obtained that from 38 respondent Which No suffer hypertension There is 10 respondent (26,3 %) Which experience incident diabetes mellitus, And of the 31 respondents who suffered from hypertension there were 10 respondent (32,3 %) Which experience incident diabetes mellitus. Statistical test results obtained  $p$  value = 0.784 ( $p > 0.05$ ) It means No There is connection Which meaning between hypertension with incident diabetes mellitus.

### Relationship Between Obesity and Diabetes Mellitus

Relationship between obesity and incidence Diabetes mellitus is done through the *Chi Square test* like Which listed in table 9 under This.

Table 9 Relationship Between Obesity and Diabetes Mellitus

Gender	Incidence of Diabetes Mellitus						P
	No DMs		DM		Total		
	n	%	n	%	n	%	
Not obese	2	80.	6	194	3	10	0.18
	5	6			1	0	

obesity			1	36,		
	2	63,	4	8	3	10
	4	2			8	0
Amoun	4	71.	2	29.	6	10
t	9	0	0	0	9	0

Results analysis connection between obesity with the incidence of diabetes mellitus obtained that of 31 respondents who were not obese there were 6 respondents (19.4%) who experienced the incident diabetes mellitus, And from 38 respondent Which experiencing obesity there are 14 respondents (36.8%) who experience incident diabetes mellitus.

Statistical test results obtained *p value* : 0.185 (*p.s* > 0.05) It means No There is connection Which significant relationship between obesity and diabetes mellitus.

## DISCUSSION

Diabetes mellitus is a collection of metabolic illnesses marked by elevated blood sugar levels. This condition is brought on by disruptions in insulin production, insulin activity, or both. illness metabolism This is ongoing and may lead to long-term harm, including impairment of the body's organs' ability to operate, including the heart, kidneys, eyes, nerves, and blood vessels. 2, 4, 8

Diabetes mellitus may be brought on by a number of risk factors, such as: factor That Is Not Modifiable includes: age factor, particularly if you're above 45 1,4,5, kind of sex, particularly in women6. National and Ethnic 1,4, descendants of factors 1, 2, 7, and history give birth to a child weighing more over 4,000 grams at birth. 4.8 history of gestational diabetes 4,5,8, although variables that are modifiable include obesity2, 5, 9, physical activity that is less4,5,6 hypertension4, 8, 10, stress1, eating pattern 1, pancreatitis, neoplasm, cystic fibrosis, 8) and alcohol.11

The correlation between diabetes mellitus incidence and age among outpatients at the Disease Polyclinic At Home Ill Banjarmasin discovered a substantial correlation between age and the occurrence of diabetes mellitus. The study's findings support the hypothesis that around the age of forty, a man's physiology begins to degrade. Diabetes mellitus often develops in older, more susceptible people. The chance of developing diabetes mellitus increases with age, particularly in those over 45 (higher

risk group). 1,4,5 Outcomes The findings of a 2007 study by Riskesdas, which showed that the prevalence of diabetes mellitus tends to rise with age but then decline beyond age 65, are supported by the current investigation. Diabetes mellitus prevalence increases with age: 2.7% in the 45–54 age range, 3.7% in the 55–64 age range, 3.4% in the 65–74 age range, and 3.2% in the 75+ age range (12).

Results on the connection between gender and diabetes mellitus occurrences among outpatients at Poly Banjarmasin Hospital Internal Medicine No, there is a substantial correlation between type sex and diabetes mellitus. The research findings are not consistent with the idea that states that women are more likely than men to develop diabetes mellitus (in the United States). It is still unclear how type sex and incidence diabetes mellitus are related.Six Study findings This is consistent with findings from a 2007 study carried out in Indonesia by Riskesdas, which showed that the prevalence of diabetes mellitus was the same regardless of a person's sex. Study findings Riskesdas found that the prevalence of diabetes mellitus for both type 2 diabetes in women and men was the same, at 1.1%.12

Results were obtained from a correlation between hypertension and incidence diabetes mellitus in outpatients at the Poly Banjarmasin Hospital Internal Medicine. No, there is a strong correlation between incident diabetes mellitus and hypertension. Study findings This contradicts the widely held belief that hypertension is a long-term (chronic) condition that increases the risk of stroke, heart disease, renal dysfunction, visual problems, insulin resistance, and diabetes mellitus. Though it is well known that resistance insulin is the primary cause of the blood glucose increase rate, the exact mechanism linking resistance insulin to hypertension is still unclear. 4,8,10 Poly Banjarmasin Hospital Internal Medicine found data about the association between obesity and incidence diabetes mellitus in outpatients. No Obesity and the incidence of diabetes mellitus are significantly correlated. The findings of this research contradict the widely held belief that obesity is a risk factor for insulin resistance. The body becomes less able to use insulin when body fat increases, particularly when extra weight or body fat gathers in the abdominal or central areas of the body (central obesity). Blood

glucose levels may rise when fat blocks the action of insulin, preventing glucose from entering cells and building up in blood vessels. Obesity is a risk factor for type 2 diabetes, of which 80–90% of patients are obese. 2, 5, 9

Study's shortcomings This among other things: Measurements of blood pressure and blood glucose are taken while the responder is between the hours of 9:00 and 12:00 WIB. Subject Matter This may have an impact on the measurement outcomes since blood pressure and glucose levels might fluctuate over time. So, measurements should be made at O'clock to minimize bias. It has a range time of  $\pm 1$  o'clock and is the same or maximum.

## CONCLUSION

Among the conclusions drawn from this study are the following: the average age of respondents is 53.55, with the lowest age being 18 years and the highest age being 74 years; the majority of respondents are women, accounting for 41 respondents (59.4%); the number of respondents who suffer from hypertension is 38 (55.1%); the number of respondents who suffer from obesity is 38 (55.1%); the number of respondents who have diabetes mellitus is 20 (29.0%); and there is a significant correlation between age and the occurrence of diabetes mellitus. No There is a noteworthy correlation between the occurrence of diabetes mellitus and type of sex. The incidence of diabetes mellitus and hypertension are significantly correlated, however there is no significant correlation between obesity and occurrence diabetes mellitus on patient treatment roads at Internal Medicine Poly Hospital Banjarmasin.

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