

# Factors Contributing to the Incidence of Hypertension in the Work Area of the Bara Baraya Public Health Center Makassar City

Factores que contribuyen a la incidencia de hipertensión en el área de trabajo del centro de salud pública Bara Baraya de la ciudad de Makassar

Hartina S<sup>1\*</sup>, Arsin A<sup>2</sup>, Nasry Noor N<sup>3</sup>, Amiruddin R<sup>4</sup>, Ibrahim E<sup>5</sup>, Suriah<sup>6</sup>

## SUMMARY

**Background:** Hypertension is a non-communicable disease leading to major public health problems worldwide and continuing to increase every year. Hypertension is often known as “the silent killer” because it does not usually cause symptoms on its own, yet it slowly damages the blood vessels and in the long term, becomes a risk factor for cardiovascular disease. This study aims to determine associated risk factors of hypertension among people of productive age in the working area of the Bara Baraya Public Health Center, Makassar City, Indonesia. **Methods:** It was used an analytic observational research method with a case-control study design. The sample was

140 patients, 70 hypertensive patients, and 70 control in their reproductive age. The sampling technique was carried out by using exhaustive sampling for the case group while the control group was matched with the case group based on age group. The data were analyzed using the odds ratio test for bivariate analysis and the multiple logistic regression test for multivariate analysis. **Result:** The results showed that gender (OR= 2.96; 95 % CI=1.39-6.36), family history (OR=3.63; 95 % CI=1.68-7.93), and smoking habits (OR= 3.08; 95 % CI=1.45-6.55) are risk factors that trigger the incidence of hypertension during working age, while drinking alcohol (OR= 1.93; 95 % CI=0.80-4.79) and obesity (OR= 0.55; 95 % CI=0.24-1.26) are non-statistically significant risk factors. **Conclusion:** The study indicates that gender, family history, and smoking habits are risk factors for the incidence of hypertension of productive age in the working area of the Baraya Public Health Center Makassar City. It is recommended to control blood pressure regularly and adopt a healthy lifestyle.

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ORCID: 0009-0004-4325-2758<sup>1</sup>

ORCID: 0000-0003-3311-6686<sup>2</sup>

ORCID: 0000-0002-0235-4211<sup>4</sup>

ORCID: 0000-0002-1810-5279<sup>3</sup>

ORCID: 0000-0002-2239-0017<sup>6</sup>

<sup>1</sup>Graduate Program, Department of Epidemiology, Faculty of Public Health, Hasanuddin University, Indonesia.

<sup>2,3,4</sup>Departement of Epidemiology, Faculty of Public Health, Hasanuddin University, Indonesia.

<sup>5</sup>Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Indonesia.

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**Keywords:** Hypertension, gender, biography, smoking habits, drinking habits, obesity.

<sup>6</sup>Department of Health Promotion and Behavioral Sciences, Faculty of Public Health, Hasanuddin University, Indonesia.

\*Corresponding author: Sri Hartina

Graduate Program, Departement of Epidemiology, Faculty of Public Health, Hasanuddin University, Indonesia

Corresponding author: Sri Hartina. E-mail: [srihartina7676@gmail.com](mailto:srihartina7676@gmail.com)

## RESUMEN

**Antecedentes:** La hipertensión arterial es una enfermedad no transmisible que constituye un importante problema de salud pública a nivel mundial y continúa aumentando cada año. La hipertensión a menudo se conoce como “el asesino silencioso” porque generalmente no causa síntomas por sí sola, pero daña lentamente los vasos sanguíneos y, a largo plazo, se convierte en un factor de riesgo de enfermedad cardiovascular. Este estudio tiene como objetivo determinar los factores de riesgo asociados a la hipertensión entre personas en edad productiva en el área de trabajo del Centro de Salud Pública Bara Baraya, ciudad de Makassar, Indonesia. **Métodos:** Los empleó un método de investigación analítico observacional con un diseño de estudio de casos y controles. La muestra fue de 140 pacientes, 70 hipertensos y 70 controles en edad reproductiva. La técnica de muestreo se llevó a cabo utilizando un muestreo exhaustivo para el grupo de casos mientras que el grupo de control se emparejó con el grupo de casos en función del grupo de edad. Los datos se analizaron mediante la prueba de razón de probabilidades para el análisis bivariado y la prueba de regresión logística múltiple para el análisis multivariado. **Resultado:** Los resultados mostraron que el sexo ( $OR= 2,96$ ;  $IC\ 95\ \%=1,39-6,36$ ), los antecedentes familiares ( $OR=3,63$ ;  $IC\ 95\ \%=1,68-7,93$ ) y el hábito tabáquico ( $OR= 3,08$ ;  $IC\ 95\ \%=1,45-6,55$ ) son factores de riesgo que desencadenan la incidencia de hipertensión en edad laboral, mientras que el consumo de alcohol ( $OR= 1,93$ ;  $IC\ 95\ \%=0,80-4,79$ ) y la obesidad ( $OR= 0,55$ ;  $IC\ 95\ \%=0,24-1,26$ ) son factores de riesgo no significativos estadísticamente. **Conclusión:** El estudio indica que el género, los antecedentes familiares y los hábitos tabáquicos son factores de riesgo para la incidencia de hipertensión en edad productiva en el área de trabajo del Centro de Salud Pública Baraya de la ciudad de Makassar. Se recomienda controlar la presión arterial regularmente y adoptar un estilo de vida saludable.

**Palabras clave:** Hipertensión, género, biografía, hábitos de tabaquismo, hábitos de bebida, obesidad.

## INTRODUCTION

Hypertension is one of the leading causes of global disease burden and is widely recognized as the most common cardiovascular disorder. It is also positively correlated to the risk of strokes, coronary heart disease, kidney failure,

and premature death worldwide. The prevalence of hypertension is increasing globally, and it is predicted to be increased to 30 % in 2025 (1).

Hypertension is a major health problem that is quite dangerous throughout the world. Globally, an estimated 22 % of the world's population has hypertension. The prevalence of hypertension is the highest in the African region, with about 27 %, and the lowest in America (18 %), while Southeast Asia is in the 3<sup>rd</sup> highest position with a prevalence of hypertension of 25 % (2).

Based on data in Indonesia, obtained from the latest Basic Health Research in 2018, the incidence of hypertension reached 34.11 %. This number of phenomena has increased quite significantly when compared to the data obtained from the previous Basic Health Research report in 2013 (3).

In general, the incidence of hypertension is greatest among older adults, however, it turns out that the prevalence of hypertension is found in the productive age group which tends to increase from year to year. People of working age are prone to be diagnosed with hypertension because of their busy life and lifestyle that pay little attention to health. Under these conditions, is required to find out the causes of hypertension early in the productive age which will provide appropriate and fast solutions and interventions in preventing hypertension and its late complications (4).

Based on data obtained from the health profile of South Sulawesi Province in 2016, the prevalence of hypertension in South Sulawesi was 21.90 %, then in 2018 the prevalence of hypertension decreased to 14.14 %, while in 2019 based on data from the health profile of South Sulawesi, the prevalence increased drastically to 25.06 % (5).

To control the incidence of hypertension, early detection is needed by identifying risk factors for hypertension. The exact causes of hypertension are not known, but several things may play a role. These risk factors are divided into major and minor factors. Major factors mean some of the risk factors for hypertension that cannot be controlled while minor factors are risk factors that can still be controlled. Gender is considered a major factor because it is a risk factor that cannot be controlled (6).

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Based on the background, this study aimed to determine the risk factors for the incidence of hypertension among productive ages based on gender, family history, smoking habits, alcohol drinking habits, and obesity in the working area of the Bara Baraya Public Health Center, Makassar City.

### METHODS

This study employed a case-control study design and fell under the category of analytic observational research, meaning a study comparing case groups (people who suffer from hypertension) and a control group (people who do not suffer from hypertension). This research was carried out in the working area of the Baraya Health Center, Makassar City (7).

The population in this study were those suffering from hypertension  $\leq 6$  months and of productive age 20-64 years. The sample of this study was 140 peoples, 70 hypertensive patients and 70 control in their reproductive age. The sampling technique was carried out by exhaustive sampling in the case group while the control

group was matched with the case group based on their age group. Data collection techniques included interviews to collect data obtained from respondents (8).

The data were analyzed using the STATA version 14 program to make it easier to describe and interpret the processed data so that the meaning of the research results was obtained. The data were analyzed using an odds ratio test for bivariate analysis and a multiple logistic regression test for multivariate analysis (9).

This research was conducted after obtaining written consent from each respondent. This research was approved by the Hasanuddin University Health Research Ethics Committee with ethical approval recommendation number 1457/UN4.14.1./TP.01.02/2023.

### RESULTS

Respondents' characteristics in this study include gender, age, and education. The distribution of the respondent's characteristics can be seen in Table 1.

Table 1. Data Distribution based on Respondents' Characteristics in the Work Area of the Bara Baraya Health Center, Makassar City

Respondents' Characteristics	Hypertension				Total	
	n	Case %	n	Control %	n	%
Gender						
Male	50	71.4	32	45.7	82	58.6
Female	20	28.6	38	54.3	58	41.4
Age (Year)						
20-28	3	4.3	9	12.9	12	8.6
29-37	10	14.3	11	15.7	21	15.0
38-46	23	32.9	16	22.9	39	27.9
47-55	15	21.4	21	30.0	36	25.7
56-64	19	27.1	13	18.6	32	22.9
Education						
No Schooling	0	0.0	5	7.1	5	3.6
Graduate from primary education	6	8.6	10	14.3	16	11.4
Graduate from lower secondary education	16	22.9	14	20.0	30	21.4
Graduate from secondary education	20	28.6	16	22.9	36	25.7
Graduate from tertiary education	28	40.0	25	35.7	53	37.9

Source: Primary Data, 2023.

Table 1 shows that there were 82 men (58.6%) and 58 women (41.4 %), while in the age group, the highest proportion was 38-46 years (27.9 %), and based on the education level of the respondents, most of them graduated from tertiary education, namely 53 people (37.9 %) and the least among the respondents who did not go to school were 5 people (3.6 %).

Table 2 shows that in the gender variable, there were 50 men (71.4 %) with hypertension in the case group, while, in the control group, hypertension mostly occurred in women as many as 38 people (54.3 %). It can be concluded that male respondents have a 2.96 times greater risk of suffering from hypertension at productive age compared to female respondents.

Table 2. Distribution of the Risk Independent Variable for Hypertension in Productive Age in the Bara Baraya Public Health Center, Makassar City in 2023.

Research Variables	Hypertension Case Group		Control Group		P	Total	
	n	%	n	%		OR	CI 95 %
Gender							
Male	50	71.4	32	45.7	0.002	2.96	1.39-6.36
Female	20	28.6	38	54.3			
Family History							
High Risk	52	74.3	31	44.3	0.0001	3.63	1.68-7.93
Low Risk	18	25.7	39	55.7			
Smoking Habit							
High Risk	48	68.6	29	41.4	0.001	3.08	1.45-6.55
Low Risk	22	31.4	41	58.6			
Drinking Habit							
High Risk	20	28.6	12	17.1	0.107	1.93	0.80-4.79
Low Risk	50	71.4	58	82.9			
Obesity							

The family history variable in the case group was mostly at high-risk hypertension because almost 75 % of respondents (52 respondents or 74.3 %) had a family history of hypertension, and some of the respondents in the control group were at low risk because they did not have a family history of hypertension, as many as 39 people (55.7 %). It means that respondents with a family history of hypertension have a 3.63 times greater risk of suffering from hypertension compared to respondents who do not have a family history of hypertension.

The smoking habit variable in the case group was mostly at high risk, as many as 48 people (68.6 %), and most of the control group respondents were at low risk, as many as 41 people (58.6 %). So smoking habits are 3.08 times more likely to suffer from hypertension at

productive age compared to respondents who do not have smoking habits.

The variable of alcohol drinking habits in the case group is mostly at low risk of 50 people (71.4 %) as well in the control group, most of them are at low risk of 58 people (82.9), therefore, respondents with drinking habits are at risk of 1.93 times more likely to suffer Hypertension compared to respondents who do not have the habit of consuming alcohol but this risk is not significant.

The last variable is obesity which in the case group is mostly low risk as many as 55 people (78.6 %) and the control group is mostly low risk as many as 47 people (67.1). It can be concluded that respondents with obesity are at risk 0.55 times greater to suffer from hypertension compared to

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respondents who are not obese, but this risk is not significant.

Table 3 shows the results of the multivariate test and it appears that the variable family history

with (OR=3.76; 95 % CI=1.82-7.77) became the greatest risk for the incidence of hypertension in productive age.

Table 3. Multivariate Analysis Result of Risk Factors for Hypertension in Productive Age in the Bara Baraya Public Health Center, Makassar City in 2023

Research Variables	Model 1		Model 2		Model 3	
	P	OR (CI 95 %)	P	OR (CI 95 %)	P	OR (CI 95 %)
Gender	0.640	1.39 (0.34-5.58)				
Family history	0.026	2.93 (1.13-7.56)	0.001	3.53 (1.69-7.36)	0.0001	3.76 (1.82-7.77)
Smoking habits	0.980	1.01 (0.23-4.35)				
Drinking habits	0.147	2.08 (0.77-5.64)	0.072	2.36 (0.92-6.06)		
Obesity	0.044	0.39 (0.16-0.97)	0.024	0.38 (0.15-0.92)	0.100	0.51 (0.23-1.13)

Source: Primary Data, 2023.

### DISCUSSION

Gender is a risk factor for uncontrolled hypertension, where men have a higher incidence of hypertension compared to women because men have higher systolic and diastolic blood pressure than women. In general, systolic blood pressure in women is lower than in men (10).

According to the research analysis results, although both men and women develop hypertension, distinct gender differences in the incidence and severity of hypertension in the productive age are well established, where the male was 2.96 times more likely to suffer from hypertension in the productive age compared to female respondents. Other researchers found that overall, the prevalence of hypertension was higher in males (34.6 %) than in females (30.8 %) (11). Consistent with our findings, the prevalence of hypertension was also higher among males in studies conducted in Turkey, Greece, Brazil, and India (12-15).

In line with this present study, the results of another study showed that women were significantly less likely to develop hypertension than men (OR = 0.37,  $p < 0.001$ ) (16).

Thus, at the Bara Baraya Public Health Center in Makassar City, gender is a risk factor for hypertension at productive age. Mostly, those who are at risk of developing hypertension are male and more predominately often experience signs of hypertension at the age of thirty and older. This is due to stiff blood vessels which affect the increase in their blood pressure so that men are considered more susceptible to hypertension. In addition, there is an influence of hormonal status since premenopausal women have a lower risk and incidence of hypertension compared with age-matched men, but this advantage for women gradually disappears after menopause. After 65 years of age, a higher percentage of women than men have hypertension, and the gap will likely increase with the continued aging of the female population (17).

A close family history of hypertension also increases the risk of developing hypertension, especially in primary hypertension. Individuals whose parents or siblings have hypertension have an elevated risk of developing the condition, particularly if both parents are affected. Hypertension tends to run in families. The results of this study indicate that family history was a significant risk factor for hypertension. Thus, in productive age respondents with a family history of hypertension will have a 3.63 times greater risk of hypertension compared to respondents who do not have a family history of hypertension. In multivariate analysis, the family history variable also appears to be the most influential risk factor for the incidence of hypertension in the productive age. Similarly, a study included all adults with a family history of parents (OR:1.28; 95 % CI: 1.12–1.48), grandparents (OR:1.34; 95 % CI: 1.20–1.50), and siblings (OR:1.27; 95 % CI: 1.21–1.33) and it was found that they were all associated with a significantly increased risk of hypertension (18).

Family history is an important non-modifiable risk factor for hypertension, showing a significant influence to be a risk factor for the incidence of hypertension both from parents (father/mother) and brothers and sisters. The hereditary nature of hypertension is well established by numerous family studies demonstrating that about 30 % of the blood pressure variance can be attributed to genetic factors.

Smoking habits are a significant risk factor and have been associated with malignant hypertension in productive age at the Bara Baraya Public Health Center. Smoking habits have a 3.08 times greater risk of suffering from hypertension at productive age compared to respondents who do not have smoking habits. These results are in accordance with studies that demonstrated an increase in blood pressure associated with smoking, showing that there was a significant relationship between smoking habits and the incidence of hypertension ( $p=0.003$ ).

Regardless of the route of entry, nicotine gets into the bloodstream. Once inhaled, the nicotine travels immediately to the lungs where it reaches millions of tiny air sacs called alveoli. The general mechanisms by which smoking results in cardiovascular events include the

development of atherosclerotic changes with narrowing of the vascular lumen and induction of a hypercoagulable state, which creates the risk of acute thrombosis. In addition, abundant evidence demonstrates that nicotine contributes to the development of atherosclerotic plaque. Furthermore, nicotine is a sympathomimetic drug that releases catecholamines, increases heart rate and cardiac contractility, constricts cutaneous and coronary blood vessels, and transiently increases blood pressure. Carbon monoxide is another dangerous chemical found in cigarettes since binds hemoglobin which is the molecule responsible for carrying oxygen. Once the carbon monoxide is bound to hemoglobin, oxygen can't bind, decreasing the amount of oxygen delivered to all cells. To provide the body with more oxygen the heart increases pump blood throughout the body (19).

Epidemiological, preclinical, and clinical studies established the association between high alcohol consumption and hypertension. Our results in the present work, however, showed that the habit of drinking alcohol was a non-significant risk factor for the incidence of hypertension in productive age. Drinking alcohol has a 1.93 times greater risk of suffering from hypertension than respondents who do not have the habit of consuming alcohol, but this risk is not significant. Other works do not confirm our results, since it was shown that of the 33 respondents who had a habit of consuming alcohol, it was found that 45.5 % had hypertension, indicating that there is a greater number of hypertension events in men who drink alcohol with a risk of developing hypertension (20). Alcohol abuse increases blood pressure since drinking excessive alcohol is considered one of the most common causes of raised blood pressure and it has been shown that hypertension is difficult to control in patients with alcohol consumption of more than two alcoholic drinks per day, in this case, alcohol consumption weakens the antihypertensive action agent.

Excess weight gain, especially when associated with increased visceral adiposity, is a major cause of hypertension, accounting for 65 % to 75 % of the risk for human primary (essential) hypertension. Contrary to this statement our present results showed that obesity was not a risk factor for the incidence of hypertension in productive age. Respondents with obesity were

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at risk 0.55 times greater for suffering from hypertension than respondents who are not obese. Contrary to our results it was shown a significant relationship between obesity and the incidence of hypertension, being statistically significant for age and the incidence of hypertension, and obese people and the incidence of hypertension with a p-value of 0.0001, and estimated risk of 2.502 (95 % CI: 2.150-2.911) (21).

Energy intake that exceeds energy expenditure is the main driver of weight gain or it is known as obesity so excess energy can be stored in the body in the form of fat tissue. An unhealthy lifestyle is one of the factors for someone to experience obesity.

### CONCLUSION

Gender, family history, and smoking habits are risk factors that are closely associated with the incidence of hypertension in productive age and family history becomes the riskiest factor in increasing the incidence of hypertension in productive age in the working area of the Bara Baraya Public Health Center, Makassar City.

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