



**KEMENTERIAN PENDIDIKAN, KEBUDAYAAN
RISET, DAN TEKNOLOGI
UNIVERSITAS HASANUDDIN
FAKULTAS KESEHATAN MASYARAKAT**

Jln.Perintis Kemerdekaan Km.10 Makassar 90245, Telp.(0411) 585658,
E-mail : fkm.unhas@gmail.com, website: <https://fkm.unhas.ac.id/>

REKOMENDASI PERSETUJUAN ETIK

Nomor : 15643/UN4.14.1/TP.01.02/2022

Tanggal : 26 Januari 2022

Dengan ini Menyatakan bahwa Protokol dan Dokumen yang Berhubungan dengan Protokol berikut ini telah mendapatkan Persetujuan Etik :

No.Protokol	191022105010	No. Sponsor Protokol	
Peneliti Utama	Dr. Ida Leida Maria, S.KM, M.KM, M.Sc.PH	Sponsor	Pribadi
Judul Peneliti	Determinan Kejadian Hipertensi di Wilayah Kerja Puskesmas Kabupaten Bone dan Kabupaten Barru Tahun 2022		
No.Versi Protokol	1	Tanggal Versi	19 Januari 2022
No.Versi PSP	1	Tanggal Versi	19 Januari 2022
Tempat Penelitian	Wilayah Kerja Puskesmas Kabupaten Bone dan Kabupaten Barru		
Judul Review	<input type="checkbox"/> Exempted <input checked="" type="checkbox"/> Expedited <input type="checkbox"/> Fullboard	Masa Berlaku 26 Januari 2022 Sampai 26 Januari 2023	Frekuensi review lanjutan
Ketua Komisi Etik Penelitian	Nama : Prof.dr.Veni Hadju,M.Sc,Ph.D	Tanda tangan 	Tanggal 26 Januari 2022
Sekretaris komisi Etik Penelitian	Nama : Dr. Wahiduddin, SKM.,M.Kes	Tanda tangan 	Tanggal 26 Januari 2022

Kewajiban Peneliti Utama :

1. Menyerahkan Amandemen Protokol untuk persetujuan sebelum di implementasikan
2. Menyerahkan Laporan SAE ke Komisi Etik dalam 24 Jam dan dilengkapi dalam 7 hari dan Laporan SUSAR dalam 72 Jam setelah Peneliti Utama menerima laporan
3. Menyerahkan Laporan Kemajuan (progress report) setiap 6 bulan untuk penelitian resiko tinggi dan setiap setahun untuk penelitian resiko rendah
4. Menyerahkan laporan akhir setelah Penelitian berakhir
5. Melaporkan penyimpangan dari protocol yang disetujui (protocol deviation/violation)
6. Mematuhi semua peraturan yang ditentukan



Determinants of Hypertension Incidence in the Work Areas of the Bone and Barru District Health Centers in 2022

Ida Leida Maria^{1*}, Andi Selvi Yusnitasari¹, Clement Lifoia², A. Tiara Aurelia Annisa¹, Sri Mulyani¹

¹Department of Epidemiology, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia

²Department of Epidemiology & Research, Solomon Islands National University, Honiara, Solomon Islands

*Authors Correspondence: idaleida262@gmail.com/0811448784

ARTICLE INFO

Article History:

Received Jun, 26th, 2022

Accepted August, 18th, 2022

Published online Sept, 30th, 2022

Keywords:

Hypertension;

smoking;

education;

stress;

age;

ABSTRACT

Hypertension is often called the silent killer because it does not show any symptoms. Hence, not all people with hypertension are aware that they suffer from a chronic condition that can cause degenerative diseases, to death. Hypertension is a problem that is often found in society, both in developed and developing countries, especially in Indonesia. The purpose of this study was to determine the factors associated with the incidence of hypertension in the work area of Dua Boccoe Health Center and Blue Health Center of Bone Regency and Padongko Health Center and Palakka Health Center of Barru Regency, with a high prevalence of hypertension cases in Bone Regency (29.33%) and Barru Regency (33.59%). The type of research used is observational with cross-sectional design with a total of 356 respondents. Data were processed using the SPSS program with chi-square analysis and logistic regression. The results of the study based on the chi-square test showed that there was a relationship between the variables of age, education level, family history of hypertension, smoking, and stress with the incidence of hypertension ($p < 0.05$) and there was no relationship between the variables of sex and physical activity with the incidence of hypertension ($p > 0.05$). Furthermore, based on the logistic regression test, respondents were at a 6.5 times greater risk of developing hypertension if they had stress risk factors. Therefore, respondents are expected to carry out regular health checks and maintain a healthy lifestyle to control risk factors for hypertension.

INTRODUCTION

Hypertension or high blood pressure is a chronic condition characterized by increased blood pressure on the walls of the arteries, which cause the heart to work harder to circulate blood throughout the body through the blood vessels. This can interfere with blood flow, damage blood vessels, cause degenerative diseases, to death.¹ Hypertension is often known as the silent killer because it does not show any symptoms for a long time so not all hypertension sufferers are aware of the disease they are suffering from.² Hypertension becomes a problem that is often found in society, both in developed and developing countries, especially in Indonesia. Data from the World Health Organization (WHO) in 2019 estimates that the prevalence of hypertension globally is 22%, with Africa having the highest prevalence of 27%, Southeast Asia is in the third position with a prevalence of 25% and the lowest is America with a prevalence of 18% of the total population. WHO estimates that 1 in 4 men and 1 in 5 men experience hypertension which can be the main cause of premature death worldwide.³ Hypertension or high blood pressure is estimated at 1.28 billion adults aged 30-79 years worldwide suffer from hypertension. and it is estimated that 46% of adults are not aware they have hypertension.⁴

Hypertension is still a big challenge in Indonesia, which is the most common occurrence in primary health services in Indonesia. Based on the results of the *Riset Kesehatan Dasar (Riskesdas)* in 2018, the national prevalence of hypertension in the population aged 18 years was 34.11% which made hypertension a health problem with a high prevalence.⁵ The incidence of hypertension occupies the top position as a Non-Communicable Disease (NCD). In 2018, there were 185,857 cases, followed by type 2 DM and followed by obesity. The estimated number of hypertension cases in Indonesia was 63,309,620, while the death rate in Indonesia due to hypertension was 427,218 deaths.⁶

Based on Health Report of South Sulawesi Province 2018 year found prevalence hypertension based on results measurement in South Sulawesi Province, namely by 31.68%,⁵ whereas Bone Regency has prevalence

hypertension by 29.33% while in Barru Regency shows that the prevalence hypertension by 33.59%.⁷ Amount case hypertension in the district Barru 2018 to 2019 is happening enhancement cases, it is known that in 2018 it was 7,699 per 100,000 population and in 2019 it was 15,764 cases per 100,000, while in 2020 the prevalence case hypertension of 3,199 per 100,000 population and is case highest third incident disease no infectious disease in Barru district.⁸

Blood pressure can easily change in seconds, this is characterized by dizziness, headache, neck stiffness, and dizzy eyes. Factors that influence the occurrence of hypertension are divided into two major groups, namely factors unmodified/cannot be changed such as gender, age, and genetics, and modifiable factors such as diet (junk food, sodium intake, fat intake, coffee intake), exercise habits, smoking, sleeping patterns, being overweight and persistent stress.⁹ Age affects the occurrence of hypertension because diastolic pressure increases with age (natural changes in hormones), so blood vessels and the heart become stiffer and weaker. In terms of gender, the risks are similar between the ages of 55-74 years, after the age of 74 women are at greater risk, and also women will also enter menopause, so women suffers more from hypertension more however women are at a greater risk after the age of 74 and suffers more from hypertension due to menopause.¹⁰

In general, education is any planned effort to influence other people, either individuals, groups, or communities so that they do what is expected by education actors, so that education can affect health, the higher a person's level of education, the level of awareness of health increases. Education is any planned effort to influence people, either individuals, groups or communities to implement what is expected by educator. Education is closely related to health, as the health awareness increases the higher one's education level is.¹¹ The level of education affects the incidence of hypertension; education is a basic need in life and the dominant factor in the formation of quality human resources. Knowledge of aspects that play an important role in the incidence of hypertension will affect efforts to help detect patients early so that they

can prevent complications.¹²

Hypertension tends to be a hereditary disease, if both of our parents have hypertension, there is a 60% chance that we will get the disease.¹³ The development and changing times also affects changes in lifestyle such as smoking behavior, lack of physical activity and stress levels, these factors can trigger the occurrence of hypertension. Smoking is a modifiable factor, the nicotine content in cigarettes can cause an increase in heart rate and blood pressure.¹⁴ A person with light to moderate physical activity can cause an increase in blood pressure. Furthermore, the release of the hormone adrenaline as a result of severe stress can cause an increase in blood pressure and blood clots which can lead to a heart attack.¹⁵

This research was conducted at four health centers, namely Dua Boccoe Health Center and Blue Health Center in Bone Regency as well as Padongko Health Center and Palakka Health Center in Barru Regency. Considering the various risk factors associated with the occurrence of hypertension along with the diversity of characters in the population in the working area of the health center, as well as the fact no previous studies were conducted in this area, it will certainly be an attraction if further research is carried out. The purpose of this study was to determine the determinants of the incidence of hypertension, namely age, gender, education level, family history of hypertension, smoking, physical activity and stress in the work area where the study was located.

MATERIAL AND METHOD

The type of research used is observational with a cross-sectional design. This research was carried out in the working area of Dua Boccoe Health Center and Blue Health Center of Bone Regency as well as at Padongko Health Center and Palakka Health Center Barru Regency in 2022. The population in this study were general poly visitors at the research location from February to April 2022. The sampling technique used was used is simple random sampling, with a total sample of 356 respondents. Data were obtained by conducting interviews with respondents based on patient medical record data in fourth public health center. Data were analyzed using SPSS

with bivariate analysis using chi square test and multivariate analysis using logistic regression test. The variables measured in this study were age, education level, family history of hypertension, smoking, and stress. The research was approved by the Ethics Committee of the Public Health Faculty at Hasanuddin University. The ethical approval number was 15643/UN4.14.1/TP.01.02/2022.

RESULTS

Respondents in this study were 356 people who were visitors to the general poly at the Dua Boccoe Health Center and the Blue Health Center in Bone Regency as well as at the Padongko Health Center and Palakka Health Center in Barru Regency in 2022. Based on Table 1, bivariate analysis showed that there was a relationship between age groups and the incidence of hypertension, obtained a value ($p = 0.000 < 0.05$) and shows that most respondents who suffer from hypertension are in the age group > 45 years, which is 67.40%. Most of the respondents who suffer from hypertension are male, namely 56.70%, and from the results of the chi square test analysis, it is known that there is no relationship between gender and the incidence of hypertension ($p > 0.05$). Most hypertension sufferers at the low education level (No School, SD/MI/Equivalent and SMP/MTS/Equivalent) that is equal to 72.2% and it is known that the results of the chi square test analysis that the value ($p = 0.000$) which means there is the relationship between education and the incidence of hypertension (Table 1).

The number of respondents who suffer from hypertension is the highest in respondents who have a family history of hypertension, which is 74.1% and it is known that there is a relationship between a family history of hypertension and the incidence of hypertension based on the results of the chi square test analysis, with ($p = 0.000 < 0.05$), then the number of respondents who suffer from hypertension is the most in respondents who smoke, which is 65% and there is a relationship between smoking behavior and the incidence of hypertension with $p = 0.000 < 0.05$ (Table 1).

Based on the results of the analysis, it was found that there was no relationship between

physical activity and the incidence of hypertension with a value ($p = 0.062 > 0.05$) and it was known that the number of respondents who suffered from hypertension was the most in respondents whose percentage of physical activity was in the high category, namely 54.5%. While the analysis of the relationship between stress levels and the incidence of hypertension shows that the number of respondents who suffer from hypertension is the most in respondents with high stress levels, namely 54.7% and there is a relationship between stress levels and the incidence of hypertension with a value ($p = 0.000 < 0.05$).

Based on the results of the chi square test analysis, there were five variables included in the multivariate analysis including age, education, family history of hypertension, smoking behavior, and stress levels (Table 1). The multivariate results of the five variables showed that all of these variables had an effect on the incidence of hypertension. However, the stress variable has the greatest influence with the value of $\text{Exp (B)} = 6.507$, meaning that respondents are 6.5 times at risk of experiencing hypertension if they have stress risk factors (Table 2).

Table 1. Analysis Results Bivariate Variable Independent to Variable Dependent

Variable	Incidence of Hypertension				Total		p-value
	Hypertension		Not Hypertension		n	%	
	n = 356	%	n	%			
Age (Years)							
> 45	130	67.40	63	32.60	193	100	0.000
≤ 45	59	36.20	104	63.80	163	100	
Gender							
Man	72	56.70	55	43.30	127	100	0.310
Woman	17	51.10	112	48.90	229	100	
Level of Educaion							
Low Education	57	72.20	22	27.80	79	100	0.000
Higher Education	132	47.70	145	52.30	277	100	
History of Hypertension							
Family							
Yes	123	74.10	43	25.90	166	100	0.000
Not	66	34.70	124	65.30	190	100	
Behavior Smoke							
Smoke	67	65.00	36	35.00	103	100	0.000
Not Smoke	122	48.00	31	51.80	253	100	
Activity Physique							
Low	98	51.90	91	48.10	189	100	0.062
High	91	54.50	76	45.50	167	100	
Stress Level							
High Stress	185	54.70	153	45.30	338	100	0.000
Low Stress	4	22.20	14	77.80	18	100	

Source: Primary Data, 2022

Table 2. Final Model of Analysis Results Multivariate

Variable	Exp (B)	95% CI	p-value
Age	1.793	1.059 - 3.034	0.030
Level of education	3.174	1.849 - 5.447	0.000
History of Hypertension Family	4.235	2.561 - 7.002	0.000
Behavior Smoke	1.938	1.113 - 3.376	0.019
Stress Level	6.507	1.810 - 23.400	0.004

Source: Primary Data, 2022

DISCUSSION

Research results show that respondents aged > 45 years (67.40%) experienced hypertension. Based on analysis bivariate, there are connection among age with incident hypertension, and based on analysis multivariate is known that age have influence 1.7 times over incident hypertension. This finding is in line with previous study showing that after reaching the age 45 years old wall arteries will thicken due to accumulation substance collagen on layer muscle so that vessels blood will narrows and becomes stiff, apart that because wall vessels blood are not capable to return to beginning position with same flexibility moment occur drop pressure cause pressure diastolic also increases.¹⁶ Hypertension often occurs at age 40 years or older, due to the seldomness people within productive age groups to check their health and less notice pattern healthy life.¹⁷

Based on the results of the study, it was known that the respondents who suffered from hypertension were mostly male (56.7%) and bivariate analysis showed that there was no relationship between gender and the incidence of hypertension. Research conducted by Garwahasada E & Wirjatmadi B states that hypertension more many suffered by women with age > 45 years because hormonal factors, namely decrease the hormone estrogen in women who have had going through menopause trigger increase pressure blood and is influenced by factors psychology and existence change in self woman that. Low estrogen levels cause blood becomes more viscous that enhances risk clumping blood.¹⁸

Based on results it is known that respondents who suffer hypertension more belong at low level education group with category respondent (Not School, Elementary SD/Equivalent and Middle School SMP/MTS/Equivalent) of 72.2%. Bivariate Analysis results showed no connection among education with hypertension incident, and based on analysis multivariate it is known that low level education have influence 3.1 times experienced incident hypertension. This result is in line with previous study previously showing that prevalence hypertension tend to be higher more high in low education group group education more low consequence ignorance about diet pattern pattern eat well, education in

this aspect include knowledge, attitude, and action related hypertension have influence with hypertension incidence.¹⁹

Respondents who have family with history most hypertension suffer from hypertension (74.1%) and from bivariate analysis bivariate, there are connection among history hypertension family with incident hypertension and based on analysis multivariate is known that respondents who have history hypertension in the family have influence 4.2 times risk experience hypertension. That thing This finding is in line with previous study previously which stated that if second both parent suffered from hypertension, then number incident hypertension in offspring increased 4 to 15 times compared to when second parent is normotensive. When second parent suffer hypertension essential, then 44.8% of his children will suffer hypertension if only one parent hypertension then 12.8% of the offspring will have hypertension.²⁰

Result of the study showed that respondents who smokes suffer more from hypertension compared to those not smoking (65%). The results study that respondents who suffer most hypertension have behavior smoking (65%). Based on analysis bivariate, there are connection Among smoking behavior smoke with incident hypertension, and outcomes analysis multivariate is known that respondents who smoke have risk of 1.9 times experiencing hypertension. Pressure blood smoker soar many times throughout day during respondents smoke.²¹ Enhancement this occur because the constricting nicotine vessels blood so that compel heart work hard and cause pressure blood increases.²²

Based on results obtained more respondents with low physical activity experienced hypertension, while analysis bivariate show that no connection among physical activity physique with incident hypertension incident. When doing physical activity such as sports, heart will become stronger and will not need to work harder in pumping blood. For hypertension sufferer this will make Genre blood becomes smoother and will keep blood pressure controlled. Moment to do activity physical, such as sports, heart will becomes more strong, so no need work more hard in pump blood, with

condition this, including for sufferer hypertension, make Genre blood becomes smooth and blood pressure becomes more under controlled. On the other hand, from study previously found that people who do not exercise regularly are more at risk at catching hypertension by 13.47 times higher compared to those with regular exercise habit.²³

Research results show that respondents who suffer hypertension also has stress complaints with high stress level 54.70%. Based on analysis bivariate, there are connection stress with incident hypertension, and based on analysis multivariate it is known that someone who experiences stress 6.5 times is more at risk of experiencing hypertension, from results study between all variable, stress Becomes variable with biggest influence on incident hypertension. This result is in line with previous study previously that strong emotions and great stress will becomes something a somatic reaction that direct about system circulation blood so that can influence beat heart and system blood circulation.²⁴ Release adrenaline hormone as consequence stress heavy could trigger rise pressure blood and freeze blood that so cause attack heart, adrenaline can also speed up pulse heart and constrict vessels coronary blood.²⁵

CONCLUSION AND RECOMMENDATION

Relevant factors with incident hypertension in the work area Public Health Center Dua Boccoe and Public Health Center Biru Bone Regency as well as Padongko Health Center and Palakka Health Center Regency Barru the year 2022 is age, education, history hypertension family, behavior smoke and level stress. Not there is connection among type gender and activity physique with incident hypertension. To do inspection health by routine to Health Center, Hospital related inspection and control pressure blood for complications hypertension can prevented as early as possible and keep pattern life healthy like no smoking, doing activity physical enough, take care pattern sleep and avoid stress to control factors risk hypertension.

AUTHOR CONTRIBUTIONS

ILM and ASY designed the research design; ATAA and SM conducted data collection; CL analyzed the data; ILM write the manuscript. ILM = Ida Leida Maria; ASY = Andi Selvi

Yusnitasari; ATAA = A. Tiara Aurelia Annisa; SM = Sri Mulyani; CL = Clement Lifoia.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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Determinants_of_Hypertension _Incidence.pdf

by

Submission date: 24-Jan-2023 01:21PM (UTC+0700)

Submission ID: 1998310835

File name: Determinants_of_Hypertension_Incidence.pdf (152.1K)

Word count: 4106

Character count: 21600



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Ida Leida Maria^{1*}, Andi Selvi Yusnitasari¹, Clement Lifoia², A. Tiara Aurelia Annisa¹, Sri Mulyani¹

¹Department of Epidemiology, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia

²Department of Epidemiology & Research, Solomon Islands National University, Honiara, Solomon Islands

*Authors Correspondence: idaileida262@gmail.com/0811448784

ARTICLE INFO

Article History:

Received Jun, 26th, 2022

Accepted August, 18th, 2022

Published online Sept, 30th, 2022

Keywords:

Hypertension;
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Hypertension is often called the silent killer because it does not show any symptoms. Hence, not all people with hypertension are aware that they suffer from a chronic condition that can cause degenerative diseases, to death. Hypertension is a problem that is often found in society, both in developed and developing countries, especially in Indonesia. The purpose of this study was to determine the factors associated with the incidence of hypertension in the work area of Dua Boccoe Health Center and Blue Health Center of Bone Regency and Padongko Health Center and Palakka Health Center of Barru Regency, with a high prevalence of hypertension cases in Bone Regency (29.33%) and Barru Regency (33.59%). The type of research used is observational with cross-sectional design with total of 356 respondents. Data were processed using the SPSS program with chi-square analysis and logistic regression. The results of the study based on the chi-square test showed that there was a relationship between the variables of age, education level, family history of hypertension, smoking, and stress with the incidence of hypertension ($p < 0.05$) and there was no relationship between the variables of sex and physical activity with the incidence of hypertension ($p > 0.05$). Furthermore, based on the logistic regression test, respondents were at a 6.5 times greater risk of developing hypertension if they had stress risk factors. Therefore, respondents are expected to carry out regular health checks and maintain a healthy lifestyle to control risk factors for hypertension.

INTRODUCTION

Hypertension or high blood pressure is a chronic condition characterized by increased blood pressure on the walls of the arteries, which cause the heart to work harder to circulate blood throughout the body through the blood vessels. This can interfere with blood flow, damage blood vessels, cause degenerative diseases, to death.¹ Hypertension is often known as the silent killer because it does not show any symptoms for a long time so not all hypertension sufferers are aware of the disease they are suffering from.² Hypertension becomes a problem that is often found in society, both in developed and developing countries, especially in Indonesia. Data from the World Health Organization (WHO) in 2019 estimates that the prevalence of hypertension globally is 22%, with Africa having the highest prevalence of 27%, Southeast Asia is in the third position with a prevalence of 25% and the lowest is America with a prevalence of 18% of the total population. WHO estimates that 1 in 4 men and 1 in 5 men experience hypertension which can be the main cause of premature death worldwide.³ Hypertension or high blood pressure is estimated at 1.28 billion adults aged 30-79 years worldwide suffer from hypertension, and it is estimated that 46% of adults are not aware they have hypertension.⁴

Hypertension is still a big challenge in Indonesia, which is the most common occurrence in primary health service⁵ in Indonesia. Based on the results of the *Riset Kesehatan Dasar (Riskesdas)* in 2018, the national prevalence of hypertension in the population aged 18 years was 34.11% which made hypertension a health problem with a high prevalence.⁵ The incidence of hypertension occupies the top position as a Non-Communicable Disease (NCD). In 2018, there were 185,857 cases, followed by type 2 DM and followed by obesity. The estimated number of hypertension cases in Indonesia was 63,309,620, while the death rate in Indonesia due to hypertension was 427,218 deaths.⁶

Based on Health Report of South Sulawesi Province 2018 year found prevalence hypertension based on results measurement in South Sulawesi Province, namely by 31.68%,⁵ whereas Bone Regency has prevalence

hypertension by 29.33% while in Barru Regency shows that the prevalence hypertension by 33.59%.⁷ Amount case hypertension in the district Barru 2018 to 2019 is happening enhancement cases, it is known that in 2018 it was 7,699 per 100,000 population and in 2019 it was 15,764 cases per 100,000, while in 2020 the prevalence case hypertension of 3,199 per 100,000 population and is case highest third incident disease no infectious disease in Barru district.⁸

Blood pressure can easily change in seconds, this is characterized by dizziness, headache, neck stiffness, and dizzy eyes. Factors that influence the occurrence of hypertension are divided into two major groups, namely factors unmodified/cannot be changed such as gender, age, and genetics, and modifiable factors such as diet (junk food, sodium intake, fat intake, coffee intake), exercise habits, smoking, sleeping patterns, being overweight and persistent stress.⁹ Age affects the occurrence of hypertension because diastolic pressure increases with age (natural changes in hormones), so blood vessels and the heart become stiffer and weaker. In terms of gender, the risks are similar between the ages of 55-74 years, after the age of 74 women are at greater risk, and also women will also enter menopause, so women suffers more from hypertension more however women are at a greater risk after the age of 74 and suffers more from hypertension due to menopause.¹⁰

In general, education is any planned effort to influence other people, either individuals, groups, or communities so that they do what is expected by education actors, so that education can affect health, the higher a person's level of education, the level of awareness of health increases. Education is any planned effort to influence people, either individuals, groups or communities to implement what is expected by educator. Education is closely related to health, as the health awareness increases the higher one's education level is.¹¹ The level of education affects the incidence of hypertension; education is a basic need in life and the dominant factor in the formation of quality human resources. Knowledge of aspects that play an important role in the incidence of hypertension will affect efforts to help detect patients early so that they

can prevent complications.¹²

Hypertension tends to be a hereditary disease, if both of our parents have hypertension, there is a 60% chance that we will get the disease.¹³ The development and changing times also affects changes in lifestyle such as smoking behavior, lack of physical activity and stress levels, these factors can trigger the occurrence of hypertension. Smoking is a modifiable factor³⁰, the nicotine content in cigarettes can cause an increase in heart rate and blood pressure.¹⁴ A person with light to moderate physical activity can cause an increase in blood pressure. Furthermore, the release of the hormone adrenaline as a result of severe stress can cause an increase in blood pressure and blood clots which can lead to a heart attack.¹⁵

This research was conducted at four health centers, namely Dua Boccoe Health Center and Blue Health Center in Bone Regency as well as Padongko Health Center and Palakka Health Center in Barru Regency. Considering the various risk factors associated with the occurrence of hypertension along with the diversity of characters in the population in the working area of the health center, as well as the fact no previous studies were conducted in this area, it will certainly be an attraction if further research is carried out. The purpose of this study was to determine the determinants of the incidence of hypertension, namely age, gender, education level, family history of hypertension, smoking, physical activity and stress in the work area where the study was located.

MATERIAL AND METHOD

The type of research used is observational with a cross-sectional design. This research was carried out in the working area of Dua Boccoe Health Center and Blue Health Center of Bone Regency as well as at Padongko Health Center and Palakka Health Center Barru Regency in 2022. The population in this study were general poly visitors at the research location from February to April 2022. The sampling technique used was simple random sampling, with a total sample of 356 respondents. Data were obtained by conducting interviews with respondents based on patient medical record data in four public health center. Data were analyzed using SPSS

with bivariate analysis using chi square test and multivariate analysis using logistic regression test. The variables measured in this study were age, education level, family history of hypertension, smoking, and stress. The research was approved by the Ethics Committee of the Public Health Faculty at Hasanuddin University. The ethical approval number was 15643/UN4.14.1/TP.01.02/2022.

RESULTS

Respondents in this study were 356 people who were visitors to the general poly at the Dua Boccoe Health Center and the Blue Health Center in Bone Regency as well as at the Padongko Health Center and Palakka Health Center in Barru Regency in 2022. Based on Table 1, bivariate analysis showed that there was a relationship between age groups and the incidence of hypertension, obtained a value ($p = 0.000 < 0.05$) and shows that most respondents who suffer from hypertension are in the age group > 45 years, which is 67.40%. Most of the respondents who suffer from hypertension are male, namely 56.70%, and from the results of the chi square test analysis, it is known that there is no relationship between gender and the incidence of hypertension ($p > 0.05$). Most hypertension sufferers at the low education level (No School, SD/MI/Equivalent and SMP/MTS/Equivalent) that is equal to 72.2% and it is known that the results of the chi square test analysis that the value ($p = 0.000$) which means there is the relationship between education and the incidence of hypertension (Table 1).

The number of respondents who suffer from hypertension is the highest in respondents who have a family history of hypertension, which is 74.1% and it is known that there is a relationship between a family history of hypertension and the incidence of hypertension based on the results of the chi square test analysis, with ($p = 0.000 < 0.05$), then the number of respondents who suffer from hypertension is the most in respondents who smoke, which is 65% and there is a relationship between smoking behavior and the incidence of hypertension with $p = 0.000 < 0.05$ (Table 1).

Based on the results of the analysis, it was found that there was no relationship between

physical activity and the incidence of hypertension with a value ($p = 0.252 > 0.05$) and it was known that the number of respondents who suffered from hypertension was the most in respondents whose percentage of physical activity was in the high category, namely 54.5%. While the analysis of the relationship between stress levels and the incidence of hypertension shows that the number of respondents who suffer from hypertension is the most in responder with high stress levels, namely 54.7% and there is a relationship between stress levels and the incidence of hypertension with a value ($p = 0.000 < 0.05$).

Based on the results of the chi square test analysis, there were five variables included in the multivariate analysis including age, education, family history of hypertension, smoking behavior, and stress levels (Table 1). The multivariate results of the five variables showed that all of these variables had an effect on the incidence of hypertension. However, the stress variable has the greatest influence with the value of Exp (B) = 6.507, meaning that respondents are 6.5 times at risk of experiencing hypertension if they have stress risk factors (Table 2).

Table 1. Analysis Results Bivariate Variable Independent to Variable Dependent

Variable	Incidence of Hypertension				Total		p-value
	Hypertension		Not Hypertension		n	%	
	n = 356	%	n	%			
Age (Years)							
> 45	130	67.40	63	32.60	193	100	0.000
≤ 45	59	36.20	104	63.80	163	100	
Gender							
Man	72	56.70	55	43.30	127	100	0.310
Woman	17	51.10	112	48.90	229	100	
Level of Educaion							
Low Education	57	72.20	22	27.80	79	100	0.000
Higher Education	132	47.70	145	52.30	277	100	
History of Hypertension							
Family							
Yes	123	74.10	43	25.90	166	100	0.000
Not	66	34.70	124	65.30	190	100	
Behavior Smoke							
Smoke	67	65.00	36	35.00	103	100	0.000
Not Smoke	122	48.00	31	51.80	253	100	
Activity Physique							
Low	98	51.90	91	48.10	189	100	0.062
High	91	54.50	76	45.50	167	100	
Stress Level							
High Stress	185	54.70	153	45.30	338	100	0.000
Low Stress	4	22.20	14	77.80	18	100	

Source: Primary Data, 2022

Table 2. Final Model of Analysis Results Multivariate

Variable	Exp (B)	95% CI	p-value
Age	1.793	1.059 - 3.034	0.030
Level of education	3.174	1.849 - 5.447	0.000
History of Hypertension Family	4.235	2.561 - 7.002	0.000
Behavior Smoke	1.938	1.113 - 3.376	0.019
Stress Level	6.507	1.810 - 23.400	0.004

Source: Primary Data, 2022

DISCUSSION

Research results show that respondents aged > 45 years (67.40%) experienced hypertension. Based on analysis bivariate, there are connection among age with incident hypertension, and based on analysis multivariate is known that age have influence 1.7 times over incident hypertension. This finding is in line with previous study showing that after reaching the age 45 years old wall arteries will thicken due to accumulation substance collagen on layer muscle so that vessels blood will narrow and becomes stiff, apart that because wall vessels blood are not capable to return to beginning position with same flexibility moment occur drop pressure cause pressure diastolic also increases.¹⁶ Hypertension often occurs at age 40 years or older, due to the seldomness people within productive age groups to check their health and less notice pattern healthy life.¹⁷

Based on the results of the study, it was known that the respondents who suffered from hypertension were mostly male (56.7%) and bivariate analysis showed that there was no relationship between gender and the incidence of hypertension. Research conducted by Garwahasada E & Wirjatmadi B states that hypertension more many suffered by women with age > 45 years because hormonal factors, namely decrease the hormone estrogen in women who have had going through menopause trigger increase pressure blood and is influenced by factors psychology and existence change in self woman that. Low estrogen levels cause blood becomes more viscous that enhances risk clumping blood.¹⁸

Based on results it is known that respondents who suffer hypertension more belong at low level education group with category respondent Not School, Elementary SD/Equivalent and Middle School SMP/MTS/Equivalent) of 72.2%. Bivariate Analysis results showed no connection among education with hypertension incident, and based on analysis multivariate it is known that low level education have influence 3.1 times experienced incident hypertension. This result is in line with previous study previously showing that prevalence hypertension tend to be higher more high in low education group group education more low consequence ignorance about diet pattern pattern eat well, education in

this aspect include knowledge, attitude, and action related hypertension have influence with hypertension incidence.¹⁹

Respondents who have family with history most hypertension suffer from hypertension (74.1%) and from bivariate analysis bivariate, there are connection among history hypertension family with incident hypertension and based on analysis multivariate is known that respondents who have history hypertension in the family have influence 4.2 times risk experience hypertension. That thing This finding is in line with previous study previously which stated that if second both parent suffered from hypertension, then number incident hypertension in offspring increased 4 to 15 times compared to when second parent is normotensive. When second parent suffer hypertension essential, then 44.8% of his children will suffer hypertension if only one parent hypertension then 12.8% of the offspring will have hypertension.²⁰

Result of the study showed that respondents who smokes suffer more from hypertension compared to those not smoking (65%). The results study that respondents who suffer most hypertension have behavior smoking (65%). Based on analysis bivariate, there are connection Among smoking behavior smoke with incident hypertension, and outcomes analysis multivariate is known that respondents who smoke have risk of 1.9 times experiencing hypertension. Pressure blood smoker soar many times throughout day during respondents smoke.²¹ Enhancement this occur because the constricting nicotine vessels blood so that compel heart work hard and cause pressure blood increases.²²

Based on results obtained more respondents with low physical activity experienced hypertension, while analysis bivariate show that no connection among physical activity physique with incident hypertension incident. When doing physical activity such as sports, heart will become stronger and will not need to work harder in pumping blood. For hypertension sufferer this will make Genre blood becomes smoother and will keep blood pressure controlled. Moment to do activity physical, such as sports, heart will becomes more strong, so no need work more hard in pump blood, with

condition this, including for sufferer hypertension, make Genre blood becomes smooth and blood pressure becomes more under controlled. On the other hand, from study previously found that people who do not exercise regularly are more at risk at catching hypertension by 13.47 times higher compared to those with regular exercise habit.²³

Research results show that respondents who suffer hypertension also has stress complaints with high stress level 54.70%. Based on analysis bivariate, there are connection stress with incident hypertension, and based on analysis multivariate it is known that someone who experiences stress 6.5 times is more at risk of experiencing hypertension, from results study between all variable, stress Becomes variable with biggest influence on incident hypertension. This result is in line with previous study previously that strong emotions and great stress will becomes something a somatic reaction that direct about system circulation blood so that can influence beat heart and system blood circulation.²⁴ Release adrenaline hormone as consequence stress heavy could trigger rise pressure blood and freeze blood that so cause attack heart, adrenaline can also speed up pulse heart and constrict vessels coronary blood.²⁵

CONCLUSION AND RECOMMENDATION

Relevant factors with incident hypertension in the work area Public Health Center Dua Boccoe and Public Health Center Biru Bone Regency as well as Padongko Health Center and Palakka Health Center Regency Barru the year 2022 is age, education, history hypertension family, behavior smoke and level stress. Not there is connection among type gender and activity physique with incident hypertension. To do inspection health by routine to Health Center, Hospital related inspection and control pressure blood for complications hypertension can prevented as early as possible and keep pattern life healthy like no smoking, doing activity physical enough, take care pattern sleep and avoid stress to control factors risk hypertension.

AUTHOR CONTRIBUTIONS

ILM and ASY designed the research design; ATAA and SM conducted data collection; CL analyzed the data; ILM write the manuscript. ILM = Ida Leida Maria; ASY = Andi Selvi

Yusnitasari; ATAA = A. Tiara Aurelia Annisa; SM = Sri Mulyani; CL = Clement Lifoia.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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