Determinants of Hypertension in Adolescents and Adults (18-44 years) at the Karang Panjang Health Center, Ambon City

Ivy Violan Lawalata[1], Bellytra Talarima[1], Bella Agustina Adinda Subagiyo[1]

Corresponding Email: ivylawalata@gmail.com

[1]Public Health Study Program, Faculty of Health, Indonesian Christian University Maluku, Indonesia

Abstract

The prevalence of hypertension in Indonesia in the young age group based on the 2018 Basic Health Research has increased significantly to 13.2% in the 18-24 year age group, 20.1% in the 25-34 year age group and 31.6% in the 25-44 year age group compared to 2013. The purpose of this study was to determine the risk factors for family genetic history, obesity, physical activity and psychological stress with the incidence of hypertension. The research method used is Case Control. The number of samples in this study were 146 respondents with details of 73 cases and 73 controls. The data analysis performed was univariate and bivariate with the chi-square test. The results of the analysis showed that family genetic history was a determinant of hypertension with an Odds Ratio (OR) = 72,696 confidence level 95% CI value LL and UL = 22,692 – 232,890; Obesity is a determinant of hypertension with Odds Ratio (OR) = 5.056 confidence level 95% CI value LL and UL = 2.112 – 12.101; Physical activity is not a determinant of hypertension with Odds Ratio (OR) = 1.059 confidence level 95% CI value LL and UL = 0.545 – 2.060; The psychological condition of stress is a determinant of the incidence of hypertension with an Odds Ratio (OR) value = 10,815, 95% CI confidence level, LL and UL values = 4,377 – 26,726. In conclusion, family genetic history, obesity and psychological stress conditions are determinants of the incidence of hypertension. It is recommended for adolescents and adults aged 18-44 years to be able to control eating patterns, carry out regular physical activity and control stress levels and carry out routine blood pressure control every month at health services closest.

Introduction

Hypertension is a disease related to human blood pressure. The normal value for a person's blood pressure with height and weight, normal activity level and general health is 120/80 mmHg. According to WHO data (2018), around the world, around 972 million people or 26.4% have hypertension, this figure is likely to increase to 29.2% in 2025. It is estimated that every year 9.4 million people die from hypertension and complications, there are 333 million out of 972 million people with hypertension in developed countries and the rest are in developing countries, one of which is Indonesia (Wicaksono, 2019).

The prevalence of hypertension in Indonesia in 2013 was in the young age group, namely the 18-24 year age group of 8.7%, the 25-34 year age group of 14.7% and the 35-44 year age group of 24.8% and the 2018 Basic Health Research results this figure increased significantly to

13.2% in the 18-24 year old, 20.1% in the 25-34 year old and 31.6% in the 25-44 year age group (Tirtasari & Kodim, 2019)

Adults aged 18-44 years are the productive age group. However, at that age, a person generally lacks the motivation to pay attention to their lifestyle and health. Things that lead to an unhealthy lifestyle include lack of exercise and smoking behavior. An unhealthy lifestyle will have consequences as a factor in the development of degenerative diseases such as hypertension. Lifestyles such as consuming coconut milk, fried foods, irregular sleeping patterns, and not exercising cause a person to experience hypertension (Maimunah, 2020).

Hypertension can be caused by several determinants, including being inherited or genetic in nature, individuals with a family history of hypertension have twice the risk of suffering from hypertension than people who do not have a family history of hypertension (Suparta & Rasmi, 2018), Obesity or obesity can cause saturated fat and Unsaturated fats that enter the body continuously accumulate in the blood vessels thereby affecting blood pressure (Ashfiya, 2019). People who do less physical activity also tend to have a higher heart rate so that their heart muscles have to work harder with each contraction (Herawati et al., 2020). Stress also increases the risk of hypertension 11.019 times higher than those who are not stressed (Masriadi, 2022).

The prevalence of hypertension in Maluku Province based on a doctor's diagnosis or taking anti-hypertensive medication in residents aged ≥ 18 years by Regency/City shows that the highest prevalence rate was in Ambon City with 3,056 cases, followed by Central Maluku Regency with 2,262 cases, District West Seram 984 cases, Buru Regency 822 cases, West Southeast Maluku Regency 665 cases, East Seram Regency 649 cases, Southeast Maluku Regency 590 cases, Aru Islands Regency 549 cases, Southwest Maluku Regency 426 cases, Tual City with 433 cases, and South Buru Regency with 343 cases. Based on data from the Ambon City Health Office for hypertension cases at productive age in the last three years, there has been an increase in the number of cases, including in 2019 there were 4,901 cases, in 2020 there were 5,013 cases, and in 2021 there were 5,816 cases.

Based on data from the Karang Panjang Health Center in Ambon City for cases of hypertension in patients aged 18-44 years in three years it is explained as follows: in 2019 there were 135 cases, in 2020 there were 34 cases, and in 2021 there were 73 cases, the data shows a fluctuating trend and increased in the last year. Based on the description of the background, the aim of this study was to determine the risk factors for family genetic history, obesity, physical activity and psychological conditions of stress.

Methods

The type and/or research design used was analytic observational with a case-control study design, the implementation time was from April to June 2022 in the working area of the Karang Panjang Health Center, Ambon City. 2021 totaling 73 people were taken by total sampling and the control group was taken based on samples that met the inclusion criteria taken by purposive sampling, the independent variables in this study were family genetic history, obesity, physical activity, psychological stress conditions and the dependent variable was hypertension, instruments data collection used is a valid and reliable questionnaire. The method of data analysis was carried out using univariate and bivariate methods, univariate analysis was used to describe the characteristics of the respondents in the form of; gender, age group, education and occupation while bivariate analysis was carried out using the chi-square test to prove the hypothesis and a large risk analysis was carried out by calculating the Odds Ratio (OR) value. Research ethics is that each respondent is asked to fill out an informed consent form, each respondent is kept confidential and each respondent's data is used anonymously.

Results and Discussion

The following describes the results of the research that has been conducted and is presented in the form of univariate and bivariate analysis as follows:

Univariate Analysis

Characteristics of Respondents

Table 1. Distribution of respondent characteristics based on gender, age group, education, and occupation

Category	Case		Control		Total
	n	**%**	**n**	**%**	
Sex					
Male	42	57.5	34	46.6	76
Female	31	42.5	39	53.4	70
Age Group (year)					
18 –24	18	24.7	18	24.7	36
25 - 29	19	26.0	19	26.0	38
30 – 34	5	6.8	5	6.8	10
35 – 39	8	11.0	8	11.0	16
40 – 44	23	31.5	23	31.5	46
Education					
Graduated from junior high school	3	41.1	31	1.4	34
Graduated from high school	62	84.9	56	76.6	118
Completed D1/D2/D3	3	4.1	5	6.8	8
Graduated PT	5	6.8	11	15.1	16
Work					
Doesn't work	17	23.3	30	41.1	47
TNI/POLRI	0	00.0	2	2.7	2
Civil Servants/Staff	16	21.9	16	21.9	32
Entrepreneurship/Trade	9	12.3	3	4.1	12
Farmer	1	1.4	0	00.0	1
Fisherman	1	1.4	0	0.0	1
Laborer	10	13.7	7	9.6	17
Private	6	8.2	7	9.6	13
Housewife	13	17.8	8	11.0	21
Total	73	50.0	73	50.0	146

Source: Primary Data

The table above shows that based on gender there were more men, namely 76 people compared to 70 women. Based on the age group, the 40-44 year old group had the most, namely 46 people and the least was the 30-34 year old group, namely 10 people. Based on the level of education, 118 people graduated from high school, and the least graduated D1/D2/D3. Meanwhile, based on the type of work, 32 people worked as civil servants/employees and the least were farmers and fishermen, 1 person each.

Bivariate Analysis

Determinants of family genetic history with the incidence of hypertension

Table 2. Determinants of family genetic history with the incidence of hypertension in adolescents and adults (18 – 44 years)

No	Family genetic history	Hypertension				Total		*p value* OR	CI 95%	
		Case		Control		N	%			
		n	%	n	%				*Lower*	*Upper*
1	Yes	69	94.5	14	19.2	83	56.8			
2	No	4	5.5	59	80.8	63	43.2	0,000	22.692	
	Total	73	100	73	100	146	100	72.696	232.890	

Source: Primary Data

The table above shows that the distribution of respondents who have a family genetic history suffers more from hypertension (cases), namely 69 people (94.5%) compared to those without hypertension (controls), namely 14 people (19.2%). Meanwhile, more respondents who did not have a family genetic history did not suffer from hypertension (control), namely 59 people (80.8%) compared to those who suffered from hypertension (cases), namely 4 people (5.5%). The results of the analysis obtained Odds Ratio (OR) = 72,696 because the value of OR > 1, then family genetic history is a determinant of hypertension with a 95% confidence level (CI) for LL and UL = 22,692 – 232,890, statistical test results obtained p value = 0 000 because the p value $< \alpha = 0.05$, then H0 is rejected and H_a is accepted, meaning that there is a relationship between genetics and the incidence of hypertension.

Determinants of Obesity with the Incidence of Hypertension

Table 3. Determinants of obesity with the incidence of hypertension in adolescents and adults (18 – 44 years)

No	Obesity	Hypertension				Total		*p value* OR	CI 95%	
		Case		Control		N	%			
		n	%	n	%				*Lower*	*Upper*
1	Yes	28	38.4	8	11.0	36	24.7			
2	No	45	61.6	65	89.0	110	75.3	0,000	2.112	12.101
	Total	73	100	73	100	146	100	5.056		

Source: Primary Data

The table above shows that the distribution of respondents who are obese suffer more from hypertension (cases), namely 28 people (38.4%) than those who are not hypertensive (controls), namely 8 people (11.0%). Meanwhile, more respondents who were not obese did not suffer from hypertension (control), namely 65 people (89.0%) compared to those who suffered from hypertension (cases), namely 45 people (61.6%). The results of the analysis showed that the Odds Ratio (OR) = 5.056 because the OR > 1, obesity is a determinant of hypertension with a 95% confidence level (CI) for LL and UL = 2.112 – 12.101. The statistical test results obtained p value = 0.000 because the p value $< \alpha$ 0.05, then H0 is rejected and H_a is accepted, meaning that there is a relationship between obesity and the incidence of hypertension.

Determinants of Physical Activity with the Incidence of Hypertension

Table 4. Determinants of physical activity with the incidence of hypertension in adolescents and adults (18 – 44 years)

No	Physical activity	Hypertension				Total		p value OR	CI 95%	
		Case		Control		N	%			
		n	%	n	%				Lower	Upper
1	Irregular	44	60.3	45	61.6	89	61.0			
2	Regularly	29	39.7	28	38.4	57	39.0	0,865	545	2.060
	Total	73	100	73	100	146	100	1.059		

Source: Primary Data

The table above shows that the distribution of respondents who did not carry out regular physical activity did not suffer from hypertension (controls), namely 45 people (61.6%) compared to those who suffered from hypertension (cases), namely 44 people (60.3%). Meanwhile, respondents who did regular physical activity suffered more from hypertension (cases), namely 29 people (39.7%), compared to those who did not suffer from hypertension (controls), namely 28 people (38.4%). The results of the analysis obtained Odds Ratio (OR) = 1.059 because the value of OR = 1, then doing physical activity is not a determinant of hypertension with a 95% confidence level for LL and UL values = 0.545 – 2.060. The statistical test results obtained p value = 0.865, because the p value > α = 0.05 then H0 is accepted and Ha is rejected, meaning that there is no relationship between physical activity and the incidence of hypertension.

Determinants of Psychological Stress Conditions with the Incidence of Hypertension

Table 5. Determinants of stress with the incidence of hypertension in adolescents and adults (18 – 44 years)

No	Stressful psychological conditions	Hypertension				Total		p value OR	CI 95%	
		Case		Control						
		n	%	n	%	N	%			
1	Yes	39	53.4	8	11.0	47	32.2	0,000	Lower	Upper
2	No	34	46.4	65	89.0	99	67.8	10.815	4.377	26.726
	Total	73	100	73	100	146	100			

Source: Primary Data

The table above shows that the distribution of respondents who experienced stressful psychological conditions (mild, moderate, severe) suffered more from hypertension (cases), namely 39 people (53.4%) compared to those who were not hypertensive (controls), namely 8 people (11.0%). Meanwhile, more respondents who did not experience psychological stress conditions did not suffer from hypertension (control), namely 65 people (89.0%) compared to those who suffered from hypertension (cases), namely 34 people (46.4%). The results of the analysis obtained Odds Ratio (OR) = 10,815 because the value of OR > 1, the psychological condition of stress is a determinant of the occurrence of hypertension with a confidence level of 95% CI value of LL and UL = 4,377 – 26,726. The statistical test results obtained p value = 0.000 because the p value < α = 0.05, then H0 is rejected and Ha is accepted, meaning that there is a relationship between psychological stress and the incidence of hypertension.

Family history of hypertension is a dominant factor in the incidence of hypertension in adolescents. History of hypertension in the family can be influenced by genetic factors and parenting factors which include dietary factors. Parents who have hypertension indirectly affect their offspring or children who may also experience hypertension (Ina et al., 2020). The results of the analysis show that respondents who have a family genetic history suffer more from hypertension (cases) than those who do not suffer from hypertension (controls). Likewise, respondents who have a family history of hypertension have a very large risk of suffering from hypertension.

Hypertension is influenced by genetic factors in the family, this is due to the association between increased individual sodium levels, genetic factors have a major role in the emergence of hypertension, this condition is proven by the finding that the incidence of hypertension occurs more in monozygotic twins (derived from one egg cell) than heterozygotes (derived from different egg cells). If you have a genetic history of hypertension and do not treat or treat it, there is a possibility that the environment will cause hypertension to develop within 30 years, accompanied by signs and symptoms of hypertension with various complications (Lawalata et al., 2021). In line with the research conducted by (Lawalata, et al., 2021) explained that there is a relationship between genetic history in the family and the incidence of hypertension.

The fundamental cause of obesity is a state of energy imbalance between calorie consumption and calories expended, including intake of high-fat foods and low physical activity. Obesity can lead to hypertension from various mechanisms, namely directly or indirectly. Obesity can directly result in increased cardiac output. The results of the analysis show that respondents who are obese suffer more from hypertension (cases) than those who do not suffer from hypertension (controls), as well as respondents who are obese have a considerable risk of suffering from hypertension.

Someone who is obese or overweight will need more blood to work to supply food and oxygen to the body's tissues, this will increase the volume of blood flowing through the blood vessels, the work of the heart will increase and this will cause blood pressure to follow. increased (Mouton et al., 2020). In line with research conducted by Herdiani et al. (2021) showing that there is a relationship between obesity and the incidence of hypertension in the elderly at the Klampis Ngasem Health Center, Surabaya City.

Physical activity is any body movement produced by muscle contraction that increases energy expenditure over daily routines. Increasing the intensity of physical activity 30-45 minutes per day is very important as a strategy for preventing hypertension (Aziz & Arofiati, 2019). In this study the results of the analysis show that regular physical activity is not a risk factor for suffering from hypertension, this is shown by the data analysis results where respondents who do not carry out regular physical activity do not suffer from hypertension (controls) more than those who suffer from hypertension (cases).

Theoretically, light, moderate or heavy physical activity depends on the type, duration, frequency and intensity of the activity carried out (Karim et al., 2018). Frequency refers to how many types of sports or activities a person does in a week, physical activity is known to help lower blood pressure if this physical activity is done regularly because regular physical activity can help the heart increase its overall efficiency (Suryani et al., 2020). In addition to regular physical activity, doing regular physical activity can also help in reducing peripheral resistance so that there will be a decrease in blood pressure (Kasumawati et al., 2020). This study is in line with the results of research conducted by Fatmawati et al. (2017) showing that there is no relationship between physical activity and the incidence of hypertension in adults (20-44 years) in the Work Area of the Puuwatu Health Center, Kendari City.

Psychological factors such as stress appear with age and changes in the cardiovascular system synergize with the increased burden on the heart. Stress causes physical, emotional and behavioral changes, when individuals experience stress and anxiety, the body experiences hormonal imbalances (Pujiastuti et al., 2022). The body's response to stress is called the defense reaction alarm or the resistance response. Stress also causes an increase in blood flow to the skeletal muscles and a decrease in blood flow to the kidneys, skin and digestive tract. Stress will make the body produce more adrenaline, this makes the heart work stronger and faster (Waty, 2022).

The results of the analysis show that respondents who experience psychological stress (mild, moderate, severe) suffer more from hypertension (cases) than those who do not have hypertension (controls). Similarly, respondents who experience psychological stress have a high risk of suffering from hypertension. Stress is basically a physical response, the emotional discomfort felt when facing a stressful situation makes our body react by releasing stress hormones (adrenaline and cortisol) into the blood. These hormones prepare the body for the "fight or flight" response by making the heart beat faster and constricting blood vessels to carry more blood to the core of the body than to the extremities. while when the stress reaction is gone, blood pressure returns to the pre-stress level, this is called situational stress. But if you are constantly in a state of stress for a long time, it can damage your health. The result of increased cortisol levels can be increased blood sugar levels and blood pressure, as well as decreased libido (Waty, 2022). This research is in line with the results of research conducted by Delavera et al. (2021) showing that there is a relationship between psychological stress conditions and the incidence of hypertension in people aged over 15 years in Indonesia.

Conclusion

Based on the results of the analysis it can be concluded that; Family genetic history, obesity, and psychological stress conditions are determinants of hypertension, but physical activity is not a determinant of hypertension. It is recommended for all adolescents and adults to be able to control eating patterns, carry out regular physical activity and control stress levels and carry out routine blood pressure control every month at the nearest health service.

References

Ashfiya, M. (2019). Faktor-Faktor Yang Berhubungan Dengan Kejadian Hipertensi Usia Dewasa Muda Di Wilayah Kerja Puskesmas Perumnas Ii Kota Pontianak. *ProNers*, *4*(1).

Aziz, A., & Arofiati, F. (2019). Aktifitas fisik untuk menurunkan tekanan darah pada penderita hipertensi: literature review. *Jurnal Kesehata Karya Husada*, *7*(1), 37-52.

Delavera, A., Siregar, K. N., Jazid, R., & Eryando, T. (2021). Hubungan Kondisi Psikologis Stress dengan Hipertensi pada Penduduk Usia≥ 15 tahun di Indonesia. *Jurnal Biostatistik, Kependudukan, dan Informatika Kesehatan*, *1*(3), 148-159.

Fatmawati, S., Jafriati, J., & Ibrahim, K. (2017). *Hubungan Life Style dengan Kejadian Hipertensi pada Usia Dewasa (20-44 Tahun) di Wilayah Kerja Puskesmas Puuwatu Kota Kendari Tahun 2017* (Doctoral dissertation, Haluoleo University).

Herawati, N. T., Alamsyah, D., & Hernawan, A. D. (2020). Hubungan antara Asupan Gula, Lemak, Garam, dan Aktifitas Fisik dengan Kejadian Hipertensi pada Usia 20–44 Tahun Studi Kasus Posbindu PTM di Desa Secapah Sengkubang Wilayah Kerja Puskesmas Mempawah Hilir. *Jumantik*, *7*(1), 34-43.

Herdiani, N., Ibad, M., & Wikurendra, E. A. (2021). Pengaruh Aktivitas Fisik Dan Obesitas

Dengan Kejadian Hipertensi Pada Lansia Di Puskesmas Klampis Ngasem Kota Surabaya. *An-Nadaa: Jurnal Kesehatan Masyarakat (e-Journal)*, *8*(2), 114-120.

Ina, S. H. J., Selly, J. B., & Feoh, F. T. (2020). Analisis Hubungan Faktor Genetik Dengan Kejadian Hipertensi Pada Usia Dewasa Muda (19-49 Tahun) Di Puskesmas Bakunase Kota Kupang Tahun 2020. *Chmk Health Journal*, *4*(3), 217-221.

Karim, N. A., Onibala, F., & Kallo, V. (2018). Hubungan aktivitas fisik dengan derajat hipertensi pada pasien rawat jalan di wilayah kerja Puskesmas Tagulandang Kabupaten Sitaro. *Jurnal Keperawatan*, *6*(1).

Kasumawati, F., Holidah, H., & A'yunin, Q. (2020). Analisis Hubungan Kebiasaan Merokok dan Aktifitas Fisik dengan Kejadian Hipertensi Pada Kelompok Usia 45-54 Tahun. *Edu Masda Journal*, *4*(1), 11-20.

Lawalata, I. V., Talarima, B., & Sahulatta, D. (2021). Hubungan Faktor Kejadian Hipertensi Pada Lansia di Wilayah Kerja Puskesmas Halong. *Moluccas Health Journal*, *3*(2).

Maimunah S. (2020). Hubungan Gaya Hidup dengan Kejadian Hipertensi pada Lansia di Desa Tawun. CAKRA Med Media Publ Penelitian; 2020; Vol 7; No 1 Website http//jurnal.akperngawi.ac.id. 2020;7(1):1–7.

Masriadi, M. (2022). Asosiasi Determinan Kejadian Hipertensi Grade 1 Usia 20-40 Tahun. *Jurnal Kesehatan Global*, *5*(1), 48-55.

Mouton, A. J., Li, X., Hall, M. E., & Hall, J. E. (2020). Obesity, hypertension, and cardiac dysfunction: novel roles of immunometabolism in macrophage activation and inflammation. *Circulation research*, *126*(6), 789-806.

Pujiastuti, C., Hindriyastuti, S., & Winarsih, B. D. (2022). Hubungan Tingkat Stres Dengan Kejadian Hipertensi Pada Pasien Rawat Inap Di Rumah Sakit Mardi Rahayu Kudus. *The Shine Cahaya Dunia D-Iii Keperawatan*, *7*(01).

Suparta, S., & Rasmi, R. (2018). Hubungan Genetik dan Stress dengan Kejadian Hipertensi. *JIKP Jurnal Ilmiah Kesehatan PENCERAH*, *7*(2), 117-125.

Suryani, N., Noviana, N., & Libri, O. (2020). Hubungan status gizi, aktivitas fisik, konsumsi buah dan sayur dengan kejadian hipertensi di Poliklinik Penyakit Dalam RSD Idaman Kota Banjarbaru. *Jurnal Kesehatan Indonesia*, *10*(2), 100-107.

Tirtasari, S., & Kodim, N. (2019). Prevalensi dan karakteristik hipertensi pada usia dewasa muda di Indonesia. *Tarumanagara Medical Journal*, *1*(2), 395-402.

Waty, G. W. G. (2022). Faktor Yang Memengaruhi Kejadian Hipertensi Pada Umur 30–40 Tahun Di Wilayah Kerja Puskesmas Palanro Kabupaten Barru. *Bina Generasi: Jurnal Kesehatan*, *13*(2), 61-73.

Wicaksono, S. (2019). Angka Kejadian Peningkatan Tekanan Darah (Hipertensi) Pada Lansia Di Dusun 1 Desa Kembangseri Kecamatan Talang Empat Bengkulu Tengah Tahun 2015. *Jurnal Kedokteran Raflesia*, *5*(1), 1-6.