

## **The Age, Smoking Habits and Hypertension Incidence in Manado City Community: A Cross-sectional Study**

**Ivonny Melinda Sapulete<sup>1</sup>, Margareth Rosalinda Sapulete<sup>2</sup>, Ronald Imanuel Ottay<sup>2</sup>,  
Oksfriani Jufri Sumampouw<sup>3\*</sup>, Jeini Ester Nelwan<sup>4</sup>, Frely Valentino Kuhon<sup>2</sup>, Martin L.  
Simanjuntak<sup>2</sup>**

<sup>1</sup>Department of Physiology, Faculty of Medicine, Sam Ratulangi University

<sup>2</sup>Department of Community Medicine, Faculty of Medicine, Sam Ratulangi University

<sup>3</sup>Department of Environmental Health, Faculty of Public Health, Sam Ratulangi University

<sup>4</sup>Department of Epidemiology, Faculty of Public Health, Sam Ratulangi University

\*Correspondent author: [oksfriani.sumampouw@unsrat.ac.id](mailto:oksfriani.sumampouw@unsrat.ac.id)

### **ABSTRACT**

The prevalence of hypertension in Indonesia continues to increase from year to year, especially in the city of Manado. The Central Statistics Agency of Manado City shows that hypertension is the disease with the highest prevalence in Manado City with a total of 27,604 cases in 2020. Hypertension risk factors are divided into 2 major parts, namely unmodified risk factors and modified risk factors. Non-modifiable risk factors such as age over 65 years, family history, and comorbidities such as diabetes mellitus (DM) or kidney disease. Risk factors that can be changed include an unhealthy diet (excessive salt consumption, a diet high in saturated fats and trans fats, low intake of fruits and vegetables), lack of physical activity, tobacco and alcohol consumption, and being overweight or obese. The purpose of this study is to analyze the correlation between age and smoking habits and the incidence of hypertension in the community in the city of Manado. This study is an observational research with a cross-sectional approach. The data was taken in Manado City. Data collection will be carried out in June 2024. Data collection was carried out through interviews using questionnaires. The data were analyzed using the square *khi* test. The results showed that the most distributed respondents were aged 50 years and over (63.3%), did not smoke (60.0%) and had hypertension (70.0%). The results of bivariate analysis obtained *p* values of 0.803 (age correlation with hypertension) and 0.328 (correlation between smoking habits and hypertension). This value suggests that there is no significant correlation between age and smoking habits and the incidence of hypertension. It can be concluded that age and smoking are not correlated to the incidence of hypertension in the people of Manado city.

**Keywords:** Hypertension; age; smoking habits

### **INTRODUCTION**

In 2017, *the American College of Cardiology and the American Heart Association* published new guidelines for hypertension management and defined high hypertension as blood pressure at or above 130/80 mmHg. *The Centers for Disease Control and Prevention* (CDC) states that stage 2 hypertension is defined as blood pressure at or above 140/90 mmHg (Whelton et al., 2017; CDC, 2022). Nearly half of adults in the United States (47%, or 116 million) suffer from hypertension. Only about 1 in 4 adults (24%) with hypertension have the condition under control. About half of adults (45%) with uncontrolled hypertension have blood pressure of 140/90 mmHg or higher. This includes 37 million U.S. adults. About 34 million adults who are recommended to take the drug may need to be prescribed and start taking it (CDC, 2021). High blood pressure costs the United States about \$131 billion annually, averaging for 12 years from 2003 to 2014 (Kirkland et al., 2018).

Uncontrolled high blood pressure is frequent; However, certain groups of people are more likely to have control over their high blood pressure than others. A greater percentage of men (50%) have high blood pressure than women (44%). High blood pressure is more common in non-Hispanic black adults (56%) than in non-Hispanic

white adults (48%), non-Hispanic Asian adults (46%), or Hispanic adults (39%). Among those recommended to take blood pressure medication, blood pressure control was higher among non-Hispanic white adults (32%) than in non-Hispanic black adults (25%), non-Hispanic Asian adults (19%), or Hispanic adults (25%) (CDC, 2021; Farley et al., 2010). The World Health Organization (WHO) states that hypertension is a serious medical condition and can increase the risk of heart, brain, kidney, and other diseases. The burden of hypertension is disproportionately felt in low- and middle-income countries, where two-thirds of cases are found, largely due to increased risk factors in that population in recent decades (WHO, 2023).

The Ministry of Health of the Republic of Indonesia stated that in Indonesia in 2013, hypertension reached 25.8% and was the third leading cause of death (Ministry of Health RI, 2013). Riskesdas 2018 data shows that the prevalence of hypertension in Indonesia is increasing and very worrying, reaching 34.11% affecting adults over the age of 18. The estimated number of hypertension cases in Indonesia is 63,309,620 people, while the death rate in Indonesia due to hypertension is 427,210 people. In 2018, it was found that residents who do not routinely check their blood pressure reached 41% (Ministry of Health of the Republic of Indonesia, 2018). Data from the Central Statistics Agency of Manado City shows that hypertension is the disease with the highest prevalence in Manado City with a total of 27,604 cases in 2020 (CSA Manado City, 2023).

The hypertension risk factors are divided into 2 major parts, namely modified risk factors and unmodified risk factors. Modifiable risk factors include an unhealthy diet (excessive salt consumption, a diet high in saturated and trans fats, low intake of fruits and vegetables), lack of physical activity, tobacco and alcohol consumption, and being overweight or obese. Non-modifiable risk factors include a family history of hypertension, age over 65 years and comorbidities such as DM or kidney disease (Shaumi and Achmad, 2019; Hidayat et al., 2021; Tumanduk et al., 2019; Kartika et al., 2021; Rahmayani, 2019).

The age risk factors are factors that cause hypertension that cannot be changed because the older a person gets, the higher blood pressure will be caused by several factors such as reduced blood vessel elasticity, kidney function as a blood pressure balancer will decrease (Heriziana, 2017). Adult age (50 years and above) is a risk group that is susceptible to hypertension. Manado City in 2023 found 115,052 people aged 50 years and above or 25%.

Smoking is one of the risk factors for hypertension. Toxic chemicals inhaled while smoking, such as nicotine which has an effect on the nervous system, nicotine can also increase pressure on the arteries and can speed up the heart rate and nicotine can significantly increase blood pressure. Smoking can also cause the process of atherogenesis and affect the activity of the sympathetic nervous system caused by the nicotine contained in cigarettes so that it can cause the formation of plaque in blood vessels and result in hypertension (Diana & Hastono, 2023).

This study aims to analyze the correlation between age and smoking habits and the incidence of hypertension in the community in the city of Manado. Research like this has indeed been done a lot, but there are several things that cause this research to be different from previous research. This research was carried out in Manado City where one of the characteristics of Manado City is a coastal city. One of the problems of coastal cities is the availability of clean water and drinking water

that is vulnerable to seawater, causing the salt content in the water to be high, which is one of the causes of hypertension. In addition, some coastal city people work as fishermen and consume marine products. This research also involves people who come to visit the Puskesmas so it is called Puskesmas-based research. Other research is conducted based on hospitals and the community.

## METHODS

This is an observational research with a cross-sectional approach. This research was carried out in Manado City in June 2024. Data was obtained from 150 respondents. These 150 respondents were obtained from patients who came to visit 3 health centers in Manado City, namely the Bahu Health Center, the Tumiting Health Center, and the Bailang Health Center. These three health centers were chosen because the work area is mostly coastal areas. The selection of respondents uses a consecutive sampling method where each subject who meets the inclusion criteria is selected until the required sample size is reached. The sample criteria are patients who come to visit the Health Center, are conscious and willing to be respondents. The data of this study was obtained by conducting interviews. The research instrument is a questionnaire. The variables in this study were age, smoking habits and the incidence of hypertension. The data analysis carried out in this study is univariate and bivariate analysis. Univariate analysis was carried out to explain the distribution of research variables. Bivariate analysis was carried out to explain the correlation between variables. The square when test is used in bivariate analysis.

## RESULTS

The distribution of age frequency, smoking habits and the incidence of hypertension can be seen in **Table 1**.

**Table 1.** Distribution of respondents based on research variables

Research variables		n	%
Age	< 50 years	55	36,7
	50 years and older	95	63,3
	Total	150	100,0
Smoking habits	Yes	60	40,0
	Not	90	60,0
	Total	150	100,0
Incidence of hypertension	Yes	105	70,0
	Not	45	30,0
	Total	150	100,0

The **Table 1** shows that the most distributed respondents are aged 50 years and above (63.3%), do not smoke (60.0%) and have hypertension (70.0%). The results of bivariate analysis to see the correlation between age and smoking habits and the incidence of hypertension can be seen in **Table 2**.

**Table 2.** Statistical test results

		Incidence of hypertension		Total	p-value
		Yes	Not		
Age	< 50 years	36	19	55	0,803
	50 years and older	70	25	95	
Total		106	46	150	
Smoking habits	Yes	38	22	60	0,328
	Not	70	20	90	
Total		108	42	150	

**Table 2** shows that respondents suffering from hypertension are most widely distributed in both age groups. Furthermore, a p value of 0.803 ( $p > 0.05$ ) was obtained, which means that there was no significant correlation between age and the incidence of hypertension in the people of Manado city. The association between smoking habits shows that both smokers and non-smokers experience the most hypertension. The p-value obtained was 0.328 ( $p > 0.05$ ). This value shows that there is no significant correlation between smoking habits and the incidence of hypertension in the people of Manado city.

## DISCUSSION

### Correlation between age and incidence of hypertension

The results of this study showed that respondents who suffered from hypertension were most distributed in both age groups. Furthermore, it was found that there was no correlation between age and the incidence of hypertension in the people of Manado city. The results of this study are different from previous studies. Research from Ardiani et al. (2015), Sugiarta (2014), and Adriani (2013) which shows that the older you get, the more risk you are of hypertension.

Age is one of the factors that affect the occurrence of hypertension. As we age, blood pressure tends to increase. This is caused by changes in the vascular system, such as a reduction in elastic tissue in the arteries so that they become stiffer. Hypertension occurs in the age group of 31-44 years (31.6%), age 45-54 years (45.3%), age 55-64 years (55.2%) (Ministry of Health 2019). Hypertension tends to increase with age. For men it will increase at the age of more than 45 years and for women it will increase at the age of more than 55 years. The results of previous studies obtained the main causes of hypertension according to the factors aged 60-74 years as many as 26 people (60.6%, 75-90 years 16 people (37.2&%)) and >90 years 1 person (2.3%) (Nelwan & Sumampouw 2019; Tambuwun et al., 2021; Memah et al., 2019; Uguy et al., 2019; Musa, 2021).

The results of this study showed different results about the correlation between age and hypertension. This could be due to several factors, such as the dominant respondents in this study were over 50 years old (63.3%) so that with a sample like this it may not have enough statistical strength to show a significant correlation between age and hypertension. In addition, there are other risk factors that are not controlled by risk factors that can also affect the occurrence of hypertension, such as lifestyle, genetics, and other medical conditions. Although there are several factors that can affect the results of this study, in general, age is a very important

risk factor for hypertension. The older a person is, the higher the risk of developing hypertension.

### **The correlation between smoking habits and the incidence of hypertension**

The results of this study show that respondents who smoke and do not smoke both experience hypertension the most. The results of the correlation analysis showed that there was no significant correlation between smoking habits and the incidence of hypertension in the people of Manado city. Theoretically, smoking is related to the incidence of hypertension. Smoking is a nicotine that causes an increase in heart rate frequency and increases systolic and diastolic blood pressure. Cigarettes contain nicotine which is addictive, stimulates abnormal functions of the heart, nerves, brain and other organs of the body, and stimulates the release of adrenaline which increases blood pressure, heart rate, and myocardial contractions (Ministry of Health, 2022).

The results of the study conducted at the Bintauna Pantai Health Center illustrate the distribution of cigarette consumption, there are more respondents who are not smokers, with a total of 93 respondents compared to 7 respondents (7%) who consume cigarettes (Talibo, 2023). Research from Muthmainnah (2019) that those who consumed cigarettes with a total of 62 respondents (52.5%) and those who did not consume cigarettes with a total of 56 respondents (47.5%) (Muthmainnah, 2019). Research from Rahmadhani (2021) that non-smokers amounted to 39 respondents (39.5%) and smokers amounted to 46 respondents (60.5%).

Smoking not only causes the risk of hypertension and heart attack but also results in a decrease in life expectancy and affects the quality of life. Tobacco in cigarettes is one of the causes of hypertension and heart attacks. One of the causes of hypertension is smoking because there is nicotine content that is absorbed by small blood vessels in the lungs and circulated to the brain. In the brain, nicotine signals the adrenal glands to release epinephrine or adrenaline which causes narrowing of blood vessels and forces the heart to work harder due to higher blood pressure (Nelwan & Sumampouw, 2019; Tambuwun et al., 2021; Memah et al., 2019; Uguy et al., 2019; Musa, 2021).

The results of this study obtained different results because there are still other factors that affect the occurrence of hypertension, namely gender, overweight, stress, alcohol consumption and excessive salt consumption. Several literature states that the factors that affect the incidence of hypertension in the elderly can be divided into 2 main factors, namely *unmodified risk factors* and *modified risk factors* (Nelwan & Sumampouw, 2019; Tambuwun et al., 2021; Memah et al., 2019; Uguy et al., 2019; Musa, 2021).

### **CONCLUSION**

The conclusion of this study shows that there is no correlation between age and smoking habits and the incidence of hypertension in the people of Manado city. Therefore, further research can be carried out on other factors related to the incidence of hypertension such as overweight, stress, alcohol consumption, excessive salt consumption and others.

## ACKNOWLEDGMENTS

The author would like to thank Sam Ratulangi University through the Institute for Research and Community Service for providing funds for the implementation of this research.

## REFERENCES

Ardiani, H. (2013). *Gambaran Hipertensi Pada Wanita Menopause Di Kelurahan Rejomulyo Kota Madiun* (Doctoral dissertation, Diponegoro University).

Ardiani, H., Saraswati, L. D., & Susanto, H. S. (2015). Risk factors of hypertension in menopausal women in Rejomulyo, Madiun.

Badan Pusat Statistik Kota Manado. (2023). Jumlah Kasus 10 Jenis Penyakit Terbanyak di Kota Manado 2020 (online) diakses dari <https://manadokota.bps.go.id/indicator/30/139/1/jumlah-kasus-10-jenis-penyakit-terbanyak-di-kota-manado.html>

Centers for Disease Control and Prevention, National Center for Health Statistics. (2022). About Multiple Cause of Death, 1999–2020. CDC WONDER Online Database website. Atlanta, GA: Centers for Disease Control and Prevention; 2022. Accessed February 21, 2022.

Centers for Disease Control and Prevention. (2021). *Hypertension Cascade: Hypertension Prevalence, Treatment and Control Estimates Among U.S. Adults Aged 18 Years and Older Applying the Criteria from the American College of Cardiology and American Heart Association's 2017 Hypertension Guideline—NHANES 2015–2018*. Atlanta, GA: U.S. Department of Health and Human Services.

Diana, T. S., & Hastono, S. P. (2023). Pengaruh Gaya Hidup terhadap Hipertensi pada Remaja: Literature Review. *Faletehan Health Journal*, 10(02), 169-177.

Farley TA, Dalal MA, Mostashari F, Frieden TR. (2010). Deaths preventable in the U.S. by improvements in the use of clinical preventive services. *Am J Prev Med*. 38(6):600–609.

Heriziana. 2017. Faktor Risiko Kejadian Penyakit Hipertensi Di Puskesmas Basuki Rahmat Palembang. Kesmas: Jurnal Kesehatan Masyarakat Jambi (Jkmj). <https://Online-Journal.Unja.Ac.Id/Jkmj/Article/Download/3689/8408> Diakses Pada 16 September 2024

Hidayat, R., Agnesia, Y., & SAFITRI, Y. (2021). Faktor Risiko Hipertensi Pada Masyarakat Di Desa Pulau Jambu Uptd Blud Kecamatan Kuok Kabupaten Kampar. *Jurnal Ners*, 5(1), 8-19.

Kartika, M., Subakir, S., & Mirsiyanto, E. (2021). Faktor-Faktor Risiko Yang Berhubungan Dengan Hipertensi Di Wilayah Kerja Puskesmas Rawang Kota Sungai Penuh Tahun 2020. *Jurnal Kesmas Jambi*, 5(1), 1-9.

Kementerian Kesehatan RI. (2013). Hasil Riset Kesehatan Dasar 2013. Jakarta

Kementerian Kesehatan RI. (2018). Hasil Riset Kesehatan Dasar 2018. Jakarta

Kementerian Kesehatan RI. (2019). Hipertensi Si Pembunuh Senyap (online) diakses dari <https://mediakom.kemkes.go.id/2019/06/hipertensi-si-pembunuh-senyap-cegah-sebelum-terlambat/>

Kementerian Kesehatan RI. (2022). Bahaya dan Efek Pajanan Rokok Pada Anak dan Remaja (online) diakses dari

[https://yankes.kemkes.go.id/view\\_artikel/1336/bahaya-dan-efek-pajanan-rokok-pada-anak-dan-remaja](https://yankes.kemkes.go.id/view_artikel/1336/bahaya-dan-efek-pajanan-rokok-pada-anak-dan-remaja)

Kirkland EB, Heincelman M, Bishu KG, et. al. (2018). Trends in healthcare expenditures among US adults with hypertension: national estimates, 2003-2014. *J Am Heart Assoc.* 7:e008731.

Memah, M., Kandou, G. D., & Nelwan, J. E. (2019). Hubungan antara kebiasaan merokok dan konsumsi alkohol dengan kejadian hipertensi di Puskesmas Kombi Kecamatan Kombi Kabupaten Minahasa. *Kesmas*, 8(1).

Musa, E. C. (2021). Status Gizi Penderita Hipertensi di Wilayah Kerja Puskesmas Kinilow Tomohon. *Sam Ratulangi Journal of Public Health*, 2(2), 060-065.

Muthmainnah, M., Kunoli, F. J., & Nurjanah, N. (2019). Hubungan Peran Keluarga Dan Peran Tenaga Kesehatan Dalam Kepatuhan Pengobatan Penderita Hipertensi Di Wilayah Kerja Puskesmas Sangurara Kota Palu. *Jurnal Kolaboratif Sains*, 2(1).

Nelwan J. E. (2022). Epidemiologi Penyakit Tidak Menular, Eurika Media Aksara, Jawa Tengah

Nelwan, J. E., & Sumampouw, O. (2019). Pengaruh penyuluhan kesehatan terhadap perubahan pengetahuan masyarakat tentang hipertensi di Kota Manado. *Journal PHWB*, 1(2), 1-7.

Rachmawati, E., Rahmadhani, F., Ananda, M. R., Salsabillah, S., & Pradana, A. A. (2021). Faktor-Faktor Yang Mempengaruhi Pengetahuan Keluarga Terhadap Penyakit Hipertensi: Telaah Naratif. *Jurnal Mitra Kesehatan*, 4(1), 14-19.

Rahmayani, S. T. (2019). Faktor-faktor risiko kejadian hipertensi primer pada usia 20-55 tahun di poliklinik penyakit dalam rsud 45 kuningan. *Syntax*, 1(4), 100-111.

Shaumi, N. R. F., & Achmad, E. K. (2019). Kajian literatur: faktor risiko hipertensi pada remaja di Indonesia. *Media Penelitian dan Pengembangan Kesehatan*, 29(2), 115-122.

Sugiarta, I. G. R. M., Mahendra, G. R., & Satriyasa, B. K. (2014). Karakteristik Penderita Hipertensi Yang Dirawat Inap Di Rumah Sakit Umum Pusat Sanglah Tahun 2013. *Bagian Farmakologi Fakultas Kedokteran Universitas Udayana ABSTRAK*, 14(3), 3-5.

Talibo, R, (2023). Gambaran Faktor Risiko Hipertensi di Wilayah Kerja Puskesmas Bintauna Pantai Kabupaten Bolaang Mongondow Utara 2023. Skripsi, Fakultas Kesehatan Masyarakat Universitas Sam Ratulangi Manado

Tambuwun, A. A., Kandou, G. D., & Nelwan, J. E. (2021). Hubungan karakteristik individu dengan kepatuhan berobat pada penderita hipertensi di Puskesmas Wori Kabupaten Minahasa Utara. *KESMAS*, 10(4).

Tumanduk, W. M., Nelwan, J. E., & Asrifuddin, A. (2019). Faktor-faktor risiko hipertensi yang berperan di Rumah Sakit Robert Wolter Mongisidi. *e-CliniC*, 7(2).

Uguy, J. M., Nelwan, J. E., & Sekeon, S. A. (2019). Kebiasaan Merokok Dan Kejadian Hipertensi Di Wilayah Kerja Puskesmas Molompar Belang Kecamatan Belang Kabupaten Minahasa Tenggara Tahun 2018. *KESMAS: Jurnal Kesehatan Masyarakat Universitas Sam Ratulangi*, 8(1).

Whelton PK, Carey RM, Aronow WS, Casey DE, Collins KJ, Dennison C, et al. (2017). Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. *Hypertension*. **71**(19):e13–115.

World Health Organization. (2023). Hypertension (online) diakses dari <https://www.who.int/news-room/fact-sheets/detail/hypertension>