

DETERMINANTS OF HYPERTENSIVE INCIDENCE IN COASTAL COMMUNITIES ON HIRI ISLAND, TERNATE CITY

Fera The^{1*}, Dini Rahmawati Permana¹, Andri Imbar²

Department of Public Health, Faculty of Medicine, Khairun University, Ternate, Indonesia¹, Bachelor degree of Medicine, Faculty of Medicine, Khairun University, Ternate, Indonesia²

*Corresponding Author : fera_the@yahoo.com

ABSTRAK

Hipertensi merupakan salah satu penyakit tidak menular yang ditandai dengan peningkatan tekanan darah di atas normal. Prevalensi hipertensi secara global sekitar 1,28 miliar usia dewasa, sebagian besar tinggal di negara berpenghasilan rendah maupun menengah. Hipertensi yang jika dibiarkan dalam jangka panjang dapat menyebabkan komplikasi dan kematian secara tiba-tiba. Determinan atau faktor risiko kejadian hipertensi dibagi menjadi dapat dimodifikasi dan tidak dapat dimodifikasi. Masyarakat pesisir yang dikelilingi dengan laut mempunyai risiko yang signifikan terhadap hipertensi. Pulau Hiri merupakan salah satu pulau dan daerah pesisir di Kota Ternate dengan angka kejadian hipertensi tertinggi. Penelitian ini memiliki tujuan untuk mengetahui hubungan antara determinan yang tidak dapat dimodifikasi (usia dan jenis kelamin) dan determinan yang dapat dimodifikasi (riwayat konsumsi garam, konsumsi sayur, aktivitas fisik, dan obesitas) dengan kejadian hipertensi. Metode penelitian yang digunakan adalah analisis observasional dengan pendekatan *cross sectional* menggunakan teknik pengambilan sampel secara *accidental sampling* sebanyak 113 responden usia dewasa >18 tahun pada masyarakat di Pulau Hiri. Data dianalisis secara bivariat (*Chi square*). Hasil analisis didapatkan 52 terdiagnosis hipertensi dan 61 tidak terdiagnosis hipertensi serta menunjukkan terdapat hubungan yang signifikan antara determinan yang dapat dimodifikasi dengan hipertensi yaitu konsumsi garam ($p = 0,002$), konsumsi sayur ($p = 0,001$), aktivitas fisik ($p = 0,000$), dan obesitas ($p = 0,016$). Beberapa determinan yang tidak dapat dimodifikasi tidak memiliki hubungan yang signifikan, yaitu usia ($p = 0,062$) dan jenis kelamin ($p = 0,699$). Berdasarkan data tersebut dapat disimpulkan bahwa determinan yang dimodifikasi memiliki hubungan erat dengan kejadian hipertensi. Edukasi terkait pencegahan sangat dibutuhkan untuk menurunkan angka kejadian hipertensi dan komplikasinya.

Kata kunci : determinan, hipertensi, Pulau Hiri

ABSTRACT

Hypertension is one of the non-communicable diseases characterized by the increase in blood pressure above normal. Hypertension that left in the long term can cause complications and sudden death. Determinants or risk factors for hypertension incidence are divided into modifiable and non-modifiable. Coastal communities surrounded by the sea are at significant risk of hypertension. Hiri Island is one of the islands and coastal areas in Ternate City with the highest incidence of hypertension. This study aims to determine the relationship between non-modifiable determinants (age and sex) and modifiable determinants (history of salt consumption, vegetable consumption, physical activity, and obesity) with the incidence of hypertension. This research used observational analysis with a cross sectional approach using accidental sampling techniques of 113 adults >18 year old respondents in the community on Hiri Island. The data were analyzed bivariately (*Chi square*). The results of the analysis found 52 diagnosed hypertension and 61 undiagnosed hypertension and showed a significant relationship between modifiable determinants with hypertension, such as salt consumption ($p = 0.002$), vegetable consumption ($p = 0.001$), physical activity ($p = 0.000$), and obesity ($p = 0.016$). Some non-modifiable determinants did not have significant relationship, such as age ($p = 0.062$) and sex ($p = 0.699$). Based on the data result, it could be concluded that the modified determinants have a close relationship with the incidence of hypertension. Education related to prevention is needed to reduce the incidence of hypertension and its complications.

Keywords : determinant, hypertension, Hiri Island

INTRODUCTION

Hypertension or also known as high blood pressure is defined as an increase in systolic blood pressure >140 mmHg and diastolic blood pressure >90 mmHg measured twice in five minutes intervals in a state of well-rested or calm. Hypertension is one of the leading causes of premature death worldwide because the long-term or persistent high blood pressure can harm the kidneys (kidney failure), heart (coronary heart disease), and brain (causing stroke) if not detected early and treated appropriately (Pusat Data dan Informasi Kementerian Kesehatan RI, 2014). According to the World Health Organization (WHO) there were 1.13 billion people worldwide with hypertension in 2015, with only 36.8% taking hypertension medication (World Health Organization, 2018). The World Health Organization (WHO), estimates that 22% of the world's total population had hypertension in 2019, with less than one-fifth of this population making efforts to control their blood pressure (Pangribowo, 2019).

In 2018, there were 972 million cases of hypertension (26.4% of the total population). This shows a significant difference between the 2019 estimate and the prevalence in 2018. The prevalence of hypertension is expected to increase to 29.2% of the global population by 2025 (World Health Organization, 2021). According to data from the National Basic Health Research in 2018, the prevalence of hypertension in Indonesia is 34.1% based on measurements in the population aged 18 years and over. This increased from the prevalence of hypertension in 2013 of 25.8%. As for the prevalence of hypertension in North Maluku Province itself is 24.65% in 2018 (Kementerian Kesehatan RI, 2019). The risk of hypertension and cardiovascular disease continues to rise over time in line with lifestyle changes and modernization process. Several studies have found that hypertension risk factors are associated with, among others, age, sex, education level, occupation, residence, smoking habits, alcohol consumption, consumption of high-sodium foods, and physical activity (Pangribowo, 2019).

According to one study, hypertension is more prevalent in coastal areas than in mountainous areas. The findings of the research analysis revealed that coastal areas have the highest sodium intake. According to his research, the cause of high blood pressure is the habitual pattern of people who marinate processed seafood and there is significant association between incidence of hypertension and nutrition intake. (Rusliafa, Amiruddin and Noor, 2014). This increases the likelihood of hypertension in coastal areas, where sodium intake plays a role in the incidence of hypertension. Coastal communities tend to consume foods high in iodine and consume fish and marine animals with high cholesterol levels. Physiologically, the blood vessels undergo vasoconstriction when there is an intake imbalance of micronutrients such as iodine, calcium and sodium and directly contribute to an increase in blood pressure. It is a significant risk factor for hypertension, especially in coastal areas (Saputra and Anam, 2016).

Based on this background, researchers are interested to analyzing data on Hiri Island, North Maluku as one of coastal areas to investigate the association between modifiable determinants such as history of salt consumption, vegetable consumption, physical activity, and obesity with the incidence of hypertension. The lifestyle of people on Hiri Island on the coast who tend to consume foods high in salt and cholesterol is a risk factor for hypertension events that are quite high. This study aims to determine the relationship between sex, age, education level, occupation, smoking, physical activity, salt consumption, vegetable and fruit consumption and Body Mass Index with the incidence of hypertension in people on Hiri Island. It is hoped that this study will contribute to hypertension prevention efforts and help to reduce the incidence of hypertension among coastal communities.

METHODS

This type of study is cross-sectional using univariate and bivariate analysis to determine the relationship of risk factors with the incidence of hypertension. This research will be carried out in June 2023 – July 2023 which will be carried out on Hiri Island, Ternate City. This research began with permission from the Ternate City Health Office and Puskesmas. The study sample was adults on Hiri Island with inclusion criteria such as people aged >18 years, elderly people who can communicate well and understand reading clearly so that they are able to respond to statements in questionnaires, willing to be a research subject by filling out an informed consent sheet. The samples in this study were selected through accidental sampling techniques during data collection. Data collection tools in the form of questionnaires with structured questions. The results of data collection were then processed using SPSS using univariate analysis and bivariate analysis to see the relationship of risk factors with the incidence of hypertension in coastal communities

RESULTS

This study was conducted on Hiri Island and obtained 113 respondents. The data distribution is presented below.

Table 1. Relationship Between Age and The Incidence of Hypertension in The Elderly

Age	Hypertension		Total	Significance
	Yes	Not		
<45 years old	9	22	31	0.062*
45-60 years old	24	25	49	
>60 years old	19	14	33	
Total			113	

The results of the analysis obtained from research subjects diagnosed with hypertension as many as 52 people aged < 45 years as many as 9 people, 45-60 years as many as 24 people and >60 years as many as 19 people. The study subjects who were not diagnosed with hypertension were 61 people aged < 45 years as many as 22 people, 45-60 years as many as 25 people and >60 years as many as 14 people. Obtained p value = 0.062, it was concluded that there was no significant relationship between age and hypertension. The results of the analysis obtained, respondents diagnosed with hypertension as many as 85 people have female sex and 28 people who have male gender. Respondents who were not diagnosed with hypertension as many as 45 people had female sex and 16 were men. Respondents diagnosed with hypertension as many as 40 people had female gender and 16 men. Obtained p value = 0.699, it can be concluded that there is no significant relationship between sex and hypertension in the elderly. The data will shown on table 2.

Table 2. Relationship of Sex with Hypertension

Gender	Hypertension		Total	Significance
	Yes	Not		
Man	12	16	28	0.699*
Woman	40	45	85	
Total			113	

The relationship of salt consumption with hypertension (table 3), The results of the analysis obtained from a total sample of 113 samples, there were as many as 30 people who consumed high-salt foods diagnosed with hypertension, 3 people who consumed enough-salt,

and 19 people who consumed low-salt foods diagnosed with hypertension. Obtained p value = 0.002 then it can be concluded that there is a significant relationship between salt consumption and hypertension.

Table 3. Relationship Of Salt Consumption with Hypertension

Salt Consumption	Hypertension		Total	Significance
	Yes	Not		
High	30	22	52	0.002*
Enough	3	19	22	
Low	19	20	39	
Total			113	

The relationship of vegetable consumption with hypertension (table 4), the results of the analysis obtained from a total sample of 113 samples, there were 34 people who consumed vegetables diagnosed with hypertension, and 18 people who did not consume vegetables diagnosed with hypertension. Obtained p value = 0.001 then it can be concluded that there is a significant relationship between vegetable consumption and hypertension. The data is presented as follows.

Table 4. Relationship of Vegetable Consumption with Hypertension

vegetable consumption	Hypertension		Total	Significance
	Yes	Not		
Yes	34	55	89	0.001*
Not	18	6	24	
Total			113	

Relationship of physical activity with hypertension (table 5) The results of the analysis obtained from a total sample of 113 samples, there were 5 respondents with light physical activity diagnosed with hypertension, 35 respondents of moderate physical activity diagnosed with hypertension and 12 respondents of heavy physical activity diagnosed with hypertension. Obtained p value = 0.000 then it can be concluded that there is a significant relationship between physical activity and hypertension. The data is presented as follows.

Table 5. Relationship of Physical Activity with Hypertension

Physical Activity	Hypertension		Total	Significance
	Yes	Not		
Heavy	5	1	6	0.000*
Keep	35	24	59	
Light	12	36	48	
Total			113	

Table 6. Relationship of Obesity with Hypertension

Obesity	Hypertension		Total	Significance
	Yes	Not		
Yes	22	30	52	0.016*
Not	13	48	61	
Total			113	

The results of the analysis obtained from a total sample of 113 samples, there were 22 respondents with obesity diagnosed with hypertension and 13 respondents who did not have

obesity diagnosed with hypertension. Obtained p value = 0.016 then it can be concluded that there is a significant relationship between obesity and hypertension. The association between obesity and hypertension shown on table 6.

DISCUSSION

The Relationship Between Age and the Incidence of Hypertension in the Elderly

Based on data analysis, this study is not in line with research conducted by The et al. (2023) at the Puskesmas Kota Kota Ternate / Ternate Island with a sample of 299 respondents, which showed as many as 157 people aged 45-70 years and 23 people aged >70 years diagnosed with hypertension. The results of the study show that there is a relationship between age and the incidence of hypertension, because with increasing age will increase the risk of hypertension events. This is due to changes in the structure of blood vessels such as the buildup of collagen in the muscle layer, which makes the walls of blood vessels thicken. This makes the walls of blood vessels slowly narrow and stiff so that blood pressure becomes high.

The Relationship Between Sex and Hypertension

The results of this study are in line with research conducted by Tumanggor et al. (2022) at the Mandala Health Center, Medan District, as many as 86 samples, in this study it was found that the majority of respondents who experienced hypertension were female as many as 52 respondents (60.5%), while for men as many as 34 respondents (39.5%) and the results of this study were also supported by research conducted by The et al. (2023) in Puskesmas in Ternate City / Ternate Island with a sample of 299 respondents, which shows that as many as 135 respondents diagnosed with hypertension are women, while 45 respondents are men and the rest are not diagnosed with hypertension. However, the results of this study are not in line with research conducted by Garwahasada and Wirjatmadi (2020) which says that men are more at risk of hypertension by 8,229 times than women, this is because the diet and lifestyle in women are better than men.

The Relationship Between Salt Consumption and hypertension

According to the results of the data analysis, this study is supported by research conducted by Yunus, Kadir and Lalu (2023) at the Central City Health Center of Gorontalo City as many as 224 samples, where in this study the proportion of hypertension incidence was more obtained in respondents who had abnormal salt consumption patterns as many as 79 people (62.2%) and 44 people (45.3%) for respondents who had normal salt consumption patterns. This is because someone who consumes high amounts of sodium can shrink the diameter of blood vessels, as a result the heart will experience an increase in pumping power that aims to push blood volume through blood vessels that are getting smaller and resulting in an increase in blood pressure.

The Relationship Between Vegetable Consumption and Hypertension

The results of this study are in line with research conducted by Fakhriyah et al. (2023) which shows that there is a relationship between consuming fruits and vegetables with hypertension. According to Leo, Willa and Bilaut (2020) vegetables and fruits are a group of food ingredients with a high amount of potassium. High consumption of potassium can lower blood pressure. The mechanism of action of potassium in preventing narrowing of blood vessels (atherosclerosis) is to keep the walls of arteries elastic and optimize their function so that they are not easily damaged by high blood pressure. In addition, the mechanism of action

of potassium as opposed to sodium is that it tends to draw fluid from the extracellular part and lower blood pressure.

The Relationship Between Physical Activity and Hypertension

The results of this study are in line with research conducted by Rhamdika et al. (2023) which showed that there is a significant relationship between physical activity and the incidence of hypertension. According to Firdaus and Suryaningrat (2020), exercise or heavy physical activity can reduce blood pressure with systemic vascular resistance mechanisms, suppress sympathetic nervous system activity, plasma renin activity, homeostasis model assessment, insulin resistance index, body weight, and abdominal circumference, besides that exercise also helps improve blood lipid profiles. In people who often do sedentary activities, for example sitting there will be constriction of the main blood vessels in the lower extremities, especially under the thighs. This leads to increased peripheral resistance of the blood vessels and there will also be fluid accumulation in the lower limbs. So that the heart muscle will also work stronger at each heart contraction. The stronger the heart pumps blood, the greater the pressure exerted on the artery walls, increasing peripheral pressure and causing hypertension.

The Relationship Between Obesity and Hypertension

The results of this study are in line with research conducted by Kartika and Purwaningsih (2020) which states that there is a significant relationship between obesity and hypertension with 39 obese people from 65 respondents diagnosed with hypertension. According to Gunawan and Adriani (2020) obesity is related to hypertension because when body mass index (BMI) increases, it will be followed by an increase in lipids in the body. The hormone leptin is one of the hormones produced by lipid cells in adipose tissue. This hormone functions to slow down food intake and reduce weight by increasing thermogenesis through activating the sympathetic nervous system so that it can trigger hypertension

CONCLUSION

Modified determinants have a close relationship with the incidence of hypertension. Education related to prevention is needed to reduce the incidence of hypertension and its complications

ACKNOWLEDGMENT

This research is financially supported by the Institute for Research and Community Service (LPPM) of Khairun University through the "DIPA Faculty of Medicine 2023". Therefore, researchers are grateful for the funding and support of this research

REFERENCES

- Fakhriyah *et al.* (2023) 'Hubungan Merokok, konsumsi Buah dan Sayur, Asupan Garam, Aktifitas Fisik dan Durasi Tidur dengan Kejadian Hipertensi di Desa Pemurus Kecamatan Aluh-Aluh', Prosiding Forum Ilmiah Tahunan IAKMI [Preprint]. Available at: <http://jurnal.iakmi.id/index.php/FITIAKMI> (Accessed: 7 July 2023).
- Firdaus, M. and Suryaningrat, W.C. (2020) 'Hubungan Pola Makan dan Aktivitas Fisik Terhadap Tekanan Darah Pada Pasien Hipertensi di Kapuas Hulu', *Majalah Kesehatan*, 7(2).

- Garwahasada, E. and Wirjatmadi, B. (2020) 'Hubungan Jenis Kelamin, Perilaku Merokok, Aktivitas Fisik dengan Hipertensi Pada Pegawai Kantor', *Media Gizi Indonesia*, 15(1).
- Gunawan, S.P. and Adriani, M. (2020) 'Obesitas dan Tingkat Stres Berhubungan Dengan Hipertensi Pada Orang Dewasa di Kelurahan Klampis Ngasem, Surabaya', *Media Gizi Indonesia*, 15(2), pp. 119–126.
- Kartika, J. and Purwaningsih, E. (2020) 'Hubungan Obesitas pada Pra Lansia dengan Kejadian Hipertensi di Kecamatan Senen Jakarta Pusat Tahun 2017-2018', *Jurnal Kedokteran dan Kesehatan*, 16(1). Available at: <https://jurnal.umj.ac.id/index.php/JKK> (Accessed: 13 July 2023).
- Kementerian Kesehatan RI (2019) *Laporan Nasional Riskesdas 2018*. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan (LPB).
- Leo, A.A.R., Willa, S.M.Ch. and Bilaut, D.A. (2020) 'Hubungan Konsumsi Laru, Garam, Sayur, dan Buah Terhadap Risiko Hipertensi Pria Dewasa Kupang', *Jurnal Ilmiah Gizi Kesehatan*, 1(2). Available at: <http://jurnal.umus.ac.id/index.php/JIGK/article/view/136/76> (Accessed: 7 July 2023).
- Pangribowo, S. (2019) 'Hipertensi si Pembunuh Senyap', Pusat Data dan Informasi Kementerian Kesehatan RI.
- Pusat Data dan Informasi Kementerian Kesehatan RI (2014) 'Hipertensi', pp. 1–6.
- Rhamdika, M.R. et al. (2023) 'Hubungan Aktivitas Fisik dengan Kejadian Hipertensi Pada Perempuan Etnis Minangkabau di Kota Padang', *Jurnal Kedokteran dan Kesehatan*, 19(1). Available at: <https://jurnal.umj.ac.id/index.php/JKK> (Accessed: 7 July 2023).
- Rusliafa, J., Amiruddin, R. and Noor, N.B. (2014) *Komparatif Kejadian Hipertensi pada Wilayah Pesisir Pantai dan Pegunungan di Kota Kendari Tahun 2014*. Thesis. Universitas Hasanuddin.
- Saputra, O. and Anam, K. (2016) 'Gaya Hidup Sebagai Faktor Risiko Hipertensi pada Masyarakat Pesisir Pantai', *Majority*, 5(3).
- The, F. et al. (2023) 'The Relationship of Risk Factors to the Incidence of Hypertension in Pre-Elderly and Elderly (Study in Ternate City)', *Journal of The Community Development in Asia*, 6(2), pp. 1–18. Available at: <https://doi.org/10.32535/jcda.v6i2.2324>.
- Tumanggor, S.D. et al. (2022) 'Karakteristik Pasien Hipertensi di Puskesmas Mandala Kecamatan Medan Tembung', *Jurnal Kedokteran STM*, 5(2).
- World Health Organization (2018) *Non-Communicable Disease Country Profiles 2018*.
- World Health Organization (2021) *Hypertension*. Available at: <https://www.who.int/news-room/fact-sheets/detail/hypertension> (Accessed: 20 December 2022).
- Yunus, M.H., Kadir, S. and Lalu, N.A.S. (2023) 'Hubungan Pola Konsumsi Garam dengan Kejadian Hipertensi Pada Lansia di Puskesmas Kota Tengah', *Gorontalo Journal Health and Science Community*, 7(1). Available at: <https://ejurnal.ung.ac.id/index.php/gojhes/index> (Accessed: 7 July 2023).