Habitus Food and Medica

E-ISSN:xxxx-yyyy

Vol. 1(1):26-35, 2025, https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

Journal homepage: https://www.journalmpci.com/index.php/hfm

Relationship of Nutritional Status, Nutrient Intake, Physical Activity, and Smoking Habits with Hypertension in Cardiology Outpatient Clinic

Nur Salsabila[1]*, Lili Amaliah[1], Ratu Diah Koerniawati[1]

[1] Department of Nutrition, Universitas Sultan Ageng Tirtayasa, Indonesia

Corresponding Author Email: sabilazis140704@gmail.com

ARTICLES

Submitted: 10 August 2025

Accepted: 25 September 2025

Keywords:

Physical activity, Nutrient intake, Hypertension, Smoking habits, Nutritional status

ABSTRACT

This study aims to investigate the relationship between nutritional status, nutrient intake (including fat, fiber, and sodium), physical activity, and smoking habits, and the incidence of hypertension at the Cardiac Polyclinic of RSUD Banten. This study was conducted from January to February, utilizing a quantitative method with a cross-sectional design and a purposive sampling technique, involving 36 respondents. Research data were collected through direct interviews using the SQ-FFQ, IPAQ SF, and GN-SBQ questionnaires. The results showed that the majority of respondents (52.8%) in the Cardiac Polyclinic of RSUD Banten were female, aged 50–64 years, and had a family history of hypertension (63.9%). Most respondents (91.7%) experienced hypertension, with half of the respondents having excess nutritional status. Additionally, excessive fat intake (72.2%), low fiber intake (61.1%), and excessive sodium intake (27.8%) were found. A total of 44.4% of respondents had low physical activity, and 11.1% had a very heavy smoking habit. Based on the analysis using the Chi-square test, it was found that there were significant relationships between nutritional status (p=0.001), fat intake (p=0.021), physical activity (p=0.043), and smoking habits (p=0.020) with the incidence of hypertension, while there were no significant relationships between fiber intake (p=0.353) and sodium intake (p=0.529) with the incidence of hypertension. The conclusion of this study is that nutritional status, fat consumption, physical activity, and smoking habits are associated with the incidence of hypertension in outpatients at the Cardiac Polyclinic of RSUD Banten

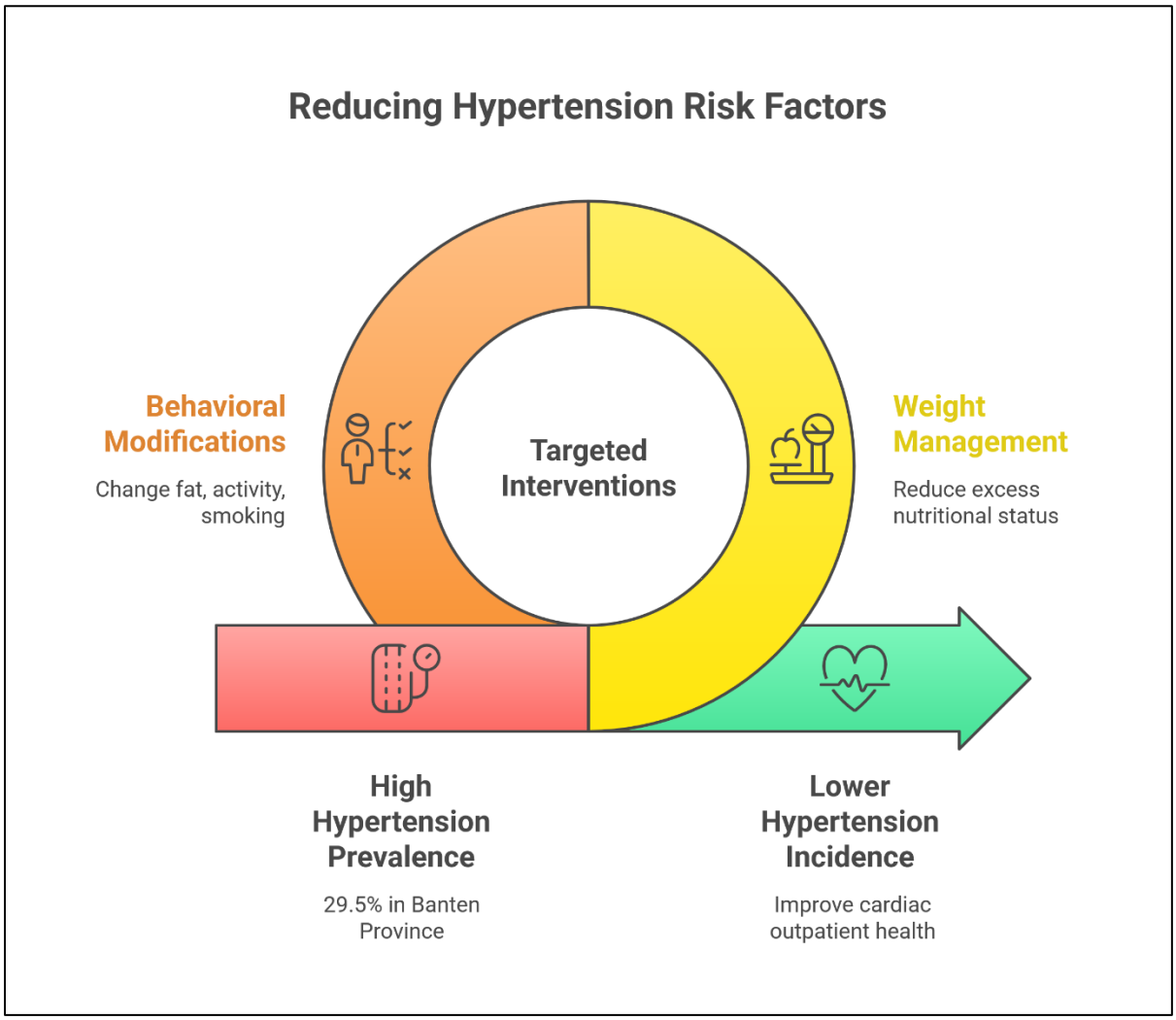
Key Messages:

- Nutritional status, excessive fat consumption, physical inactivity, and smoking habits are identified as significant determinants of hypertension among cardiac outpatients at RSUD Banten, highlighting the critical need for targeted interventions focused on weight management and behavioral modifications

Access this article online

Quick Response Code

GRAPHICAL ABSTRACT



INTRODUCTION

Non-communicable diseases (NCDs) represent a major challenge in the global health system. The World Health Organization (WHO) notes that NCDs account for 71% of deaths globally, with approximately 41 million deaths annually, and 77% of these occur in low- to middle-income countries (1). In Indonesia, a similar trend is observed, where NCDs are the leading cause of death, contributing 69.91% (2). The shift in disease patterns from communicable diseases to NCDs indicates a significant change in the burden of public health.

One of the most dominant NCDs is cardiovascular disease, which accounted for 30% of total deaths in Indonesia in 2023 (3). These diseases include hypertension, stroke, coronary heart disease, and heart failure. Among the risk factors for cardiovascular disease, hypertension is one of the most significant and prevalent in the productive-age population. WHO (2019) estimates that 22% of the world's population suffers from hypertension, and in Indonesia, the prevalence reaches 26.4%, with a projection to increase to 29.2% by 2025 (4).

Hypertension is influenced by various risk factors, both uncontrollable, such as age, gender, and genetics, and controllable, such as diet, physical activity, smoking habits, and nutritional status. Riskesdas data shows an increase in hypertension prevalence from 25.8% in 2013 to 34.1% in 2018 in the population aged ≥ 18 years (2). In Banten Province, the prevalence of hypertension reached 29.5%, with Serang City reporting a surge in cases, increasing from 15,963 cases in 2021 to 123,266 cases in 2023 (5).

Several previous studies have shown a relationship between nutritional status, consumption of fat,

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

sodium, fiber, physical activity, and smoking habits with the incidence of hypertension (6–8). However, there are still limitations in studies that comprehensively examine all these factors simultaneously, particularly in populations within health care facilities. Based on these issues, this study aims to analyze the relationship between nutritional status, intake of fat, fiber, and sodium, physical activity, and smoking habits with the incidence of hypertension in patients at the Cardiac Polyclinic of RSUD Banten.

METHODS

This study employed an analytical quantitative design with a cross-sectional approach, conducted at the Cardiac Polyclinic of RSUD Banten from January to February 2025. The study was carried out through direct interviews using the SQ-FFQ, IPAQ, and modified GN-SBQ questionnaires. The study population consisted of outpatients at the cardiac polyclinic of RSUD Banten who met the following inclusion criteria: outpatients visiting the cardiac polyclinic of RSUD Banten, willing to participate as respondents, having signed an informed consent form, and being able to communicate effectively.

Samples were collected using a purposive sampling technique, involving a total of 36 respondents. The independent variables in this study were gender, age category, family history of hypertension, nutritional status, nutrient intake (fat, fiber, and sodium), physical activity, and smoking habits, while the dependent variable was the incidence of hypertension in the Cardiac Polyclinic of RSUD Banten. Data analysis was performed with the Chi-square test using SPSS. The protocol for this study has been approved by the KEPK (Health Research Ethics Committee) of Universitas Sultan Ageng Tirtayasa with Number 1/UN43.20/KEPK/2025.

RESULTS

Table 1 indicates that the majority of respondents in this study were female, comprising 19 individuals (52.8%), while the male respondents totaled 17 individuals (47.2%). In the age category, most respondents were in the 50-64 years age range, totaling 19 people (52.8%), followed by the 65-80 years age group with 10 people (27.8%), the 30-49 years with 6 people (16.7%), and the 19-29 years with 1 person (2.8%). Furthermore, based on family history of hypertension, it is known that 23 respondents (63.9%) had a family history of hypertension, while the other 13 respondents (36.1%) did not have such a history. In addition, based on blood pressure measurements, 33 respondents (91.7%) fell into the hypertension category, while 3 respondents (8.3%) were in the normal category.

Table 1. Frequency distribution of respondent characteristics

Characteristics	Category	n	%
Gender	Male	17	47.2
	Female	19	52.8
Age Category	19-29 years	1	2.8
	30-49 years	6	16.7
	50-64 years	19	52.8
	65-80 years	10	27.8
	>80 years	0	0
Family History of Hypertension	Yes	23	63.9
	No	13	36.1

Based on Table 2, it is known that nutritional status based on Body Mass Index (BMI) shows that 18 respondents (50%) were classified in the overnutrition category. This indicates that excess nutritional status is the most dominant condition among the study respondents. Regarding fat intake, the majority of respondents showed an excessive consumption pattern, totaling 26 people (72.2%). This condition indicates that high fat consumption remains a major problem that can increase the risk of hypertension and other cardiovascular diseases . meanwhile, regarding fiber intake, most respondents also experienced a lack of fiber intake, with 22 respondents (61.1%) in the deficient category. This low fiber consumption can have a negative impact on blood pressure control and overall body metabolism.

Unlike fat and fiber, sodium intake data showed that most respondents were in the deficient

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

sodium intake category, namely 18 respondents (50%). Meanwhile, there were 10 respondents (27.8%) with excessive sodium intake. This could be an indication that respondents are starting to comply with doctors' advice regarding the importance of limiting salt consumption. Meanwhile, the distribution of physical activity results showed that 16 respondents (44.4%) had a low level of physical activity. Thus, almost half of the respondents did not perform sufficient or routine physical activity, either in the form of exercise or daily activities involving body movement. Furthermore, based on the distribution of respondent smoking habits, it is known that 4 respondents (11.1%) were included in the very heavy smoker category. This category refers to individuals who smoke in high quantities per day and have done so for a long period.

Table 2. Distribution of nutritional status, nutrient intake (fat, fiber, and sodium), physical activity, and smoking habits of respondents

Characteristics	Category	n	%
Blood Pressure	Hypertension	33	91.7
	Normal	3	8.3
Nutritional Status	Over	18	50
	Normal	15	41.7
	Under	3	8.3
Fat Intake	Excessive	26	72.2
	Sufficient	5	13.9
	Deficient	5	13.9
Fiber Intake	Deficient	22	61.1
	Sufficient	3	8.3
	Excessive	11	30.6
Sodium Intake	Excessive	10	27.8
	Sufficient	8	22.2
	Deficient	18	50
Physical Activity	Low	16	44.4
	Normal	20	55.6
	High	0	0
Smoking Habits	Non-smoker	21	58.3
	Very Heavy	4	11.1
	Heavy	9	25
	Moderate	2	5.6
	Light	0	0

Based on Table 3, it is known that the average fat intake of respondents was 84 grams/day with a standard deviation of 35 grams, which exceeds the fat intake recommendation for adults in the 2019 RDA (AKG), which is 62-67 grams/day. This indicates excessive fat consumption potentially increasing the risk of hypertension. The average fiber intake was recorded at 22 grams/day with a standard deviation of 17 grams, which is still below the RDA recommendation of 25-30 grams/day. Although approaching the ideal figure, this shows that most respondents have not optimally met their daily fiber needs. Meanwhile, the average sodium intake was found to be 1,072 mg/day with a standard deviation of 716 mg, which is generally still below the maximum daily intake of 2,300 mg/day. However, the high standard deviation indicates a large variation between individuals, with the possibility that some respondents consume sodium in very high amounts. This would still cause a risk of increased blood pressure events in respondents.

Table 3. Mean, Standard Deviation, Minimum, and Maximum of Nutrient Intake (Fat, Fiber, and Sodium)

Intake	Mean	Standard Deviation (SD)	Minimum	Maximum
Fat (g)	84	35	26	150
Fiber (g)	22	17	4	68
Sodium(mg)	1,072	716	174	3,026

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

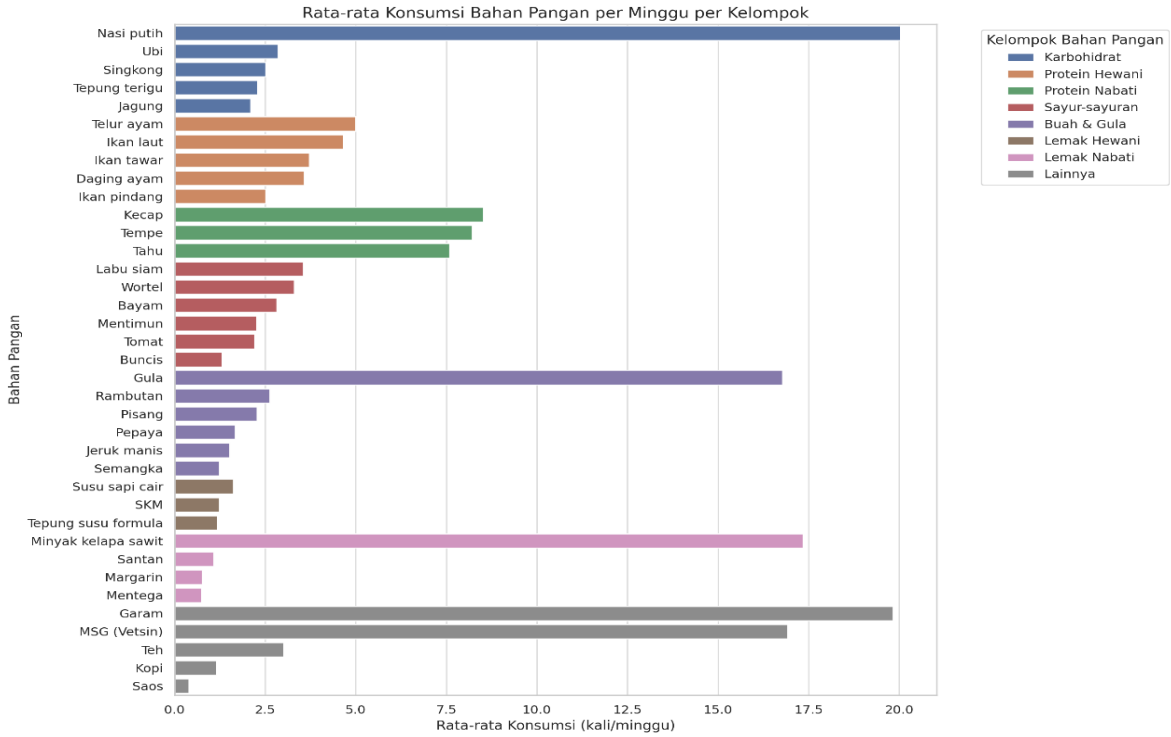


Figure 1. Overview of Food Types and Consumption Frequency

Based on SQ-FFQ data, the food items with the highest consumption frequencies per week were white rice (20.03 times/week), salt (19.83 times/week), palm oil (17.35 times/week), and sugar (16.78 times/week). This pattern reflects the high consumption of simple carbohydrates and food additives such as salt, sugar, and oil in the respondents' daily lives. Conversely, food additives such as sauce (0.40 times/week), butter (0.74 times/week), and margarine (0.76 times/week) were recorded as the lowest. The staple food group was dominated by white rice, while sweet potatoes, cassava, and corn were consumed in smaller amounts. Consumption of animal protein (such as chicken eggs and sea fish) and vegetable protein (tempeh and tofu) showed a fairly high frequency. This reflects the diversity of protein sources in the respondents' diet. However, vegetable and fruit consumption remains relatively low compared to the carbohydrate and protein groups, which is a factor in the imbalance of fiber intake. Additionally, the high use of palm oil also illustrates the choice of cooking methods such as frying and sautéing, contributing to high fat intake. Overall, the respondents' consumption pattern shows high intake of simple carbohydrates, fat, and sodium, as well as low fiber intake, which contributes to the increased risk of degenerative diseases such as hypertension if not balanced with adequate physical activity.

Table 4. Relationship of nutritional status, nutrient intake (fat, fiber, and sodium), physical activity, and smoking habits with hypertension

Variables	Blood Pressure Degree				Total		p-value
	Normal		Hypertension				
	n	%	n	%	n	%	
Nutritional Status							0.001
Over	0	0	18	100	18	100	
Normal	1	6.7	14	93.3	15	100	
Under	2	66.7	1	33.3	3	100	
Fat Intake							0.021
Excessive	1	3.8	25	96.2	26	100	
Sufficient	2	40	3	60	5	100	
Deficient	0	0	5	100	5	100	
Fiber Intake							0.353
Deficient	3	13.6	19	86.4	22	100	

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

Sufficient	0	0	3	100	3	100	
Excessive	0	0	11	100	11	100	
Sodium Intake							0.529
Excessive	0	0	10	100	10	100	
Sufficient	1	12.5	7	87.5	8	100	
Deficient	2	11.1	16	88.9	18	100	
Physical Activity							0.043
Low	3	18.8	13	81.3	16	100	
Normal	0	0	20	100	20	100	
Smoking Habits							0.020
Non-smoker	0	0	21	100	21	100	
Very heavy	0	0	4	100	4	100	
Heavy	3	33.3	6	66.7	9	100	
Moderate	0	0	2	100	2	100	

Table 4 show the results of the analysis, indicating a significant relationship between several risk factors and the incidence of hypertension in outpatients at the cardiac polyclinic of RSUD Banten. It was found that 100% of respondents with excess nutritional status experienced hypertension (p=0.001). Excessive fat intake was also significantly associated with hypertension, where 25 out of 26 respondents (96.2%) experienced hypertension (p=0.021). Conversely, deficient fiber intake was found in 22 respondents; however, only 19 people (86.4%) experienced hypertension, and no statistically significant relationship was observed (p = 0.353). Similarly, although all respondents (100%) with excessive sodium intake (10 people) experienced hypertension, no statistically significant relationship was found (p=0.529). Low physical activity also showed a significant relationship with hypertension, where 13 out of 16 respondents (81.3%) experienced hypertension (p=0.043). Furthermore, very heavy smoking habits in 4 respondents were all (100%) associated with the incidence of hypertension (p=0.020), indicating a significant relationship between smoking habits and hypertension

DISCUSSION

Nutritional Status

Nutritional status is the primary benchmark for assessing the balance between nutrient intake and the body's needs. This balance is essential for maintaining the body's physiological functions, supporting growth and development processes, and strengthening the immune system. Nutritional imbalance, whether deficiency or excess, can have negative impacts on health, including increasing the risk of degenerative diseases such as hypertension, diabetes, and metabolic disorders. Therefore, monitoring nutritional status is an important part of promotive and preventive strategies in public health. This finding aligns with the study by Al Fariqi (2021), which involved 59 respondents. Based on the analysis using the Chi-Square test, a p-value of 0.031 was obtained, indicating a significant relationship between nutritional status and the incidence of hypertension in the elderly (9). Similar results were also found in Langingi's research (2021), which showed a significant relationship between nutritional status and hypertension in the elderly in Tombolango Village, Loak District, as evidenced by a p-value of 0.003 (10). Both studies are reinforced by Safitri & Aminah's research (2023), which stated that there was a significant relationship between nutritional status and the incidence of hypertension in the outpatient room of Puskesmas Bahagia in 2023 with a p-value of 0.004 (11). Obesity can directly increase the risk of hypertension because the heart must pump more blood to meet tissue needs, impacting increased cardiac output and blood pressure. Indirectly, obesity can impair kidney function in regulating sodium and ultimately increase blood volume. Furthermore, obesity can also damage endothelial function, increase oxidative stress, and trigger inflammation, which contributes to disrupted blood pressure regulation.

Fat Intake

High fat intake, particularly saturated fat, plays a significant role in the incidence of hypertension because it can increase LDL cholesterol levels in the blood and trigger plaque formation in blood vessels, causing narrowing and increased blood pressure. Based on interviews using SQ-FFQ on outpatients of the

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

Cardiac Polyclinic of RSUD Banten, the average fat intake of respondents reached 84 grams/day, which exceeds the 2019 RDA recommendation. The main sources of fat consumed came from animal protein side dishes such as chicken, eggs, and fish cooked by frying or sautéing. Respondents also routinely consumed fried foods such as fried tofu, tempeh, and fried bananas about five times a week. The dominant cooking method using oil and the habit of consuming foods with coconut milk also increased saturated fat intake, which risks increasing cholesterol levels and triggering hypertension (12). This finding aligns with a study by Batubo et al. (2023) in West Africa, which showed that individuals with high saturated fat consumption had a 76% greater risk of experiencing hypertension compared to those who consumed less (OR: 1.76; 95% CI: 1.357–2.861) (13). Similar results were found by Alwa et al. (2024), indicating a significant relationship between excessive fat intake and hypertension (p = 0.006) (14). Excessive saturated fat increases LDL levels in the blood, which can form plaques on the walls of blood vessels, reduce their elasticity, and cause arterial narrowing. This process inhibits blood flow and encourages increased blood pressure as a compensatory response by the body, thus contributing to the onset of hypertension (12).

Fiber Intake

Fiber is a type of complex carbohydrate that cannot be broken down by human digestive enzymes. Because it cannot be digested into simple molecules like glucose, fiber does not contribute to energy intake and is classified as a non-nutrient substance. Nevertheless, fiber plays a crucial role in maintaining digestive tract health and contributes to reducing the risk of heart disease, diabetes, and hypertension (15). The low fiber intake in most respondents is one of the reasons a significant relationship was not found in this study. Based on interview results using the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ), the average fiber intake of the respondents was recorded at 23 grams/day. This value is still below the Recommended Dietary Allowance (RDA) according to Permenkes 2019. Most respondents were known not to follow a high-fiber diet, characterized by minimal consumption of vegetables and fruits. This finding aligns with the results of Wijaya & Kumala (2021) (16) and Melini & Tanuwijaya (2021) (17), which showed no significant relationship between fiber intake and hypertension (p = 0.712 and p = 1.000). This indicates that fiber is not the only factor influencing blood pressure. However, these results contradict the study by Ghada A Soliman (2019), which stated that low fiber intake can disrupt bile acid excretion, increase cholesterol reabsorption, and trigger arteriosclerosis, leading to increased blood pressure (18). Marques (2017) also emphasized the role of fiber in maintaining gut microbiota balance and producing acetate compounds that support blood vessel health and blood pressure regulation (19). This finding is supported by the study of Panchal et al. (2020), which found that total fiber intake and fiber from grains can significantly reduce the risk of hypertension in adults (20).

Sodium Intake

Sodium is the primary positive ion in extracellular fluid, playing a crucial role in maintaining body fluid balance through osmotic pressure regulation. Excessive sodium consumption, particularly from high-sodium foods, can lead to fluid retention and an increase in blood volume, ultimately triggering a rise in blood pressure (15). Therefore, limiting sodium intake is important to prevent and manage hypertension and cardiovascular diseases. From the results of the research conducted, it was found that the respondents' sodium intake was classified as normal, at 1,072 mg. This intake figure was proven from interview results using the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) and then compared with the Recommended Dietary Allowance (RDA) based on Permenkes 2019. These results are in line with the research of Lukiah et al. (2024), Ekaningrum (2021), and Afifah (2016), all of which showed no significant relationship between sodium intake and hypertension (p=0.426; p=0.531; and p=0.094) (21) (22) (23). This may be caused by the body's compensatory mechanism in regulating sodium through renal excretion. Interview results also showed that most respondents had limited sodium intake with a plant-based diet pattern like tofu and tempeh, and minimal consumption of high-sodium processed foods. The cooking methods commonly used, such as boiling and sautéing without high-sodium seasonings, also supported the respondents' low salt intake. However, these results contradict the research of Purba et al. (2023) and Purwono et al. (2020), which found a significant relationship between sodium intake and hypertension

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

(p=0.000 and p=0.010) (24) (25). This is associated with sodium's property of attracting water, so excessive consumption can increase blood volume and blood pressure due to the increased flow load in blood vessels.

Physical Activity

According to WHO, physical activity is any form of bodily movement involving skeletal muscle contraction and requiring energy from calorie burning. This activity plays an important role in maintaining health, including lowering the risk of metabolic syndrome and heart disease, improving the body's response to insulin, and supporting the achievement and maintenance of ideal body weight. Regular physical activity can increase heart work efficiency, widen blood vessels, and improve endothelial function, thereby lowering peripheral resistance and stabilizing blood pressure. Conversely, a lack of physical activity causes the heart to work harder, increasing heart rate and blood pressure, which ultimately burdens the arteries and triggers hypertension. Therefore, physical activity is a major non-pharmacological intervention in the prevention and management of hypertension. These findings align with the research of Casmuti & Fibriana (2023) and Jiang (2021), which demonstrated a significant relationship between physical activity and hypertension (p = 0.000 and p = 0.0001) (26) (27). Physical activity is also clinically proven to support blood vessel health, lower sympathetic nerve activity, and prevent excess weight, all of which contribute to lowering blood pressure.

Smoking Habits

Smoking and hypertension are major factors contributing to the occurrence of atherosclerosis, coronary heart disease, heart attacks, and sudden death. Smoking is the habit of burning tobacco and inhaling the smoke, either through conventional cigarettes or other devices. Nicotine in cigarettes can increase heart rate and blood pressure through the release of norepinephrine and epinephrine hormones that affect blood flow and body metabolism. Additionally, harmful substances in cigarettes can inhibit the repair of damaged blood vessels. Research by Apriza & Nurman (2022) mentions a significant relationship between smoking habits and hypertension (p=0.003)(28). Individuals who smoke for a long period have a higher risk of experiencing hypertension. This is caused by carbon monoxide (CO) gas in cigarette smoke binding to hemoglobin, reducing the blood's capacity to transport oxygen. As a result, the body responds by increasing blood pressure. Furthermore, nicotine can stimulate the sympathetic nervous system, causing vasoconstriction, increasing blood vessel resistance, and making the heart work harder. Over a long period, the accumulation of harmful substances from cigarette smoke can cause plaque in blood vessels, narrow the diameter, and reduce blood vessel elasticity, which ultimately triggers chronic hypertension. Prang & Sekeon (2021) reinforce the above statement that the longer and more frequently someone smokes, the higher their hypertension risk (29). Ramadani (2019) also mentions that a smoking habit of more than 15 cigarettes per day significantly increases the risk of hypertension with long-term impacts that can appear after 10-20 years (30).

CONCLUSION

Based on the study's results regarding the relationship between nutritional status, nutrient intake (including fat, fiber, and sodium), physical activity, smoking habits, and hypertension at the Cardiac Polyclinic of RSUD Banten, several important findings were obtained. The majority of respondents were female (52.8%), in the 50-64 years age group (52.8%), and had a family history of hypertension (63.9%). Most respondents (91.7%) were identified as experiencing hypertension, and 50% had excess nutritional status. Additionally, it was found that 72.2% of respondents had excessive fat intake, 61.1% had deficient fiber intake, and 27.8% had excessive sodium intake. Respondent physical activity varied, with 44.4% in the low category. Smoking habits were also one of the observed factors; 11.1% of respondents were very heavy smokers. Analysis results showed significant relationships between nutritional status (p = 0.001), fat intake (p = 0.021), physical activity (p = 0.043), and smoking habits (p = 0.020) and the incidence of hypertension. Meanwhile, no significant relationships were found between fiber intake (p = 0.353) and sodium intake (p = 0.529) and the development of hypertension. These findings indicate that lifestyle and dietary factors, especially related to nutritional status, fat consumption, physical activity, and smoking

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

habits, play an important role in the incidence of hypertension among patients at the Cardiac Polyclinic of RSUD Banten.

FUNDING

This research received no external funding

ACKNOWLEDGMENTS

The authors convey their gratitude to all staff and officers at the Cardiac Polyclinic of RSUD Banten for their administrative and technical support during the data collection process. The authors also express gratitude to the enumerators who served in this study. Gratitude is also conveyed to family and colleagues for their invaluable moral support and motivation during the process of compiling this research.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. WHO. Noncommunicable diseases [Internet]. 2025 [cited 2025 Nov 23]. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
2. Kemenkes RI. Riset Kesehatan Dasar (Riskesdas). Jakarta: Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI; 2018.
3. Santoso A, Citraningtyas T, Viora E, Gotera W, Fujiati II, Lukito W, et al. Towards integrated cardiovascular and mental health management in primary health care in Indonesia: a policy outlook. The Lancet Regional Health - Southeast Asia. 2025 June 1;37:100605.
4. WHO. World Hypertension Day 2019 [Internet]. 2019 [cited 2025 Sept 8]. Available from: https://www.who.int/news-room/events/detail/2019/05/17/default-calendar/world-hypertension-day-2019
5. Badan Pusat Statistik Provinsi Banten. Profil Kesehatan Provinsi Banten 2023 [Internet]. Serang: Badan Pusat Statistik Provinsi Banten; 2024 [cited 2025 Sept 8]. Available from: https://banten.bps.go.id/id/publication/2024/04/17/43cc3cc44da7ef1babc8e066/profil-kesehatan-provinsi-banten-2023.html
6. Suryani N, Noviana N, Libri O. Hubungan Status Gizi, Aktivitas Fisik, Konsumsi Buah Dan Sayur Dengan Kejadian Hipertensi Di Poliklinik Penyakit Dalam RSD Idaman Kota Banjarbaru. Jurnal Kesehatan Indonesia. 2020 Mar 30;10(2):100–7.
7. Juliana I, Hengky HK, Umar F, Usman U. Analisis Faktor Yang Berhubungan Dengan Kejadian Hipertensi Pada Usia Produktif (15 – 59 Tahun). Jurnal Gizi Kerja dan Produktivitas. 2024 May 28;5(1):138–48.
8. Bujung RD, Silva MC da, Yauri I. Hubungan kebiasaan merokok dengan kejadian hipertensi pada orang dewasa di wilayah kerja Puskesmas Kawangkoan [Internet] [skripsi]. [Manado]: Universitas Katolik De La Salle; 2020 [cited 2025 Sept 8]. Available from: http://digilib.unikadelasalle.ac.id/
9. Fariqi MZA. Hubungan antara Status Gizi dengan Kejadian Hipertensi pada Lansia di Puskesmas Narmada Lombok Barat. Nutriology : Jurnal Pangan,Gizi,Kesehatan. 2021 Dec 15;2(2):15–22.
10. Langingi ARC. Hubungan Status Gizi dengan Derajat Hipertensi Pada Lansia Di Desa Tombolango Kecamatan Lolak. Coping: Community of Publishing in Nursing. 2021 Feb 28;9(1):46–57.
11. Safitri E, Aminah S. Analisa Hubungan Pola Makan Dan Status Gizi Dengan Kejadian Hipertensi Di Ruang Rawat Jalan Puskesmas Bahagia Tahun 2023. Innovative: Journal Of Social Science Research. 2023 June 28;3(2):14761–72.
12. Kartika LA, Afifah E, Suryani I. Asupan lemak dan aktivitas fisik serta hubungannya dengan kejadian hipertensi pada pasien rawat jalan. Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics). 2017 May 22;4(3):139–46.

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199

13. Batubo NP, Moore JB, Zulyniak MA. Dietary factors and hypertension risk in West Africa: a systematic review and meta-analysis of observational studies. J Hypertens. 2023 Sept 1;41(9):1376–88.
14. Alwa M, Syafriani S, Lasepa W. Hubungan Obesitas Sentral, Asupan Natrium dan Lemak dengan Kejadian Hipertensi pada Dewasa di Desa Naumbai. Science: Indonesian Journal of Science. 2024 Sept 27;1(3):857–65.
15. Hardinsyah H, Supariasa I. Ilmu gizi: teori & aplikasi [Internet]. Jakarta: EGC; 2017 [cited 2025 Sept 8]. Available from: https://eprints.poltekkesadisutjipto.ac.id/id/eprint/1996/
16. Wijaya DA, Kumala M. Hubungan konsumsi sayur dan buah dengan tekanan darah pada masyarakat usia produktif di Puskesmas Kecamatan X tahun 2020. Tarumanagara Medical Journal. 2021 Nov 1;3(2):274–81.
17. Melini DOCW, Tanuwijaya RR. Status Gizi, Asupan Natrium, Asupan Serat dengan Kejadian Hipertensi: A Cross Sectional Study. 1. 2021 Dec 1;23(2):101–8.
18. Soliman GA. Dietary Fiber, Atherosclerosis, and Cardiovascular Disease. Nutrients. 2019 May;11(5):1155.
19. Marques FZ, Nelson E, Chu PY, Horlock D, Fiedler A, Ziemann M, et al. High-Fiber Diet and Acetate Supplementation Change the Gut Microbiota and Prevent the Development of Hypertension and Heart Failure in Hypertensive Mice. Circulation. 2017 Mar 7;135(10):964–77.
20. Panchal AR, Bartos JA, Cabañas JG, Donnino MW, Drennan IR, Hirsch KG, et al. Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2020 Oct 20;142(16_suppl_2):S366–468.
21. Lukiah, Agestika L, Jennie RP. Hubungan kepatuhan asupan natrium dan konsumsi obat terhadap tekanan darah penderita hipertensi di wilayah Puskesmas Cibeber Kota Cilegon. ARGIPA (Arsip Gizi dan Pangan). 2024 June 3;9(1):1–10.
22. Ekaningrum AY. Hubungan asupan natrium, lemak, gangguan mental emosional, dan gaya hidup dengan hipertensi pada dewasa di DKI Jakarta. Journal of Nutrition College. 2021 June 30;10(2):82–92.
23. Afifah E. Asupan kalium-natrium dan status obesitas sebagai faktor risiko kejadian hipertensi pasien rawat jalan di RS Panembahan Senopati Bantul Yogyakarta. Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics). 2016 Aug 30;4(1):41–8.
24. Purba TH, Mariyanaq M, Demitri ADA. Hubungan Pola Makan Dan Status Gizi Terhadap Kejadian Hipertensi Pada Lansia Di Puskesmas Sultan Daulat Kota Subulussalam. Journal of Pharmaceutical and Sciences. 2023 Feb 21;6(1):334–43.
25. Purwono J, Sari R, Ratnasari A, Budianto A. Pola konsumsi garam dengan kejadian hipertensi pada lansia. Jurnal Wacana Kesehatan. 2020 Aug 3;5(1):531–42.
26. Casmuti C, Fibriana AI. Kejadian Hipertensi di Wilayah Kerja Puskesmas Kedungmundu Kota Semarang. HIGEIA (Journal of Public Health Research and Development). 2023 Jan 18;7(1):123–34.
27. Jiang Q, Zhang Q, Wang T, You Q, Liu C, Cao S. Prevalence and risk factors of hypertension among college freshmen in China. Sci Rep. 2021 Nov 29;11(1):23075.
28. Apriza A, Nurman M. Analysis of the relationship between smoking habits and the incidence of hypertension in Kuok, Kampar Regency. Jurnal kesehatan komunitas (Journal of community health). 2022;8(2):344–51.
29. Prang MF, Kaunang WPJ, Sekeon SAS. Hubungan antara kebiasaan merokok dengan hipertensi di Kota Tomohon. KESMAS: Jurnal Kesehatan Masyarakat Universitas Sam Ratulangi [Internet]. 2021 [cited 2025 Sept 8];10(6). Available from: https://ejournal.unsrat.ac.id/v3/index.php/kesmas/article/view/35460
30. Ramadani D, Hamidah. Hubungan lama merokok dengan kejadian hipertensi di Puskesmas Kenyaran Kecamatan Pantan Cuaca Kabupaten Gayo Lues Tahun 2019. Jurnal Ilmiah Kebidanan Imelda. 2019 Sept 28;5(2):95–9.

https://doi.org/10.56303/habitusfoodandmedica.v1i1.1199