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Association Between Fast and Junk Food Consumption and Hypertension Risk Among Adults in Bengkulu: A Case-Control Study

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ABSTRACT

Hypertension is caused by a variety of factors, including an unhealthy lifestyle such as a poor diet (high in salt, fat, and sugar), lack of physical activity, obesity, and smoking and drinking habits. Despite extensive global and national research on the link between fast and junk food consumption and hypertension, there is a notable lack of localized studies in regions like Bengkulu. The rising fast food intake and hypertension prevalence in these areas underscore the urgent need for context-specific evidence to support targeted public health interventions. This study aims to determine the relationship between fast food and junk food consumption habits and the incidence of hypertension in adults with a control case design. A total of 30 case groups and 60 control groups. Data collection was carried out using instruments such as respondent identity forms, informed consent sheets, the Food Frequency Questionnaire (FFQ), and blood pressure measuring devices (digital sphygmomanometers, stethoscopes, and observation sheets). Data analysis using the Chi-Square Test and multivariate logistic regression. The results of the bivariate analysis show that the habit of eating fast food often had a risk of 28.5 times, and the habit of eating junk food often had a risk of experiencing hypertension in adults 26.0 times. The results of the multivariate analysis showed a significant correlation between fast food consumption (p-value <0.0001; OR=23,709) and junk food (p-value <0.0001; OR=16,687) with the incidence of hypertension after controlling for the age factor. It is necessary to increase efforts in prevention, early detection, treatment, and education.

INTRODUCTION

Known as the "silent killer", hypertension is a disease that can kill a person without showing any symptoms, and it continues to be a global health problem. Many adults worldwide suffer from hypertension, with a prevalence of 31.5%, or 1.04 billion people, in low-middle-income countries, compared to 28.5%, or 349 million, in high-income countries (Fauziyyah & Solikhah, 2021). Worldwide, an estimated 1.28 billion adults between the ages of 30 and 79 suffer from hypertension, with 46% of them unaware of the disease. Only 42% have been diagnosed and received treatment, and only 21% have managed to control their blood pressure. This condition is one of the leading causes of hypertension and early death in the world (World Health Organization, 2023).

The prevalence of hypertension in Indonesia in 2018 reached 34.1% (Kementerian Kesehatan Republik Indonesia, 2018). In 2023, the prevalence of stunting has not decreased significantly. The 2023 Indonesian Health Survey (IHS) Report shows that the prevalence of hypertension in the population aged ≥18 years has reached 30.8% (Kementerian Kesehatan Republik Indonesia, 2023). The prevalence of hypertension in Bengkulu Province is ranked 15th among the provinces. In 2022, it is estimated that there are 36,404 hypertension patients in Bengkulu City, with 40.7% of them receiving adequate services. The Bengkulu City Small Bridge Health Center is ranked second for the highest number of hypertension cases, which is 2,961 people (Dinas Kesehatan Propinsi Bengkulu, 2021; Dinas Kesehatan Propinsi Bengkulu, 2022).

Hypertension is not a disease that can be considered common because its complications can damage blood vessels, which have the potential to cause a heart attack, heart failure, and, if left untreated, can be life-threatening and lead to death (Isfandiari et al., 2021). The impact of hypertension is not only felt in the clinical aspect but also has significant economic consequences for the national health system. Hypertension is a major risk factor for various chronic complications such as stroke, kidney failure, and coronary heart disease, which require long-term medical expenses (World Health Organization, 2023). In Indonesia, hypertension and other non-communicable diseases are the highest contributors to the claim burden in the National Health Insurance (NHI) program (Siregar & Lubis, 2022; Istiqomah, 2016). This shows that hypertension is not only a medical problem, but also a sustainable financing issue for NHI. People with hypertension generally require long-term treatment, regular check-ups, and ongoing monitoring. If not properly controlled, hypertension can lead to serious complications such as stroke, kidney failure, and heart disease. These conditions require intensive and expensive treatment, including hospitalization, ICU use, advanced medical procedures, and rehabilitation, all of which add to the burden of health service costs in the NHI scheme. The Indonesian Minister of Health Regulation Number 3 of 2023 concerning Health Service Tariff Standards regulates an INA-CBGs-based payment system, where service rates are determined based on the severity and complexity of cases. In the context of hypertension, the claim rate for cases with complications is much higher than for cases without complications (Kementerian Kesehatan Republik Indonesia, 2023).

One of the main causes of hypertension that can be modified is poor food consumption patterns, especially fast food and junk food consumption. This type of food is known to be high in salt, saturated fat, calories, and low in fiber and other essential nutrients, which contribute significantly to increased blood pressure (Siregar & Lubis, 2022; Destra et al., 2022). Recent studies have shown that in Indonesia, frequent consumption of fast food and junk food, which are typically high in salt, saturated fat, and calories, is significantly associated with an increased risk of hypertension, highlighting how unhealthy dietary habits contribute to the global burden of hypertension (Suryani et al., 2025; Fauziyyah & Solikhah, 2021). In the modern era, the ease of access to fast food makes people, especially young age groups and active adults, tend to choose practical but unhealthy foods. A study showed that regular consumption of fast food is closely associated with an increase in systolic and diastolic blood pressure, as well as the risk of long-term hypertension. Fast food and junk food habits will cause increased blood flow and lead to high blood pressure, stroke, and obesity (Fauziyyah & Solikhah, 2021). Fast food has a high level of sodium, which increases with the amount of salt consumed. Sodium in the body functions as a regulator of body fluids and is related to the large amount of salt consumption, excess salt consumption can cause an increase in the percentage of sodium in the blood circulation as well as interfere with the osmotic proportion, a high percentage of sodium can cause fluid retention which makes blood pressure increase (Destra et al., 2022; Meher et al., 2023).

There have been many studies that have examined the relationship between fast food and Junk Food consumption and hypertension risk globally and nationally. There remains a significant gap in localized data, particularly in the context of Bengkulu Province. Most existing research tends to focus on urban centers in Java or large metropolitan areas, leaving smaller regions like Bengkulu underrepresented in public health literature. This lack of localized evidence limits the ability of regional health authorities to design targeted interventions that reflect the specific dietary patterns, cultural influences, and lifestyle behaviors of the local population. Given the increasing availability and popularity of fast and junk food in Bengkulu, particularly in the Puskesmas work area, such as the Jembatan Kecil Health Center in Bengkulu City, and the concurrent rise in hypertension prevalence, this study provides a timely and necessary investigation. By focusing on a specific population in Bengkulu, this research offers novel insights that can inform context-sensitive prevention strategies and contribute to the broader understanding of dietary risk factors for hypertension in under-researched areas of Indonesia. Puskesmas, as a first-level health facility, play an important role in the prevention and control of non-communicable diseases through education and lifestyle changes. By understanding the specific food consumption patterns of the community, the promotive and preventive efforts designed will be more effective and efficient. This study aims to determine the relationship between fast food and junk food consumption habits and the incidence of hypertension in adults in the working area of the Jembatan Kecil Health Center, Bengkulu City. The results of this study

are expected to contribute to evidence-based policy-making at both the health center and regional levels, and to help reduce the burden of disease and financing due to hypertension in the JKN program. Given the increasing financial pressure on the national health financing system, it is urgent to conduct this research as part of efforts to optimize health promotion and behavioral risk-based prevention.

METHOD

This study uses an analytical observational design with a case-control approach. This design was chosen to assess the relationship between exposure to fast food and junk food consumption and the incidence of hypertension in adults. The study compared individuals with hypertension, the case group, to those without hypertension, the control group, to identify differences in food consumption habits between the two. This study was carried out in the working area of the Jembatan Kecil Health Center, Bengkulu City, from April to May 2024.

The source population consisted of all residents aged 20–60 years within the health center's working area. The case group sample was selected from patients diagnosed with hypertension and registered at the health center, all of whom met the inclusion criteria. The control group consisted of individuals from the same neighborhood who did not have a history of hypertension and met the same inclusion criteria. Inclusion criteria for both groups included willingness to participate, permanent residency in the area, and absence of comorbidities such as diabetes mellitus or cardiovascular diseases. A simple random sampling technique was applied within both groups to reduce selection bias and ensure each eligible individual had an equal chance of being selected. This method was considered appropriate due to the manageable size of the population and the availability of a complete list of eligible individuals from health center records. The sampling technique used was simple random sampling in both groups. The calculation of the sample size in this study uses the Lemeshow formula for a case-control study based on the assumption of an Odds Ratio (OR) of 7.0 from the previous study(Rahayu, 2021), a significance level of 5% ($Z\alpha = 1.96$), and a power of 95% ($Z\beta = 1.64$). The proportion of exposure in the case group (P1) was calculated to be 0.875, and in the control group (P2) was 0.5, so the mean proportion (P) was 0.6875. Based on this calculation, a minimum sample number of 27 people was obtained for the case group, which was then increased by 10% to account for drop-out, to 30 people. With a case-control ratio of 1:2, the control group consisted of 60 people. Thus, the total sample in this study is 90 respondents, consisting of 30 case groups and 60 control groups. The 1:2 case-to-control ratio (30 cases and 60 controls) was chosen to increase statistical power and improve the precision of the estimated association without a substantial increase in cost or time. This ratio is commonly used in case-control studies to enhance the study's efficiency, particularly when cases are fewer or more complicated to recruit than controls.

The variables in this study consist of independent variables, namely fast food and junk food habits, and dependent variables, namely the incidence of hypertension. In addition, there are control variables such as age, gender, education, occupation, and income. The frequency of consumption of fast food and junk food is categorized as frequent if consumed more than three times a week, and rare if consumed three times a week or less. The incidence of hypertension was determined based on blood pressure measurements with a sphygmomanometer, using a threshold of ≥140/90 mmHg according to the standards of the Ministry of Health of the Republic of Indonesia.

Data collection was carried out using instruments such as respondent identity forms, informed consent sheets, and blood pressure measuring devices (digital sphygmomanometers, stethoscopes, and observation sheets). Consumption habits of fast food and junk food were collected using questions on weekly consumption frequency over the past three months, employing a semi-quantitative Food Frequency Questionnaire (FFQ) format. To improve the accuracy of self-reported dietary data, researchers used visual aids of standard portion sizes and a list of commonly consumed local fast food and junk food items. In addition, interviews were conducted directly by trained enumerators to minimize interpretation bias and ensure consistency in recording responses. Primary data was obtained directly from interviews and measurements of respondents. In contrast, secondary data were taken from medical records of

the Health Center and reports from the Bengkulu City Health Office. Blood pressure measurements are carried out by nursing personnel, while researchers fill in and manage data from interviews and observations. After the data is collected, the processing process is carried out through several stages, namely editing, coding, entry, and cleaning, with the help of statistic software. Data analysis was carried out using univariate methods to describe the characteristics of respondents and the distribution of each variable. In contrast, the bivariate analysis used the Chi-square test to test the relationship between fast food and junk food consumption and the incidence of hypertension. Multivariate analysis using binary logistic regression by controlling for potential confounding variables, namely age, gender, education, occupation, and income. The result is statistically significant if the p-value≤0.05. The results of this analysis are expected to provide a deeper understanding of the lifestyle factors contributing to hypertension and serve as the basis for formulating promotive interventions at the health center level. Research ethics approval was obtained from the Health Research Ethics Commission of the Ministry of Health of Bengkulu.KEPK.BKL/017/02/2024.

RESULTS

Table 1 shows the characteristics of the Cases and Controls groups. In age, the Case group was dominated by individuals aged 41-60 years (76.7%), while the Control group had a more even distribution with a significant proportion in the age group of 20-40 years (46.7%). In terms of gender, the Case group showed a balanced proportion of males and females (50.0% each), in stark contrast to the Control group, which was heavily dominated by females (81.7%). For Employment, the Case group was slightly more employed (53.3%), while the Control group had a higher proportion of unemployment (63.3%). Interestingly, the proportion of education was identical between the two groups, with 80.0% of respondents having low education on both sides. Finally, income shows a balanced distribution in the Case group (50.0% low, 50.0% high), while the Control group is slightly more in the low-income category (56.7%).

Table 1. Characteristics of the adult population

Characteristic	Case		Control		Total		p-value
	n	%	n	%	n	%	
Age							
41 – 60 years	23	76.7	28	46.7	51	56.7	0.013
20 - 40 years	7	23.3	32	53.3	39	43.3	
Gender							
Male	15	50.0	11	18.3	26	28.9	0.004
Female	15	50.0	49	81.7	64	71.1	
Occupation							
Unemployed	14	46.7	38	63.3	52	57.8	0.200
Employed	16	53.3	22	36.7	38	42.2	
Education							
Low	24	80.0	48	80.0	72	80.0	1.000
High	6	20.0	12	20.0	18	20.0	
Income							
Low	15	50.0	34	56.7	49	54.4	0.708
High	15	50.0	26	43.3	41	45.6	

The results of the homogeneity test in Table 1 show the distribution of respondents' characteristics based on age, sex, occupation, education, and income. The variables of age (p-value=0.013) and sex (p-value=0.004) were found to be not homogeneous between the case and control groups, indicating statistically significant differences in these characteristics. In contrast, the variables of occupation (p-value=0.200), education (p-value=1.000), and income (p-value=0.708) were homogeneous, indicating no significant differences between the two groups in these characteristics. This suggests that occupation, education level, and income were relatively similar between hypertensive and non-hypertensive respondents. At the same time, differences

in age and sex may act as potential confounding variables that need to be controlled in further analysis.

Table 2. The relationship between fast food and junk food eating habits and the incidence of hypertension

Eating habits	Incidence of hypertension				OR 95%CI	p-value
	Hypertension		No Hypertension			
	n	%	n	%		
Fast Food						
Frequently	18	60.0	3	5.0	28.5	
Rarely	12	40.0	57	95.0	(7.230 - 112.342)	<0.0001
Total	30	100	60	100.0	1	
Junk Food						
Frequently	24	80.0	8	13.3	26.0	
Rarely	6	20.0	52	86.7	(8.120 – 83. 252)	<0.0001
Total	30	100.0	60	100.0	1	

The results of the bivariate analysis in Table 2 show that in the case group, most of the adult population, namely 18 people (60%), have fast food eating habits that frequently include other categories. In the control group, almost all of the adult population, namely 57 people (95%), had a habit of eating fast food, with only a few exceptions. The results of the Chi-Square test showed a significant relationship between fast food eating habits and the incidence of hypertension, with a p-value of <0.05, which was <0.0001. The results of the odds ratio (OR) calculation showed that the adult population who had a habit of eating fast food with the rare category was 28.5 times more likely not to experience hypertension compared to the adult population who had a fast food eating habit with the frequent category of OR (95%CI:7.230-112.342). Based on junk food eating habits, it shows that in the case group, almost the entire adult population, namely 24 people (80%), frequently consume junk food. In the control group, almost all of the adult population, namely 52 people (86.7%), had the habit of eating junk food in the infrequent category. The results of the Chi-Square test showed that there was a significant relationship between junk food eating habits and the incidence of hypertension, with a p-value of <0.05, which was <0.0001. The results of the odds ratio (OR) calculation showed that the adult population who had a habit of eating junk food with the rare category was 26 times more likely not to experience hypertension compared to the adult population who had a habit of eating junk food with the frequent category of OR (95%CI:8.120–83,252).

Table 3. Multivariate analysis of the relationship between fast food and junk food eating habits and the incidence of hypertension in adulthood

Variable	B	*p-value*	OR (95% CI)
Fast food	3.166	0.001	23.709 (3.523-259.557)
Junk food	2.815	<0.0001	16.687 (3.978-70.005)
Age	2.291	0.011	9.886 (1.699-57.526)

Based on the multivariate logistics regression analysis presented in Table 3, a significant and intense relationship was found between fast food and junk food consumption habits and the incidence of hypertension in the adult population in the working area of the Jembatan Kecil Health Center in Bengkulu City in 2024, after controlling for age. For Fast Food, a p-value of 0.001 (very significant) and an Odds Ratio (OR) of 23.709 (with a 95% confidence interval between 3.523-259.557) indicate that individuals who have a habit of eating fast food are more than 23 times more likely to suffer from hypertension than those who do not, leaving aside the influence of age. Similarly, Junk Food consumption showed an even stronger association with p-values <0.0001 and an OR of 16.687 (95%CI 3.978-70.005), indicating that the habit of consuming junk food increased the risk of hypertension by almost 17 times. In addition, the Age variable was also shown to be a significant independent risk factor for hypertension, with a p-value of 0.011 and an OR of 9.886 (95% CI 1.699-57.526). This confirms that the risk of hypertension increases with age. Overall, these results provide strong evidence that both fast food and junk food consumption habits are substantial independent predictors of hypertension incidence, even after accounting

for the effects of aging. The findings of this study have important practical implications for the prevention and control of hypertension in the community, particularly in the working area of the Jembatan Kecil Health Center, Bengkulu. This is due to strong evidence that fast food and junk food consumption habits significantly increase the risk of hypertension. Respectively, public health interventions should focus on promoting healthy eating habits and reducing the intake of fast and processed unhealthy foods. Nutrition education programs and campaigns aimed at reducing the consumption of foods high in salt, saturated fat, and empty calories, along with developing healthier local food alternatives, could be effective strategies. Furthermore, since age is also a significant risk factor, targeted interventions for older adults are essential. Therefore, these findings can serve as a foundation for policymakers and healthcare providers to design more targeted programs aimed at lowering hypertension prevalence through lifestyle and dietary changes in Bengkulu.

DISCUSSION

The study found that in the case group, almost the entire population was aged 41-60 years, while in the control group, most of the population was aged 20-40 years. The age of 40-50 years is an age that has undergone significant physical and psychological changes, the body's ability to gradually decline and the thickening of the arterial walls resulting in narrowing and stiffening of blood vessels, reducing their elasticity and stiffness of blood vessels which will lead to a reduction in the elasticity of blood vessels and an increase in peripheral vascular resistance and hypertension (Syafira et al., 2022). Based on research from UIN Sultan Thaha Saifuddin Jambi, a p-value of 0.029<0.05 was obtained, which shows a relationship between the incidence of hypertension and age (Suryanti et al., 2022). The sex in the case group was comparable between males and females, but it was primarily female. Gender does not affect blood pressure because it is an internal factor that cannot be modified. Men are more likely to have higher risk factors for hypertension than women and lower awareness of the condition due to unhealthy lifestyle choices, such as smoking and coffee consumption, which are difficult to stop (Sari & Zulfitri, 2020). A person's age and gender can have an impact on their blood pressure (Lin et al., 2016).

The work factor in the control group was mainly effective, while in the case group, it was mostly ineffective. A person's job is a risk factor for the incidence of hypertension, because work means doing a lot of physical activity, which can reduce the risk of hypertension by preventing being overweight (Puryanti et al., 2022). People who do not engage in activities such as work tend to have a higher heart rate than those who are active. This affects blood pressure stability because the heart muscle must pump more blood, increasing pressure on the arteries and thus raising the risk of hypertension (Islamy et al., 2023). Based on education, most case groups and control groups are poorly educated. Education can be a risk factor for the incidence of hypertension. However, people with low education will still have easy access to information on the prevention and management of hypertension through media such as television, the internet, and health promotion campaigns (Islamy et al., 2023). The study's findings also stated that the income in the case group was low in half of the adult population (50%), and in the control group, it was mostly low-income. Income can be a risk factor for the occurrence of hypertension, as a person's efforts to live a healthier life are correlated with their income. However, even though a person has a low income, which makes it difficult to meet nutritional needs, many are highly aware of the importance of maintaining health through physical activity and choosing suitable food ingredients (Kapahang et al., 2023).

The findings of this investigation show that there is a significant relationship between junk food and junk food consumption habits and the incidence of hypertension in adults. Junk food consumption is a potential risk factor for hypertension (Lin et al., 2016). Fast food is food that is prepared quickly and ready-to-eat, even though it is high in salt, fat and sugar (Anggraini & Sodik, 2018), who frequent fast food meals generally choose foods such as fried chicken, instant noodles, sweet potato chips, and donuts, while foods such as cilor, french fries, ice cream, and soda drinks are rarely consumed. Many factors can increase blood pressure, including fast food, which is a risk factor for hypertension (Lin et al., 2016). Fast foods are generally high in salt (sodium), saturated and trans fats, and simple sugars. These components are primary triggers of endothelial

dysfunction, increased blood volume, and insulin resistance —key pathophysiological mechanisms in the development of hypertension (Istiqomah, 2016; Wang et al., 2022). Excessive sodium intake is a factor that increases blood pressure through fluid retention and increased arterial stiffness (World Health Organization, 2023). High sodium levels will increase blood pressure through fluid retention due to increased sodium levels in the blood (Meher et al., 2023), as well as can affect increased levels of low-density lipoprotein (LDL) which leads to the formation of atherosclerosis, in the blood vessels, which ultimately leads to increased resistance of blood vessels to elevated blood pressure (Destra et al., 2022).

The habit of consuming junk food has also been shown to be significantly related to the incidence of hypertension. Junk food also contains high levels of fat. Excessive consumption of fatty foods can lead to obesity as well as increased levels of bad cholesterol (LDL). Foam cells are produced when vascular macrophages phagocytose excess low-density lipoprotein (LDL). Lipid deposits left behind by dead macrophages accumulate on the walls of blood vessels. Lipid buildup has the potential to cause atherosclerosis, which is the narrowing and hardening of the walls of the blood vessels, ultimately increasing the pressure in them. This stenosis increases resistance in the blood vessels, which in turn increases blood pressure (Isfandiari et al., 2021; Kim et al., 2020). Cholesterol levels increase the risk of hypertension (r=0.371, p=0.003) (Alsabieh et al., 2019). Adults who often consume junk food generally choose foods such as fried tofu, bakwan, fried bananas, pempek, meatballs, and fried rice, while foods such as candied fruits, pickled fruits, corn ice, canned sardines, and seblak are rarely consumed. Junk food (JF) containing high sodium levels is known to affect the renin-angiotensin system in the kidneys, causing vasoconstriction in the arterioles and increasing blood pressure. High sodium levels can also lead to an increase in blood volume in the body, putting more pressure on the heart and increasing blood pressure, a condition known as hypertension (Isfandiari et al., 2021). The possibility of consuming excess nutrients increases along with the frequency of junk food consumption. The reason is that junk food contains high calories and fats, which can increase blood volume in the body and make the heart work harder to pump blood, potentially increasing blood pressure or causing hypertension (Badu et al., 2022). A study on the productive age population in Kuok Village, UPT Blud Work Area, Kuok Health Center, Kampar Regency, showed that the Chi-Square test results, with a p-value of 0.011 < 0.05, supported this study (Rahayu, 2021). With a p-value of 0.009<0.005, research on the elderly conducted in the Tilamuta Health Center Working Area of Boalemo Regency, Gorontalo Province, also gave similar results (Badu et al., 2022). However, research conducted in Jimbaran Village produced different findings, namely, there was no correlation (p-value 0.195>0.05) between the incidence of hypertension in the elderly and the consumption pattern of junk food (Pertiwi, 2022).

The results of the same study showed that there was a significant relationship between fast food consumption habits and the incidence of hypertension (p-value 0.044<0.05)(Destra et al., 2022), as well as the results of the research in Surakarta with a p-value result of 0.046<0.05 (Saleh, 2019). These findings are consistent with a wide range of recent literature and research that has widely reported a positive association between Western diets, which are rich in fast food and junk food, with an increased risk of cardiovascular disease, including hypertension. A systematic review and meta-analysis confirmed that a diet high in processed and energy-dense foods significantly increases the risk of hypertension in adults (Meher et al., 2023). Prospective cohort studies also show that the frequency of fast food consumption is directly correlated with increased blood pressure and a higher incidence of hypertension in the long term (Zhang et al., 2023). Meanwhile, the East Jakarta study showed that there was no relationship between fast food consumption and adolescent blood pressure (p-value 0.355>0.05) (Setyaningsih & Manikam, 2021; Suprayitno et al., 2023).

The results of the study found that individuals who had the habit of consuming fast food were at 23 times the risk, and those who had the habit of consuming junk food were almost 17 times more at risk of hypertension than those who did not, after controlling for the influence of age. The odds ratio value obtained was very high compared to some other studies that may report a more moderate odds ratio (Rahayu, 2021; Pertiwi, 2022; Setyaningsih & Manikam, 2021; Sumarni et al., 2016). These differences may reflect the specific characteristics of the population in Bengkulu, such as different levels of health awareness, limited accessibility to healthy food, or complex interactions with genetic factors and the local environment. This high OR may also

indicate that in this population, fast food and junk food are not only contributing factors, but may be the primary triggers among other risk factors that are less dominant or have not been identified. In addition, the finding that age is also a significant predictor (OR=9,886) further strengthens the general understanding supported by the latest clinical guidelines, namely American Heart Association and American College of Cardiology (AHA/ACC) that aging is a non-modifiable risk factor for hypertension, whose effects remain relevant even though dietary habits are already taken into account in the model (Vemu et al., 2024).

The very high odds ratios observed in this study suggest that fast and junk food consumption may be particularly influential triggers for hypertension in the local context, potentially due to low nutritional literacy, limited access to affordable healthy food, or unique dietary patterns in Bengkulu. These findings underline the need for locally tailored interventions that not only provide information but also address structural barriers to healthy eating. For example, increasing the availability of affordable and nutritious food options through collaboration with local markets and food vendors could help shift consumer choices. Moreover, the strong statistical significance of age as a non-modifiable risk factor emphasizes the importance of early prevention. Integrating hypertension screening and nutrition counseling into routine services for middle-aged adults at primary care centers could enable earlier identification of at-risk individuals. These services should be made more accessible and community-oriented, particularly in semi-urban or peri-urban areas where dietary transitions are occurring rapidly.

The findings of this study have important practical implications for the prevention and control of hypertension in the community, particularly in the working area of the Jembatan Kecil Health Center, Bengkulu. This is due to strong evidence that fast food and junk food consumption habits significantly increase the risk of hypertension. Public health interventions should focus on promoting healthy eating habits and reducing the intake of fast and processed unhealthy foods. Nutrition education programs and campaigns aimed at reducing the consumption of foods high in salt, saturated fat, and empty calories, along with developing healthier local food alternatives, could be effective strategies. Furthermore, since age is also a significant risk factor, targeted interventions for older adults are essential. Therefore, these findings can serve as a foundation for policymakers and healthcare providers to design more targeted programs aimed at lowering hypertension prevalence through lifestyle and dietary changes in Bengkulu. In line with national priorities, the implications of this study are also highly relevant to the implementation of Indonesia's National Health Insurance (NHI) program. Given that hypertension is a major contributor to the financial burden of non-communicable diseases within the NHI system, findings from this study can support the development of cost-effective, preventive health strategies at the primary care level. Health promotion efforts focused on reducing fast and junk food consumption may not only reduce hypertension prevalence but also alleviate long-term healthcare costs associated with its complications, such as stroke or kidney failure.

This study has several limitations that should be considered. The case-control design does not allow researchers to establish a direct causal relationship between the consumption of fast food and junk food and the incidence of hypertension. Additionally, dietary data were obtained through self-reported questionnaires, which are prone to recall bias and social desirability bias that may affect data accuracy. Other potentially confounding variables, such as stress levels, family history, physical activity, and salt intake, were not examined in detail, even though they may influence the outcomes. The study's limited geographic scope, focusing on only one primary health center area in Bengkulu City, also restricts the generalizability of the findings to broader populations or regions with different social and cultural characteristics.

Nevertheless, the findings remain relevant and have limited generalizability to populations with similar characteristics, particularly in urban areas where fast food and junk food consumption trends are rising. These results serve as a preliminary basis for further studies with wider geographic coverage and more robust methodologies to strengthen the evidence and understanding of the relationship between modern dietary patterns and hypertension risk. For future research, it is recommended to investigate dose-response relationships between frequency of fast/junk food consumption and the severity of hypertension, as well as to explore potential moderating factors such as income level, education, genetic predisposition, and urban food environments. Longitudinal studies would provide stronger causal evidence to support national policy planning and inform targeted interventions in similar high-risk populations.

CONCLUSION

This study comprehensively proves that the consumption of fast food and junk food is significantly related to the incidence of hypertension in the adult population at the Jembatan Kecil Health Center, Bengkulu, even after controlling for age variables. These findings crucially enrich the scientific understanding of the lifestyle determinants of hypertension triggers in Indonesia. They highlight that modern dietary habits significantly contribute to the burden of non-communicable diseases, a significant concern for the National Health Insurance (NHI) program. Given the strength of the association found, this study strongly supports the urgency for more proactive and structured public health interventions that directly target unhealthy dietary behaviors. Specific strategies may include: community-based campaigns promoting low-sodium and balanced diets, integration of routine dietary counseling into primary care services, and the use of mobile health (mHealth) tools to monitor eating habits and provide personalized feedback. These interventions should be complemented by regulatory measures such as limiting advertisements of unhealthy foods, especially to vulnerable groups like children and low-income communities, and supporting local food systems that improve access to affordable, nutritious meals. Thus, this study emphasizes the urgency of public health interventions focused on dietary modification as a key strategy in the prevention and control of hypertension for the sustainability of the NHI system. Based on these findings, it is recommended that the Indonesian Ministry of Health, BPJS Kesehatan, the Bengkulu City Health Office, and the Jembatan Kecil Health Center strengthen synergy in promotive and preventive programs that are integrated with NHI. More intensive nutrition education about the dangers of fast food and junk food consumption needs to be promoted massively through primary health facilities, as an effort to reduce the incidence of hypertension and directly ease the burden of NHI financing due to NCDs and their complications. The government also needs to take a more active role in creating a supportive food environment through policies that encourage reformulation of processed foods, subsidize healthier food options, and incorporate dietary risk screening in the NHI coverage protocol.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities

NPS: Contributes to writing the original draft (supporting), administrative completion, data collection, and data processing and analysis; **DS, AR:** Contributes to writing the original draft, concept development, visualization, data processing and analysis, review and editing, as well as manuscript writing.

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Competing interests

The author states that the implementation and publication of research results do not have a conflict of interest.

REFERENCES

Alsabieh, M., Alqahtani, M., Altamimi, A., Albasha, A., Alsulaiman, A., Alkhamshi, A., Habib, S. S., & Bashir, S. (2019). Fast food consumption and its associations with heart rate, blood pressure, cognitive function, and quality of life. Pilot study. *Heliyon*, *5*(5), e01566. https://doi.org/10.1016/j.heliyon.2019.e01566

Anggraini, linda putri, & Sodik, M. A. (2018). Fast Food, Junk Food, dan Dampaknya Bagi Kesehatan. *Osf Preprints*, *Ldl*. https://doi.org/10.1016/j.heliyon.2019.e01566

Badu, F. D., Nyandra, M., Arda, Z. A., & Labaco, N. (2022). Determinan Kejadian Hiertensi Pada Lansia di Wilayah Kerja Puskesmas Tilamuta Kabupaten Boalemo Provinsi Gorontalo Tahun 2022. *Jurnal Kesehatan Terpadu*, *6*(2), 45–54.

Destra, E., Frisca, F., Santoso, A., & Friamnsyah, Y. (2022). Hubungan Asupan Makanan Cepat Saji dengan Angka Kejadian Hipertensi pada Orang Dewasa dengan Aktifitas Fisik Ringan Hingga Sedang. *Jurnal Medika Hutama*, *03*(03), 2525–2529.

Dinas Kesehatan Propinsi Bengkulu. (2021). *Profil Kesehatan Propinsi Bengkulu Tahun 2021*. Bengkulu.

Dinas Kesehatan Propinsi Bengkulu. (2022). *Profil Kesehatan Provinsi Bengkulu Tahun 2022.* Bengkulu.

Fauziyyah, Z. R., & Solikhah, S. (2021). Hubungan Pola Konsumsi Makanan Cepat Saji Dan Hipertensi : Sebuah Penelitian Berskala Nasional Di Indonesia. *Buletin Penelitian Sistem Kesehatan*, *24*(1), 31–37. https://doi.org/10.22435/hsr.v24i1.2986

Isfandiari, M. A., Fajariyah, R. N., & Destiani, A. (2021). Risiko Pola Konsumsi Dan Status Gizi Pada Kejadian Hipertensi Masyarakat Migran Di Indonesia. *Media Gizi Indonesia*, *16*(2), 194–199. https://doi.org/10.20473/mgi.v16i2.194-199

Islamy, I. El, Simamora, L., Syahri, A., Zaini, N., Sagala, N. A., & Dwi, A. (2023). Faktor Determinan Kejadian Hipertensi di Desa Sikeben Kecamatan Sibolangit Kabupaten Deli Serdang. *Jurnal Ilmiah Universitas Batanghari Jambi*, *23*(1), 601. https://doi.org/10.33087/jiubj.v23i1.2808

Istiqomah, A. N. (2016). Beban Ekonomi Pada Penderita Hipertensi Dengan Status Pbi Jkn Di Kabupaten Pamekasan. *Jurnal Manajemen Kesehatan Yayasan RS.Dr. Soetomo*, *2*(2), 124–132. https://doi.org/10.29241/jmk.v2i2.58

Kapahang, G. V., Wiyono, W. I., & Mpila, D. A. (2023). Analisis Faktor Risiko Terhadap Kejadian Hipertensi Di Puskesmas Ratahan. *Jurnal Kesehatan Tambusai*, *4*(2019), 637–646.

Kementerian Kesehatan Republik Indonesia. (2018). Laporan Nasional Riset Kesehatan Dasar 2018. In *Kementerian Kesehatan RI*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan.

Kementerian Kesehatan Republik Indonesia. (2023). *Peraturan Menteri Kesehatan Republik Indonesia No. 3 Tahun 2023 Tentang Standar Tarif Pelayanan Kesehatan Dalam Penyelenggaraan Program Jaminan Kesehatan, Permenkes No. 31. Tahun 2023.* Jakarta.

Kementerian Kesehatan Republik Indonesia. (2023). *Survei Kesehatan Indonesia (SKI) dalam Angka.* Jakarta.

Kim, J., Hoang, T., Boo, S. Y., Kim, J. M., Choi, J. H., Park, E. J., Lee, S., Park, E., Min, J. Y., Lee, I. S., & Youn, S. Y. (2020). Associations of dietary intake with cardiovascular disease, blood pressure, and lipid profile in the Korean population: A systematic review and meta-analysis (Journal of Lipid Atherosclerosis, 2020, 9, 1, 205–229), 10.12997/jla. 2020.9.1.205. *Journal of Lipid and Atherosclerosis*, *9*(3), 474–475. https://doi.org/10.12997/jla.2020.9.3.474

Lin, J. D., Chen, Y. L., Wu, C. Z., Hsieh, C. H., Pei, D., Liang, Y. J., & Chang, J. B. (2016). Identification of Normal Blood Pressure in Different Age Groups. *Medicine (United States)*, *95*(14), 1–8. https://doi.org/10.1097/MD.0000000000003188

Meher, M., Pradhan, S., & Pradhan, S. R. (2023). Risk Factors Associated With Hypertension in Young Adults: A Systematic Review. *Cureus*, *15*(4). https://doi.org/10.7759/cureus.37467

Pertiwi, N. K. N. A. (2022). Hubungan Pola Konsumsi Junk Food dengan eEjadian HIpertensi pada Lansia di Desa Jimbaran. *[Undergraduate thesis]. Denpasar: Faculty of Health, Institut Teknologi Dan Kesehatan Bali.*

Puryanti, E., Gustina, E., & Yusnilasari. (2022). Analisis Faktor Risiko Kejadian Hipertensi di Puskesmas Lubuk Batang Wilayah Kerja Dinas Kesehatan Kabupaten OKU Tahun 2021. *Jurnal Kesehatan Saelmakers PERDANA*, *5*(1), 40–51. https://doi.org/10.32524/jksp.v5i1.411

Rahayu, S. (2021). Hubungan Konsumsi Junk Food Dengan Kejadian Hipertensi Usia Produktif Di Desa Kuok Wilayah Kerja Upt Blud Puskesmas Kuok Kabupaten Kampar Tahun 2021. *[Undergraduate thesis]. Bangkinang Kota: Faculty of Health Sciences, Universitas Pahlawan Tuanku Tambusai.*

Saleh, A. J. (2019). Hubungan Kebiasaan Konsumsi Makanan Siap Saji (Fast Food), Status Gizi dan Kejadian Hipertensi Dengan Fungsi Kognitif Pada Remaja. *[Thesis]. Master of Nutritional*

Science Program, Universitas Sebelas Maret.

Sari, F., & Zulfitri, R. (2020). Hubungan Kebiasaan Konsumsi Kopi Dengan Tekanan Darah Pada Lansia Riwayat Hipertensi. *Jurnal Vokasi Keperawatan*, *5*(2), 138–147. https://doi.org/10.33369/jvk.v5i2.24114

Setyaningsih, E. D., & Manikam, R. M. (2021). Hubungan Konsumsi Fast Food dan Asupan Natrium dari Fast Food dengan Tekanan Darah Remaja. *Jurnal Ilmiah Gizi Kesehatan*, *9*(11), 9–15.

Siregar, S. M. F., & Lubis, A. I. (2022). Analysis of Hypertension Risk Behavior. *J-Kesmas: Jurnal Fakultas Kesehatan Masyarakat (The Indonesian Journal of Public Health)*, *9*(2), 50–55. https://doi.org/10.35308/j-kesmas.v9i2.6101

Sumarni, R., Sampurno, E., & Aprilia, V. (2016). Konsumsi Junk Food dan Hipertensi pada Lansia di Kecamatan Kasihan, Bantul, YogyakartaKasihan,. *Jurnal Ners Dan Kebidanan Indonesia*, *3*(2), 59–63. https://doi.org/10.21927/jnki.2015.3(2).59-63

Suryani, T., Syafiq, A., Sartika, R. A. D., & Putri, P. N. (2025). Dietary Patterns, Physical Activity, And Obesity Status On Blood Pressure In Hypertensive Patients. *JKM (Jurnal Kebidanan Malahayati)*, *11*(4), 291–306. https://doi.org/10.33024/jkm.v11i4.19450

Suryanti, D., Harokan, A., Priyatno, A. D., & Handayani, S. (2022). Analisis Hubungan Kejadian Hipertensi pada Dosen UIN Sulthan Thaha Saifuddin Jambi. *Journal Of Health Science*, *VII*(I), 13–23. https://doi.org/https://doi.org/10.24929/jik.v7i1.2025

Suprayitno, V. Y., Romadhona, N., Surialaga, S., & Hermawan, N. A. (2023). Kaitan Frekuensi Konsumsi Makanan Cepat Saji dengan Kejadian Hipertensi pada Usia Produktif. In *Bandung Conference Series: Medical Science* (Vol. 3, No. 1, pp. 262-266). https://doi.org/10.29313/bcsms.v3i1.5951

Syafira, S., Nadira, C. S., & Akbar, T. I. S. (2022). Analisis Perbedaan Fungsi Kognitif pada Pasien dengan Variasi Tekanan Darah Normal, Hipertensi Terkontrol dan Hipertensi Tidak Terkontrol di Poli Penyakit Dalam RSU Cut Meutia. *Galenical : Jurnal Kedokteran Dan Kesehatan Mahasiswa Malikussaleh*, *1*(2), 10. https://doi.org/10.29103/jkkmm.v1i2.8148

Vemu, P. L., Yang, E., & Ebinger, J. (2024). ESH Hypertension Guideline Update Bringing Us Closer Together Across the Pond - American College of Cardiology. *American College of Cardiology*, 1–7. https://www.acc.org/Latest-in-Cardiology/Articles/2024/02/05/11/43/2023-ESH-Hypertension-Guideline-Update

Wang, C., Zheng, Y., Zhang, Y., Liu, D., Guo, L., Wang, B., & Zuo, H. (2022). Dietary Patterns in Association With Hypertension: A Community-Based Study in Eastern China. *Frontiers in Nutrition*, *9*(July), 1–10. https://doi.org/10.3389/fnut.2022.926390

World Health Organization. (2023). *Hypertension*. World Health Organization.

World Health Organization. (2023). *Global Report on Hypertension*. World Health Organization.

Zhang, J., Du, W., Huang, F., Li, L., Bai, J., Wei, Y., Wang, Z., Zhang, B., & Wang, H. (2023). Longitudinal study of dietary patterns and hypertension in adults: China Health and Nutrition Survey 1991–2018. *Hypertension Research*, *46*(10), 2264–2271. https://doi.org/10.1038/s41440-023-01322-x