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RISK FACTORS FOR HYPERTENSION IN ADULTS AGED 36–45 YEARS AT THE CENTRAL CITY HEALTH CENTER OF GORONTALO CITY

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Abstract

Hypertension is a non-communicable degenerative disease with high prevalence, mortality, and impact on quality of life and productivity. Hypertension is diagnosed when blood pressure exceeds 140/90 mmHg at rest in two measurements taken five minutes apart. This study aimed to analyze the relationship of gender, family history, smoking status, coffee consumption, and alcohol consumption with hypertension incidence among individuals aged 36–45 years in the Central City Health Center area. A cross-sectional analytical survey was conducted using accidental random sampling. The study population consisted of 74 hypertensive patients aged 36–45 years during September–October 2025. Data were analyzed using the chi-square test. Results showed significant associations between hypertension and gender (p=0.000), family history (p=0.001), smoking status (p=0.002), coffee consumption (p=0.022), and alcohol consumption (p=0.002). In conclusion, these five factors significantly influence hypertension incidence. Regular health and blood pressure checks are recommended to control hypertension effectively.

INTRODUCTION

Hypertension is often called *The Silent Killer,* this cardiovascular disease is the most common disease suffered by the community because it often occurs without any complaints so that sufferers cannot know or identify that they have hypertension and only find out after complications occur (Zethira et al., 2024) . A person is said to have hypertension or high blood pressure if a blood pressure examination shows results above 140/90 mmHG or more in a resting state with two examinations 5 minutes apart. At rest, systolic is said to be normal if it is at a value of 100-140 mmHg, while diastolic is said to be normal if it is at a value of 60-9 mmHg (Sekar Siwi et al., 2020) .

The prevalence of hypertension in 2024 in the 15-24 age group is 8.7%, in the 25-34 age group is 14.7%, 36-45 years 24.8%, 45-54 years 35.6%, 55-64 years 45.9%, 65-74 years 57.6%, and over 75 years is 63.8%. With this high prevalence, the number of unnoticed hypertension may be even higher. This is because hypertension and its complications are much less than asymptomatic hypertension. Based on previous research by there is a relationship between family history, smoking and physical activity with the incidence of hypertension in the age of 36-45 years in the Kobengkuang Community Health Center work area in 2024 (T Cut Lizam1, Julissasman2, 2024) .

According to data from the World Health Organization (WHO), an estimated 1.28 billion adults aged 30-79 worldwide will suffer from hypertension in 2023, most of whom live in low- and middle-income countries. An estimated 46% of adults with hypertension are unaware they have the condition, and less than half (42%) of adults with hypertension are diagnosed and treated.

Based on the 2023 Indonesian Health Survey (SKI), the prevalence of hypertension in Indonesia reached 30.8%. This figure shows a decrease from the 2018 Riskesdas data, which recorded a hypertension prevalence of 34.1%. The 2023 SKI also noted a gap between respondents diagnosed with hypertension and those undergoing regular treatment, especially in the productive age group (18-59 years) and the elderly. According to the results of the 2023 SKI, the prevalence of hypertension in Indonesia based on the 35-45 age group was 27.2%, at 46-55 years old it was 39.1%, at 56-65 years old it was 49.5%, and at 66-75 years old it was 57.8%.

Factors influencing the occurrence of hypertension are divided into two groups: uncontrollable factors such as gender, age, family history, coffee consumption, smoking status, and alcohol consumption. For hypertension to occur, these risk factors must play a role together (*a common underlying risk factor).* In other words, one risk factor alone is not enough to cause hypertension (Halim et al., 2025) .

Those with a family history of hypertension are at greater risk of developing hypertension than those without. The expression of hypertension appears to be a result of genetic changes. It has been shown that not only blood pressure but also the regulatory mechanisms of the renin-angiotensin- aldosterone system and the sympathetic nervous system are genetically influenced. Modern biomolecular techniques have made it possible to identify the genes responsible for hypertension in individuals. (Aldhufairi et al., 2025).

Gender is one of the unchangeable factors influencing hypertension. Research conducted by (Adila & Mustika, 2023) shows that men have higher rates of hypertension than women. This suggests that the incidence of hypertension in women is influenced by decreasing estrogen levels, suggesting that premenopausal women are protected by estrogen, which plays a role in increasing High Density Lipoprotein (HDL) levels.

The habit of drinking coffee increases the risk of hypertension, but this depends on the frequency of daily consumption. Drinking coffee and smoking can stimulate blood vessel constriction, which can increase blood pressure (Miranda et al., 2021) . The habitual coffee consumption factor is derived from the fact that one cup of coffee contains 75-200 mg of caffeine, which can potentially increase blood pressure by 5-10 mmHg.

Smoking and hypertension are two of the most important risk factors for atherosclerosis, coronary heart disease, acute myocardial infarction, and sudden death. Research has shown that the acute effects of smoking include increased heart rate and blood pressure due to increased levels of the hormones epinephrine and norepinephrine due to sympathetic nervous system activity (Mamile et al., 2024) .

One consequence of excessive alcohol consumption is increased blood pressure, known as hypertension. Long-term, excessive alcohol consumption increases cortisol levels in the blood, increasing the activity of the renin-angiotensin-aldosterone system (RAAS), resulting in increased blood pressure (Rizki, nd) .

The results of initial observations and secondary data obtained from the Gorontalo Provincial Health Office indicate that hypertension sufferers in Gorontalo City reached 17,624. Based on data from the Gorontalo Provincial Health Office, it shows that the Central City Health Center ranks first in hypertension sufferers, namely 1,999 hypertension sufferers compared to the North City Health Center, namely 285 hypertension sufferers (Gorontalo City Health Office, 2024).

Secondary data obtained from the Kota Tengah Community Health Center shows that in 2023, hypertension ranked first as the most common disease at the Kota Tengah Community Health Center with a total of 1,874 people. Then in 2024, there were 1,999 people with hypertension, making this disease the second most common disease at the Kota Tengah Community Health Center. In May 2025, observations were conducted in the Kota Tengah Community Health Center's work area, with 520 visits. The number of visits was 89 people aged 36-45 years, of which 40 (44.94%) of hypertension sufferers are in the 36-45 year age range in the Kota Tengah Community Health Center work area (Kota Tengah Community Health Center, 2024).

Based on the background description, the researcher is interested in conducting a research study entitled "factors related to the incidence of hypertension in the work area of the Central City Health Center".

METHOD STUDY

Location and Time of Research

The Kota Tengah Community Health Center covers an area of 4.13 km², or 6.08% of Gorontalo City. Geographically, it is located at 0.19'–1.15' South Latitude and 121.23'–123.43' East Longitude, approximately 5 meters above sea level. Average daytime temperatures range from 30.9–34.0°C and nighttime temperatures range from 20.8–24.4°C.

Administratively, the working area consists of six sub-districts with the following boundaries: North and East bordering the North City Health Center, South with the South City Health Center, and West with the Dungingi and West City Health Centers.

The working area covers the sub-districts of Wumialo, Dulalowo, Liluwo, Pulubala, Paguyaman, and East Dulalowo.

Table 1. Number of RT/RW in the Kota Tengah Health Center Area

No	Ward	Area (Km²)	RT	RW
1	Wumialo	0.83	11	5
2	Dulalowo	0.39	10	4
3	Liluwo	1.10	10	4
4	Pulubala	0.96	15	6
5	Association	0.64	9	3

6	East Dulalowo	0.88	9	3
	Amount	*4.08*	*67*	*25*

Source: Secondary Data from Kota Tengah Community Health Center, 2022

The population in 2022 was 30,227 (14,692 males and 15,535 females). The population composition was dominated by people of productive age.

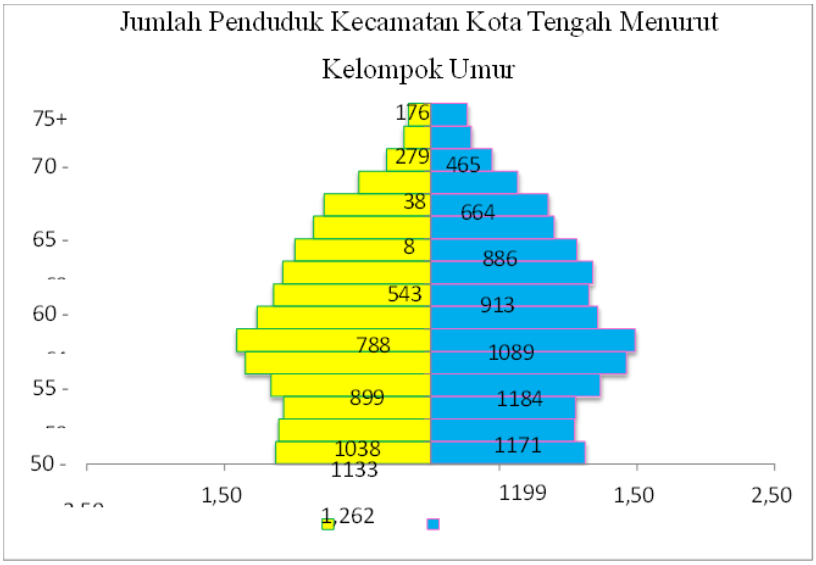

Figure 4.2 Graph of the population of Central City by Age Group

Univariate Analysis

The number of respondents was 74 people aged 36–45 years.

Table 2. Distribution of Respondents by Gender

Gender	Amount	
	n	%
Man	41	55.4
Woman	33	44.6
Amount	74	100

Source: Primary Data, 2025

The majority of respondents were male (55.4%).

Table 3. Distribution of Respondents Based on Family History

Family history	Amount	
	n	%
There is	37	50.0
There isn't any	37	50.0
Amount	74	100

Source: Primary Data, 2025

The distribution of family history is balanced (50%).

Table 4. Distribution of Smoking Status

Smoking status	Amount	
	n	%
Often	35	47.3
Sometimes	34	45.9
Never	5	6.8
Number	74	100

Source: Primary Data, 2025

Most of the respondents were active smokers.

Table 5. Distribution of Coffee Consumption

Coffee consumption	Amount	
	n	%
Often	43	58.1
Sometimes	29	39.2
Never	2	2.7
Amount	74	100

Source: Primary Data, 2025

The majority of respondents consume coffee regularly.

Table 6. Distribution of Alcohol Consumption

Alcohol consumption	Amount	
	n	%
Often	34	45.9
Sometimes	34	45.9
Never	6	8.1
Amount	74	100

Source: Primary Data, 2025

Most of the respondents have a habit of consuming alcohol.

Bivariate Analysis

Relationship between Gender and Hypertension

Table 7. Relationship between Gender and the Incidence of Hypertension

Gender	Incident hypertension				Total		*p value*
	Hypertension		No hypertension		n	%	
	n	%	n	%			
Man	30	73.2	11	26.8	41	100	

Woman	10	30.3	23	69.7	33	100	0,000
Amount	40	54.21	34	45.9	74	100	

Source: Primary Data, 2025
The p-value = 0.000 <0.05 indicates a significant relationship.

Relationship between Family History and Hypertension

Table 8. Relationship between Family History and Hypertension

Family history	Incident hypertension				Total		*p value*
	Hypertension		No hypertension		n	%	
	n	%	n	%			
There is	27	73.0	10	27.0	37	100	0.001
There isn't any	13	35.1	24	64.9	37	100	
Amount	40	54.1	34	45.9	74	100	

Source: Primary Data, 2025
p=0.001 indicates a significant relationship.

Relationship between Smoking Status

Table 9. Relationship between Smoking Status and Hypertension

Smoking status	Incident hypertension				Total		*p value*
	hypertension		No hypertension		n	%	
	n	%	n	%			
Often	26	74.3	9	25.7	35	100	0.002
Sometimes	11	32.4	23	67.6	34	100	
Never	3	60.0	2	40.0	5	100	
Amount	40	54.1	34	45.9	74	100	

Source: Primary Data, 2025
p=0.002 indicates a significant relationship.

Relationship between Coffee Consumption

Table 10. Relationship between Coffee Consumption and Hypertension

Coffee consumption	Incident hypertension				Total		*p value*
	Hypertension		No hypertension		n	%	
	n	%	n	%			
Often	29	67.4	14	32.6	43	100	0.022
Sometimes	10	34.5	19	34.5	29	100	
Never	1	50.0	1	50.0	2	100	
Amount	40	54.1	34	54.1	74	100	

Source: Primary Data, 2025
p=0.022 indicates a significant relationship.

Relationship between Alcohol Consumption

Table 11. Relationship between Alcohol Consumption and Hypertension

Alcohol consumption	Incident hypertension				Total		*p value*
	Hypertension		No hypertension		n	%	
	n	%	n	%			
Often	25	73.5	9	26.5	34	100	0.002
Sometimes	11	32.4	23	67.6	34	100	
Never	14	66.7	2	33.3	16	100	
Amount	40	54.1	34	45.9	74	100	

Source: Primary Data, 2025

p=0.002 indicates a significant relationship.

DISCUSSION

The relationship between gender and the incidence of hypertension in the age group of 36-45 years in the working area of the Central City Community Health Center

The results of the Chi-Square statistical test show a p-value of (0.000). Because the p-value (0.000) is much smaller than the commonly used significance limit (α = 0.05), H0 is statistically rejected. There is a highly statistically significant relationship between gender and the incidence of hypertension in the 36-45 year old age group at the Kota Tengah Community Health Center. This relationship proves that the difference in hypertension prevalence between men and women in this population is not a coincidence, but is influenced by factors related to gender.

Biological differences between men and women in blood pressure regulation are due in part to the different roles of sex hormones on the renin-angiotensin-aldosterone system (RAAS) and vascular function; androgens in men tend to direct the RAAS toward a vasoconstrictor pathway that increases the risk of hypertension, while estrogens in premenopausal women have a vasoprotective effect by increasing nitric oxide (NO) production and modulating RAAS components that favor vasodilation, thus providing protection against vascular elasticity and the development of hypertension (Choopani & Nematbakhsh, 2025) . Epidemiologically and physiologically, men tend to show a higher prevalence of hypertension in early to middle adulthood than women due to biological differences in hormones and other risk factors, while the risk of hypertension in women increases sharply after entering perimenopause and menopause when the protective effects of estrogen hormones decline, so that hypertension in women becomes more prevalent approaching age 45 years and beyond. These differences reflect the different blood pressure trajectories by sex throughout the life cycle, which are influenced by hormonal changes and complex lifestyle factors (Drury et al., 2024) .

The results of this study are in line with research conducted by (Ikhwan et al., 2015) with the title of the relationship between triggering factors for hypertension and the incidence of hypertension, that there is a relationship between gender and the incidence of hypertension p-value 0.000 (p<0.05).

The results of the study showed a higher prevalence of hypertension in males compared to females. This is clearly evident in the prevalence of hypertension in males, which was 73.2% of respondents. This figure indicates that more than two-thirds of the male respondents in this sample had high blood pressure. This indicates that males (aged

36-45 years) in the study location are at a very high risk of developing hypertension compared to females.

The study also showed that 11 men (26.8%) did not experience hypertension, which can be assumed to be due to differences in behavioral and lifestyle factors for each individual. Not all men have exposure to the same risk factors. Some may not smoke, do not consume alcohol, engage in sufficient physical activity, and maintain a more controlled diet, thus maintaining blood pressure within normal limits. Previous research has shown that healthy lifestyle behaviors, particularly regular physical activity and not smoking, act as protective factors against hypertension, even if a person belongs to a group that is generally at higher risk.

Several epidemiological studies have shown that risky behaviors such as smoking and alcohol consumption are more prevalent in men than in women, and these behaviors are significantly associated with an increased risk of hypertension across various adult populations, contributing to the higher prevalence of hypertension in men of productive age (including those aged 36–45 years). Furthermore, premenopausal women tend to have a lower prevalence of hypertension, which is partly related to the protective effects of estrogen on blood pressure regulation and vascular elasticity, although after menopause this effect decreases and the prevalence of hypertension in women increases (Defianna et al., 2021) . Premenopausal women generally have higher estrogen levels, which play a role in improving blood lipid profiles, including increasing High Density Lipoprotein (HDL) levels, thus providing a protective effect against atherosclerosis and reducing the risk of hypertension. After entering menopause, a significant decrease in estrogen levels is followed by metabolic changes that can lead to decreased HDL and a higher risk of cardiovascular disorders, including hypertension in the elderly (Susilo et al., 2025) . Estrogen is known to have a protective effect on blood pressure through various vasoprotective mechanisms, including increasing the production of nitric oxide (NO) by the endothelium, thus promoting vasodilation, and modulating the activity of the renin-angiotensin-aldosterone system (RAAS) by suppressing the vasoconstrictor pathway, thus contributing to differences in blood pressure values between women and men of reproductive age; pre-menopausal women generally show lower systolic and diastolic blood pressure than men of the same age due to the presence of estrogen which protects vascular function (Sabbatini & Kararigas, 2020) .

The relationship between family history and the incidence of hypertension in 36-45 year olds in the working area of the Central City Community Health Center

The results of the Chi-Square statistical test show a p-value of (0.001). Because the p-value (0.001) is much smaller than the commonly used significance limit ($\alpha = 0.05$), H0 is statistically rejected. There is a highly statistically significant relationship between family history and the incidence of hypertension in the 36-45 year age group at the Kota Tengah Community Health Center. This relationship indicates that a family history of hypertension is not just a coincidence, but is a real risk factor for respondents.

The genetic theory discovered by Gregor Mendel, later developed by Shih & O'Connor, explains that the familial risk of hypertension is primarily based on the concept that essential hypertension is a polygenic disease with moderate to high hereditary potential, reinforced by familial aggregation and molecular genetic studies. Hypertension exhibits "familial aggregation," meaning a higher prevalence in parents, siblings, and children. The hereditary value of blood pressure/hypertension is estimated at around 30–60%, meaning that a significant portion of blood pressure variation in the population is

explained by genetic factors inherited within families. Essential hypertension is not caused by a single gene, but by a combination of many gene variants (polygenic), each with a small but compounding effect, increasing the risk in individuals with a positive family history. Genetics confers a "basic susceptibility," but the expression of hypertension is strongly influenced by environmental and lifestyle factors that often run in families (high-salt diet, obesity, inactivity, stress) (Mocan et al., 2021) .

The results of this study are in line with the research conducted by LO et al., (2020) with the title analysis of the relationship between family history and physical activity with the incidence of hypertension in Indrasari sub-district, Banjar district, that there is a relationship between family history and the incidence of hypertension, obtained a p value = 0.001 <α 0.005.

Based on this study, the researcher assumes that there is a relationship between a family history of hypertension and the incidence of hypertension at the age of 36–45 years, where respondents who have a family history of hypertension are more at risk of developing hypertension than respondents who do not have a family history also through a combination of genetic factors and similar lifestyle habits in the family. Those who have a family history of hypertension as much as 73.0% compared to those who do not have a family history and do not experience hypertension 27.0% shows that even though there is no family history but can potentially develop hypertension, and not solely because of having a family history, and not having a family history but hypertension is 35.1% is assumed due to several other factors such as age, alcohol, smoking, and coffee consumption

The relationship between smoking status and the incidence of hypertension in the age group of 36-45 years in the working area of the Central City Community Health Center

The results of the Chi-Square statistical test showed a p-value of (0.002). Because the p-value (0.002) is much smaller than the commonly used significance limit (α = 0.05), H0 is statistically rejected. There is a highly statistically significant relationship between smoking status and the incidence of hypertension in the 36-45 year age group at the Kota Tengah Community Health Center. This relationship indicates that smoking frequency is a factor that influences a person's risk of developing hypertension.

The Guyton theory of hypertension, developed by Arthur C. Guyton in the 1950s and 1970s, emphasizes the kidneys' dominant role as the primary long-term regulator of blood pressure through the "renal-body fluid feedback" mechanism, or pressure-natriuresis curve. Guyton stated that arterial blood pressure is determined by the balance of body fluid volume and sodium; the kidneys adjust sodium excretion according to blood pressure (pressure-natriuresis), so that if there is a disturbance, blood pressure will rise or fall to restore this balance. Chronic exposure to smoking can negatively impact kidney function and blood pressure regulation mechanisms, with nicotine and cigarette toxins contributing to vasoconstriction, increased blood pressure, and impaired glomerular filtration associated with increased serum creatinine levels. This imbalance impairs the kidneys' ability to excrete sodium, which is consistent with the long-term physiological model of blood pressure where impaired kidney function increases sodium retention and fluid volume, leading to persistent hypertension (Haryanti et al., 2025) .

The results of this study are in line with the research conducted by Umbas et al., (2019) entitled the relationship between smoking and hypertension at the Kawangkoan Community Health Center which states that there is a relationship between smoking and hypertension at the Kawangkoan Community Health Center at a significance level of

95%, it was found that the p-value was 0.016 which was smaller than the significance value of 0.05.

Based on this study, researchers assume that there is a significant relationship between smoking status and the incidence of hypertension at the age of 36–45 years, where smokers have a greater chance of experiencing hypertension than non- smokers. The more frequently and longer respondents smoke, the higher the prevalence of hypertension in the 36–45 age group due to the effects of nicotine on the cardiovascular system. This can be seen in groups with frequent smoking status. 74.3% of respondents who smoke frequently experience hypertension, this impact is consistent with medical literature regarding the effects of smoking on the cardiovascular system. Nicotine in cigarettes triggers the release of catecholamines which cause acute vasoconstriction (narrowing of blood vessels) and increased heart rate, thereby increasing blood pressure rapidly while in the group who smoke occasionally. And those who consume cigarettes but do not have hypertension are 25.7%, and those who have never smoked but have hypertension are 3 (60.0%) and can be assumed by several other factors such as family history, gender, cigarette consumption, coffee and alcohol.

The relationship between coffee consumption and the incidence of hypertension in people aged 36-45 years in the working area of the Central City Community Health Center

The results of the Chi-Square statistical test showed a p-value of (0.022). Because the p-value (0.002) is much smaller than the commonly used significance limit ($\alpha = 0.05$), H0 is statistically rejected. There is a highly statistically significant relationship between the frequency of coffee drinking and the incidence of hypertension in the 36-45 year old group at the Kota Tengah Community Health Center. This relationship indicates that the habit of drinking coffee, especially the frequency, has a significant influence on the risk of hypertension in this population.

C. Sachse, J. Brockmöller, S. Bauer, and I. Roots explained that the risk of hypertension from coffee at the age of 36–45 years is high risk because caffeine lasts a long time in the body, with coffee consumption >2 cups/day at risk of 1.5–2 times higher hypertension because chronic caffeine exposure causes persistent vasoconstriction and vascular dysregulation. Then, at productive age, coffee consumption is often high (work stress), so it is more susceptible to hypertension (Popa et al., 2024) .

The results of this study are in line with the research conducted by Umbas et al., (2019) entitled the relationship between coffee consumption and the incidence of hypertension in the Polanharjo Klaten Community Health Center work area, which states that there is a relationship between the amount of coffee consumption and the incidence of hypertension in the Polanharjo Klaten Community Health Center work area. The results of the Chi Square statistical test obtained a p-value of (0.000) <α value (0.05).

Based on this study, the association between coffee drinking and hypertension in respondents aged 36-45 is due to the effects of caffeine, which acts as a cardiac stimulant. Simply put, caffeine makes the heart beat faster and blood vessels temporarily narrow. If coffee is consumed too frequently or in large quantities every day, blood pressure that previously fluctuated can become persistently high. The combination of strong caffeine, lack of rest due to staying up late, and work stress during productive age is what researchers believe makes respondents' blood pressure tend to be higher than those who rarely or never drink coffee.

In the group that frequently consumed coffee, 29 (67.4%) respondents who frequently consumed coffee experienced hypertension. This effect is consistent with the primary biological role of caffeine. Caffeine is a central nervous system stimulant and triggers increased catecholamine release that causes peripheral blood vessel constriction and increased heart rate. Meanwhile, in the group that did not consume coffee but did not develop hypertension, namely 14 (67.4%), it can be assumed that the cause is due to several genetic lifestyle factors and alcohol and smoking. And those who never consumed but developed hypertension, namely 1 (50.0%), can be assumed to be due to genetic factors and lifestyle such as coffee consumption and smoking.

The relationship between alcohol consumption and the incidence of hypertension in the age group of 36-45 years in the working area of the Central City Community Health Center

The results of the Chi-Square statistical test showed a p-value of (0.002). Because the p-value (0.002) is much smaller than the commonly used significance limit ($\alpha = 0.05$), H0 is statistically rejected. There is a highly statistically significant relationship between alcohol consumption and the incidence of hypertension in the 36-45 year age group at the Kota Tengah Community Health Center. This relationship indicates that alcohol consumption habits, especially its frequency, are a strong risk factor in determining the respondents' hypertension status.

Regular alcohol consumption, especially when exceeding moderate limits (>20–30 g per day), is associated with an increased risk of hypertension through activation of neurohormonal pathways involving increased aldosterone secretion and activity of the renin --angiotensin-aldosterone system (RAAS), which impact sodium and fluid volume retention, leading to increased blood pressure. Epidemiological evidence also suggests that excessive alcohol consumption is associated with a higher prevalence of hypertension compared to abstaining, and that reducing alcohol consumption can lower blood pressure. The heredity of the RAAS pathway and these hormonal responses explains the physiological mechanisms behind alcohol's effects on blood pressure (Cecchini et al., 2024) .

The results of this study are in line with the research conducted by (Jayanti et al., 2017) entitled The relationship between alcoholic beverage consumption patterns and the incidence of hypertension in tourism workers in Legian Village, that there is a significant relationship between the type of beverage and the incidence of hypertension ($r_s = 0.433$) the amount of consumption and the incidence of hypertension ($r_s = 0.566$).

Based on the results of this study, the link between alcohol consumption and hypertension in respondents aged 36-45 is related to how alcohol disrupts the body's blood pressure control system. Simply put, alcohol can stimulate the central nervous system to work harder, causing the heart to beat faster and blood vessels to stiffen or narrow. Furthermore, alcohol can also trigger the release of stress hormones that cause blood pressure to spike. In the productive age group (36-45 years), researchers observed that alcohol consumption is often used as a way to cope with life's stresses or work stress. In fact, alcohol actually disrupts the balance of fluids and calcium in the muscles of the blood vessels.

In the group that frequently consumed alcohol, 73.5% of respondents who frequently consumed alcohol experienced hypertension. This impact is very consistent with the pathophysiological mechanisms of alcohol on the cardiovascular system. Heavy and chronic alcohol consumption causes increased blood pressure through several

pathways: alcohol increases the release of catecholamines, which causes an increase in heart rate and raises blood pressure. In the group that consumed alcohol, namely 9 (26.5%) but did not have hypertension, it can be assumed that this is due to the temporary effect of blood vessel dilation. And those who did not consume alcohol but had hypertension, namely 14 (66.7%), can be assumed to be due to other factors such as genetics, alcohol consumption, coffee, and smoking.

CONCLUSION

Based on the results of research on factors related to the incidence of hypertension in 36–45 year olds in the working area of the Central City Community Health Center in Gorontalo City, it can be concluded that all variables studied have a significant relationship with the incidence of hypertension. Gender showed a significant relationship (p=0.000), where men had a higher proportion of hypertension than women. Family history was also significantly associated with the incidence of hypertension (p=0.001), indicating the contribution of genetic or hereditary factors to the increased risk. Smoking status had a significant relationship (p=0.002), confirming that exposure to nicotine and cigarette toxic substances plays a role in increasing blood pressure. Coffee consumption was also significantly associated with the incidence of hypertension (p=0.022), indicating that caffeine intake can affect the cardiovascular system. In addition, alcohol consumption showed a significant relationship (p=0.000), indicating that this habit contributes to increased blood pressure through the mechanism of fluid retention and increased sympathetic nerve activity. Overall, this study confirms that biological and behavioral factors play an important role in the incidence of hypertension in the productive age group.

The practical implication of this research is the need to strengthen promotive and preventive efforts at the primary health care level, particularly through education on controlling hypertension risk factors. The public, especially those aged 36–45 years and those with hypertension, are expected to undergo regular blood pressure checks at the Kota Tengah Community Health Center to detect and control blood pressure early. Furthermore, adopting a healthy lifestyle, such as maintaining a balanced diet, reducing smoking, limiting coffee consumption, and avoiding excessive alcohol consumption, are strategic steps in reducing the risk of hypertension. For the Kota Tengah Community Health Center, the results of this study can serve as a basis for improving the quality of services through health promotion, routine counseling, the installation of educational media such as pamphlets or posters, and the development of a hypertension screening program for those of productive age.

This study has several limitations that should be considered. The cross-sectional design cannot directly explain causal relationships; it only shows associations at a single observation point. Furthermore, the researchers' limited time and resources, as well as the difficulty in obtaining respondents aged 36–45 who fit the research schedule, also impacted the data collection process. Some respondents also had limited time for in-depth interviews. This study only examined five risk factors, thus not including other variables that could potentially influence the incidence of hypertension, such as obesity, stress levels, lack of physical activity, and excessive salt consumption.

Based on these limitations, further research is recommended to use a longitudinal or cohort design to more clearly examine causal relationships. Future research is also expected to include other relevant variables and utilize multivariate analysis to identify

the dominant factors most influential in the incidence of hypertension. Thus, future research results can provide a more comprehensive picture to support the formulation of hypertension prevention policies at the primary healthcare level.

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