

Triggering factors related to hypertension in the City of Kendal, Indonesia

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Abstract

Background: Hypertension, which is one of the major health problems, not only in Indonesia but also around the world, has attracted a great number of concerns. Hypertension is a risk factor for heart disease, diabetes, kidney failure, and stroke. Most people with hypertension do not know that they are hypertensive, so they tend not to get proper treatment. The factors that influence the occurrence of hypertension are divided into two major groups, namely, those that cannot be controlled such as gender, age, genetic properties and race, and those that can be controlled such as diet, exercise habits, employment, consumption of salt, coffee, alcohol and stress. The study aims to determine the triggering factors associated with hypertension.

Material and methods: This type of quantitative research using descriptive correlation study method was conducted on individuals aged over 18 years in the city of Kendal, Central Java, amounting to 428 people. The sample was pooled employing purposive sampling technique. The data was collected using a questionnaire. The data were analyzed univariably in the form of frequency distribution and bivariate using the χ^2 test.

Results: The results show that the majority of the respondents with hypertension were those aged 51–60 years, male, and working as fishermen. In this regard, there are a factor of hypertension, obesity in the moderate category, and stage III hypertension. In addition, there is a relationship between the triggering factors of hypertension (age, gender, employment, heredity, obesity) and the incidence of hypertension (p value < 0.005).

Conclusion: Triggering factors related to hypertension include age, gender, employment, heredity, and obesity level.

Key words: age; gender; employment; heredity; level of obesity; hypertension

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Introduction

At present, hypertension is one of the major health problems across the globe. Hypertension is a gateway or risk factor for heart disease, diabetes, kidney failure, and stroke. A persistent disease occurs when the systolic pressure is above 140 mm Hg and the diastolic pressure is above 90 mm Hg. The prevalence of hypertension, according to World Health Organization (WHO) data in 2015, shows that around

1.13 billion people in the world have hypertension. This means that 1 in 3 people in the world are diagnosed with hypertension. The number of people with hypertension continues to increase every year; it is estimated that in 2025, there will be 1.5 billion people suffering from hypertension, and every year an estimated 9.4 million people die from hypertension and its complications [1].

The results of basic health research across Indonesia in 2018 show the prevalence of hypertension

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based on the measurements of the 18-year-old population of 34.1%, the highest being in South Kalimantan (44.1%), while the lowest in Papua (22.2%). Hypertension occurs in the group of 31–44 years old (31.6%), 45–54 years old (45.3%), and 55–64 years old (55.2%). Based on the prevalence of hypertension of 34.1%, it is known that 8.8% have been diagnosed with hypertension and 13.3% of people diagnosed with hypertension do not take medication and 32.3% do not regularly take medication. This shows that many people with hypertension do not know that they suffer from hypertension, so they do not receive proper treatment [2].

The reasons why those with hypertension do not take medication include hypertension sufferers feeling healthy (59.8%), irregular visits to health care facilities (31.3%), taking traditional medicine (14.5%), using other therapies (12, 5%), forgetting to take medicine (11.5%), inability to buy drugs (8.1%), side effects of drugs (4.5%), and unavailability of hypertension drugs in health care facilities (2%). In this regard, hypertension is often called silent killer because it usually does not cause any symptoms. People with hypertension often do not know that they have hypertension and are only diagnosed after complications occur. Target organ damages due to complications of hypertension depend on the magnitude of the increase in blood pressure and the duration of the condition of the undiagnosed and untreated elevated blood pressure [2].

Global Status Report on Non-Communicable Diseases in 2010 stated that the percentage of hypertension sufferers is currently at most 40% in developing economies, while in developed countries it is only 35% [3]. Based on data obtained in Kendal District in 2015, cases of hypertension in the age group of 25–44 years were 1,282, in 45–64 years old were 4,327 and 65 years old and above were 2,737 [4].

Actually, hypertension can be prevented by controlling the triggering factors which are mostly behavioral and life habits. If someone aspires to adopt a healthy lifestyle, then they are likely to avoid hypertension. This disease continues for a life time and is often without any typical complaints as long as there are no complications in the organs of the patient's body. The high incidence of hypertension can occur due to various triggering factors. Triggers for hypertension are classified into two groups, namely, factors that cannot be controlled, such as heredity, gender, and age, and those which can be controlled such as obesity, lifestyle, diet, physical activity, smoking habits, and alcohol and salt consumption [5]. So, for the occurrence of hypertension, the role of these common risk factors are complementary; in other

words, one risk factor is usually not enough to cause hypertension [6].

Controllable factors such as obesity are one of the biggest causes of hypertension. The food consumed having a high degree of cholesterol can cause fat accumulation along the blood vessels. As a result, blood flow is inhibited. People who have excessive fat (hyperlipidemia) have the potential to experience blood clots which decreases the supply of oxygen and nutrients into the body. The narrowing and blockage in the blood vessels by fat stimulates the heart to pump the blood even stronger so that it can supply the blood to the tissues. As a result, blood pressure increases and hypertension occurs. People who have body weight above normal may be able to increase the work of the heart in pumping the blood throughout the body. This also results in the increase in blood pressure [7]. Several studies show that rising blood pressure, in addition to being influenced by heredity, is closely related to the behavior of people, such as rare physical exercises and unhealthy lifestyles. The situation is worse if these factors are doubled up with old age.

Knight's research shows that there is a relationship between the incidence of hypertension and excessive body weight. The risk of developing hypertension is increased 1.6 times for the elderly with overweight and 2.5–3.2 times for the elderly with obesity [8]. The risk of hypertension in the elderly with obesity is by 5.9 times in elderly women and 2.5 times in elderly men [9]. Thus, overweight in the elderly can cause many health problems and increase the risk of developing hypertension [10].

Research related to obesity as one of the triggers for hypertension has been carried out, but other triggering factors linking the occurrence of hypertension seem to have been overlooked. Therefore, this research is carried out to seek for the triggering factors associated with hypertension through quantitative research.

This study aims to determine the triggering factors associated with hypertension in Kendal City, Indonesia.

Material and methods

Research design

The present research uses descriptive correlation studies.

Conformity criteria

Respondents aged over 18 years in the City of Kendal.

Research facilities

On 428 respondents aged over 18 years in the City of Kendal, Central Java, Indonesia. Kendal city is the north coast of the island of Java where the majority of people work as fishermen. The sample was pooled using purposive sampling technique.

Research duration

The study was conducted for 2 months through a permit from the local area.

Medical procedure description

Before the research was conducted, the researcher ensured that the respondents were conscious and declared physically and psychologically healthy. Researchers explained research procedures to prospective respondents. Researchers measured the respondents' blood after they expressed their willingness to participate in the study by signing the informed consent.

Research findings

The main research outcome

The results of this study describe about age, gender, employment, heredity, level of obesity, and hypertension.

Additional research outcomes

The results of this study were to determine the factors associated with hypertension including age, gender, occupation, heredity, obesity levels, and hypertension.

Subgroup analysis

The results of this study were to determine the triggering factors related to hypertension including age, gender, employment, heredity, level of obesity, and hypertension.

Methods for registration of outcomes

Before the research was carried out, the researcher had explained the aims and benefits as well as the risks, although this study did not pose any significant physical or psychological risks. This study did not provide any form of intervention. Researchers only distributed questionnaires. The data collection was carried out using a questionnaire consisting of 6 questions related to age, gender, occupation, hereditary history of hypertension, weight, height, and blood pressure. Respondent identities such as names and addresses were not included in the questionnaire; this is to protect the privacy of respondents. Prospective respondents who agreed to take part in this study

were asked to sign the informed consent that had been provided.

Ethical review

This article is part of a larger research carried out by the Kendal College of Health Sciences in collaboration with Universitas Negeri Malang and has been declared to be ethically appropriate to 7 (seven) WHO 2011 standards, referring to the 2016 CIOMS Guidelines. This research has met the standards as indicated by the fulfilment of the indicators of each standard (as per description of ethical exemption from the Health Research Ethics Committee, Kendal Islamic Hospital, Ethical code No.5/KEPK/RSI/XII/2019). The informed consents were taken from the respondents.

Statistical analysis

The research data were analyzed univariably in the form of frequency distributions and bivariately using the Chi-square test.

Results

Univariate analysis

The results of the univariate analysis are presented in Table 1. Table 1 shows that the majority of the respondents were 51–60 years old, with an average age of 47 years, the youngest being 25 years and the oldest being 60 years. The majority of the respondents were male working as fishermen.

Out of the 428 respondents, 218 (50.9%) had indication of hereditary hypertension (see Tab. 2). As regards obesity, the majority of the respondents had moderate levels of obesity (see Tab. 3). Table 4 shows that the majority of the respondents had stage III hypertension.

Table 5 indicates that in the age of 20–50 years old, the respondents were in stage I + II hypertension. While in the age of 51–60 years old, the respondents were in stage III hypertension. Chi-square test results obtained the p value of 0,000 ($p < 0.05$) which shows that there is a relationship between age and the incidence of hypertension in the City of Kendal, with an r value of 0.548 which means that age and hypertension have a strong relationship.

Table 6 shows that female respondents fell into the category of stage I + II hypertension, while male respondents in stage III hypertension. The results of the analysis using χ^2 test obtained the p value of 0,000 ($p < 0.05$) which shows that there is a relationship between gender with the incidence of hy-

Table 1. Age, gender and employment of the respondents (n = 428)

Variable	f	%	Mean	Min–Max	SD			
Age								
20–30 years	20	4.7	46.9	25–60	8.07			
31–40 years	55	12.8						
41–50 years	157	36.7						
51–60 years	196	45.8						
Gender								
Female	192	44.9						
Male	236	55.1						
Employment								
Does not work	92	21.5						
Trader	69	16.1						
Fishermen	158	36.9						
Farmer	81	18.9						
Government employees	28	6.5						

SD — standard deviation

Table 2. Heredity of hypertension (n = 428)

Heredity of hypertension	f	%
No	210	49.1
Yes	218	50.9

Table 3. Level of obesity of respondents (n = 428)

Level of obesity	F	%
Normal weight	62	14.5
Mild	181	42.3
Moderate	185	43.2

pertension, with an r value of 0.316 which means that the gender with hypertension is related to the relationship.

A group of respondents who did not have a history of hypertension were shown in Table 7. The majority were in stage I + II hypertension, while the majority of the respondents who had a hereditary history of hypertension were in stage III

Table 4. Respondent hypertension level (n = 428)

Hypertension	f	%
Stage I	88	20.6
Stage II	116	27.1
Stage III	224	52.3

hypertension. Chi-square test results obtained the p value 0,000 ($p < 0.05$) which shows there is a relationship between family history of hypertension and the incidence of hypertension, with an r value of 0.701 which means that family history of hypertension and hypertension have a very strong relationship.

The next point is about the relationship between employment and hypertension. Table 8 shows that the majority of fishermen were at stage I + II hypertension and the majority of those who were not fishermen were at stage III hypertension. Chi-square test results obtained the p value of 0,000 ($p < 0.05$) which shows there is a relationship between the employment and the incidence of hypertension in the

Table 5. Relationship between age and hypertension (n = 428)

Age	Hypertension		p value
	Stage I + II f (%)	Stage III f (%)	
20–50 years	171 (40)	63 (14.7)	0.000
51–60 years	35 (8.2)	159 (37.1)	r = 0.548

Table 6. Relationship between gender and the incidence of hypertension (n = 428)

Gender	Hypertension		p value
	Stage I + II f (%)	Stage III f (%)	
Female	126 (29.4)	66 (15.4)	0.000 R = 0.316
Male	80 (18.7)	156 (36.5)	

Table 7. Relationship between heredity of hypertension and the incidence of hypertension (n = 428)

Heredity of hypertension	Hypertension		p value
	Stage I + II f (%)	Stage III f (%)	
No	176 (41.1)	34 (8)	0.000
Yes	30 (7)	188 (43.9)	r = 0.701

Table 8. Relationship between employment and the incidence of hypertension (n = 428)

Employment	Hypertension		p value
	Stage I + II f (%)	Stage III f (%)	
Fisherman	158 (36.9)	113 (26,4)	0.000
Other than a fisherman	48 (11.2)	109 (25,5)	r = 0.267

Table 9. Relationship between level of obesity and hypertension (n = 428)

Level of obesity	Hypertension		p value
	Stage I + II f (%)	Stage III f (%)	
Normal weight + Mild	166 (38.8)	81 (18.9)	0.000
Moderate	40 (9.3)	141 (33)	r = 0.479

City of Kendal, with an r value of 0.267 indicating that there is a weak relationship between the employment and hypertension.

As regards obesity and hypertension, the results demonstrate that the majority of the respondents with normal weight and mild obesity levels were at stage I + II hypertension, while those with moderate obesity were at stage III hypertension. Chi-square test results obtained the p value of 0,000 ($p < 0.05$) which shows there is a relationship between the level of obesity and the incidence of hypertension in the City of Kendal, with an r value of 0.479 which indicates that there is a moderate relationship between the level of obesity and hypertension.

Discussion

Univariate analysis

Age

The results indicate that the majority of the respondents are aged 51–60 years (45.8%). This point indicates that age can affect a person's blood pressure; the older the person is, the higher blood pressure they will have [11]. Even though hypertension is closely related to age, this situation can be controlled by maintaining diet, exercising diligently, and doing routine medical checks. This is because the arteries lose their elasticity as people age due to natural changes in heart, blood vessels, and hormones and if these changes are accompanied by other factors, they

can trigger hypertension. So, as people get older, the risk of hypertension also increases. Although hypertension can occur at any age, it is most common to occur to people aged 35 years or more [12].

This is consistent with the theory stating that hypertension is most dominant in the age group over 18 years [13]. This opinion is also in line with the research of Sari and Livana (2016) that the majority of the respondents who suffer from hypertension are aged 31–40 years. This is because with age, blood pressure tends to increase. Hypertension generally develops when a person reaches middle age, that is, it tends to increase, especially among those over the age of 40 years. The likelihood gets higher among those at the age of more than 60 years. In general, hypertension affects men over the age of 31 years, whereas in women, it occurs after the age of 45 years or before menopause [14].

The results of the present study are in line with the previous research finding that the majority of the respondents who suffer from hypertension are elderly [15–17]. This is in accord with Lewa's research (2010) that population above 55 years old have the risk of suffering from hypertension due to the aortic constriction and decreased distention ability of arterial dilation resulting in an increase in systolic blood pressure. These results are in line with Nasri's research (2012) that among men aged 65 years who have a history of hypertension for 3 years, monitored laboratory results have shown that antiphospholipid syndrome nephropathy (APSN) manifested against hypertension [18]. This result affirms the research by Ghorbani, Rafeian-Kopaei, and Nasri (2013) which states that there is a significant relationship between serum lipoprotein and age, where lipoprotein is involved as a co-factor in hypertension.

Based on the results of our study, theories, and previous research, we can conclude that as we age, blood pressure increases. However, blood pressure can be controlled by exercising diligently, maintaining diet, and carrying out routine medical checks [19].

Gender

Pertinent to gender, the results show that the majority of the respondents were male (55.1%). In this regard, Rosta (2011) argues that gender is also one of the factors that influence blood pressure. The results of this study affirms Wahyuni and Eksanoto's (2013) research indicating that males tend to suffer from hypertension more than females do. This happens because males tend to have living habits that can cause hypertension such as smoking, bad-temperedness, and consuming alcoholic drinks [20]. The results of

this study underline the point that males in puberty tend to have higher blood pressure than females [21].

This research is in line with the observation that the majority of respondents who suffer from hypertension are male [15–17]. However, the results of this study are different from that of Sudawam and Livana (2017) research which states that the majority of the respondents who experience hypertension are female; women are more likely to experience stress than men [22]. The results of the our study, theories and previous research lead us to a point that gender is a trigger for hypertension.

Employment

As work affects the physical activity of a person, this has to do with hypertension because activity relates to hypertension. People who do not work tend not to have many activities that can increase the incidence of hypertension [23]. In this context, our research has turned out to deal with the fact that the majority of the respondents work as fishermen (36.9%).

It is ubiquitous that everyone experiences stress related to their work. As work tends to take longer time, it is likely to affect someone's level of vulnerability to hypertension. Everyone experiences work-related stress, like the fishermen who work hard every day. Fishermen are required to work for a long time at the sea. Despite the hard work, fishermen sometimes have a low economic status, which triggers hypertension. This is consistent with Waspadji's statement that socioeconomic status is closely related to the type of work. In this regard, we come to a conclusion that respondents who work as fishermen tend to suffer from hypertension because they work hard every day for a long time. In addition, as they sometimes have low economic status, they are more prone to hypertension [24].

Heredity

The analysis demonstrates that the majority of the respondents had a hereditary history of hypertension (50.9%). The hereditary factor always plays a crucial role in the emergence of a disease carried by familial genes. If one family member or parent has high blood pressure, the child also tends to have the same risk and even that risk is greater than that passed down by the parent's genes. It has been shown that a person is more likely to get hypertension if his/her parents are hypertension sufferers. Seventy to eighty percent of essential hypertension cases are inherited from their parents. If a history of hypertension is obtained in both parents, then the suspicion of essential hypertension is greater. Even in monozygotic twins (one egg), if one of them suffers from hypertension,

the other one is also likely to suffer from hypertension [25–27].

A close family history of hypertension (heredity) increases the risk of developing hypertension, especially in primary hypertension. Families who have hypertension and heart disease increase the risk of hypertension 2–5 times. Research shows that a child's blood pressure will be closer to his parents' blood pressure if they have blood relations compared to an adopted child. This shows that the genes are passed down, and not just environmental factors (such as food or social status) play a large role in determining blood pressure. The results of research conducted in the City of Kendal cannot be separated from the habits of respondents in consuming foods that are high in salt, where geographically, the City of Kendal is in the northern coast of Java. These results are in line with the research of Mahmudah, Maryusman, Arini, and Malkan (2015) showing that there is a relationship between physical activities, fat intake, and sodium intake and the incidence of hypertension. So, we may conclude that hypertension sufferers tend to have a hereditary history of hypertension. This is because hypertension is passed down through genes and a person's blood pressure is closer to his parents' blood pressure [28].

Level of obesity

The analysis suggests that the majority of the respondents (43.2%) had moderate obesity. In people suffering from obesity, their organs are forced to work harder. Therefore, people with obesity tend to be hotter in the body temperature and more tired. As a result of obesity, people tend to suffer from cardiovascular disease, hypertension, and diabetes mellitus. Obesity is an imbalance between calorie consumption and energy requirements stored in the form of fat (subcutaneous tissue of intestinal curtain, vital organs of the heart, lungs, and liver). This causes the network to be inactive so that the heart's workload increases [29, 30].

Someone with overweight tends to have a great risk of hypertension. Obesity is closely related to the fondness of eating foods that are high in fat. Obesity increases the risk of hypertension due to several reasons. The greater the body mass, the more blood is needed to supply oxygen and food to body tissues. This means that the volume of blood circulating through blood vessels increases so that it puts more pressure on the artery walls. Being obese also increases heart rate frequency and insulin levels in the blood [31]. In short, some of the respondents experienced moderate obesity which is likely to increase the risk of hypertension.

Hypertension

The results show that as many as 52.3% of the respondents had hypertension in stage III. Hypertension is a condition where there is arterial constriction which can increase blood pressure abnormally and continuously for more than one period so that it can increase the workload of the heart and if it continues it can damage the heart and blood vessels. At the age of more than 45 years, hypertension is said when the blood pressure is more than 145/95 mm Hg. Hypertension in the elderly is a condition where the systolic pressure is equal to or greater than 140 mm Hg and the diastolic pressure is equal to or greater than 90 mm Hg. And according to WHO, the normal blood pressure is 140/90 mm Hg and the blood pressure equal to or above 160/95 mm Hg is stated as hypertension [32–34].

The results of this study confirm Joseph's research that most hypertension sufferers are in stage III hypertension, namely, systolic blood pressure 180–209 mm Hg and diastolic blood pressure 110–119. These results indicate that hypertension that occurs in the respondents is in the weight category [35]. So, we may conclude that the majority of the respondents had hypertension at stage III and this relates to the fact that most of the respondents were of 51–60 years old.

Bivariate analysis

Relationship between age and the incidence of hypertension

The results show that in the age group of 20–50 years, there were 171 individuals (40%) with stage I + II hypertension and 63 (14.7%) with stage III hypertension. While in the age group of 51–60 years, stage I + II hypertension was found in 35 persons (8.2%) and stage III in 159 (37.1%). The results of the bivariate analysis using the χ^2 test obtained the p value of 0,000 ($p < 0.05$) which shows that there is a relationship between age and the incidence of hypertension.

In general, hypertension sufferers are people aged over 40 years, but currently this does not rule out the possibility of suffering by young people. Most cases of primary hypertension occur at the age of 25–45 years and only 20% occur under the age of 20 years and above 50 years. This is because people of productive age tend not to pay attention to health, such as eating patterns, and unhealthy lifestyles like smoking. Age is one of the important variables of a person because morbidity and mortality figures of almost all of the conditions show a relationship with age. It was found that the incidence of hypertension

was more likely to be experienced by respondents within the age group of 35 years compared with those in the age group below 35 years. As people get older, the possibility of someone suffering from hypertension is also greater. There is a relationship between age and the incidence of hypertension. It was found that the incidence of hypertension was more likely to happen to respondents who were aged ≥ 40 years compared to those aged < 40 years. There is a relationship between the characteristics (age, gender, level of education), physical activities, and blood pressure in the elderly. So, the conclusion is that there is a relationship between age and the incidence of hypertension: the older the person, the higher the possibility of someone to suffer from hypertension [36–38].

Relationship between gender and hypertension

In our study, there were 126 women (29.4%) with stage I + II hypertension and 66 women (15.4%) with stage III hypertension, whereas in men stage I + II hypertension was found in 80 subjects (18.7%) and stage III in 156 (36.5%). The results of the bivariate analysis using the χ^2 test showed a p value of 0.017 ($p < 0.05$) which showed a relationship between gender and the incidence of hypertension.

In general, the risk of hypertension in men is greater than that in women, but in middle age and older, the incidence of hypertension among women increases. This is related to the premenopausal period experienced by women which tends to cause blood pressure to rise. Before menopause, women are relatively protected from cardiovascular disease due to the presence of estrogen. Meanwhile, estrogen levels decrease in women who experience menopause. Thus, the risk of hypertension in women over 65 years old is higher. However, in a young age below 60 years, more men suffer from hypertension than women do. Men are often thought to have a lifestyle that tends to increase blood pressure compared to women. But after entering menopause, the prevalence of hypertension in women increases [20–22].

Pertinent to hypertension after the age of 65 years, the occurrence among women is higher than that among men. This seems to be due to hormonal factors, i.e., the influence of estrogen. These hormone levels decrease after depositing. The protective effect of estrogen may account for the presence of female immunity at premenopausal age. Along the premenopausal period, women begin to lose little by little the estrogen which has protected blood vessels from damage [39].

The relationship between gender and blood pressure in the elderly is found with a p value of 0.001 ($p < 0.05$). The same study conducted about the relationship between respondent characteristics and the incidence of hypertension showed that there was a relationship between gender and the occurrence of hypertension with a p value of 0.004 ($p < 0.05$). Similar research conducted on factors related to the incidence of hypertension has shown that there was a relationship between gender and the incidence of hypertension with a p value of 0,000 ($p < 0.05$). So, all these pieces of research have led to a notion that there is a relationship between gender and the incidence of hypertension: men tend to have a lifestyle attributable to the increase of blood pressure compared to women [40, 41].

The relationship between heredity and the incidence of hypertension

The analysis has shown the hereditary factors were present in 30 respondents (7%) with stage I + II hypertension and 188 respondents (43.9%) with stage III hypertension. Among those without hereditary history, 176 individuals (41.1%) had stage I + II hypertension and 34 people (8%) had stage III hypertension. The results of the bivariate analysis using the chi-square test showed a p value of 0,000 ($p < 0.05$) which suggests that there was a relationship between heredity and the incidence of hypertension.

So, hereditary factors do have a large role in the emergence of hypertension. This has been indicated by the discovery that hypertension is more common in monozygotic twins than heterozygotes (derived from different egg cells) [42]. In a study conducted by Raihan (2014) in the working area of the Rumbai Pesisir Community Health Center, it was found that there was a relationship between respondents who had a hereditary history of hypertension and hypertension in the community [43].

The above point suggests that the hereditary factor always plays an important role in the emergence of a disease carried by hereditary genes. If one family member or parent has a high blood pressure, the child also tends to have the same risk and even that risk can be greater than that passed down by the parent's genes. In 70–80% of cases of essential hypertension, a family history of hypertension shows this phenomenon. If a history of hypertension is found in both parents, the possibility of essential hypertension is greater. So, the relationship between heredity and the incidence of hypertension can be established: a child who has hypertension is very likely to have parents having hypertension.

Relationship between employment and the incidence of hypertension

As noted earlier, among people employed as fishermen, 158 respondents (36.9%) had stage I + II hypertension and 113 individuals (26.4%) had stage III hypertension. On the other hand, among non-fishermen, there were 48 people (11.2%) with stage I + II hypertension and 109 people (25.5%) with stage III hypertension. The types of non-fishing work include unemployment, farmers, traders, and civil servants. The results of the bivariate analysis using the chi-square test showed a p value of 0,000 ($p < 0.05$) which suggests a relationship between work and the incidence of hypertension.

The location and time of work, such as the majority of fishermen who work from morning to evening, influence the incidence of hypertension. Another point is that despite the long time of work, fishermen may still fall into the category of low economic status. All this triggers hypertension. This research resonates Rahajeng's (2009) research which observed that there is a significant relationship between work and hypertension [44]. Nevertheless, different results are shown by Purniawaty (2010) who showed that there is no meaningful relationship between work and hypertension. Despite the contradiction, it can be logically construed that work affects the physical activities of a person [45]. People who do not work do not have many activities which, in turn, tend to lead to the increase of the incidence of hypertension [23].

The results of the present study echoes those documented by Sihombing in a study conducted in 33 provinces across Indonesia in 2010. Based on the economic status of 114,692 obese respondents, it has been identified that people with high economic status tend to be relatively at risk of hypertension compared to those with low economic status with $OR = 1.05$ [46]. Most hypertension sufferers have problems with family expenses and tend to have a low level of education. This result corroborates the previous research observing that the proportion of hypertension incidence among respondents with a family expenditure below the UMR (regional minimum wage) was higher, namely 96.08% compared to those with a family expenditure of more than or equal to the UMR (3.92%) [47].

The study also found that there is a relationship between the type of work and the occurrence of hypertension with a p value of 0.001 ($p < 0.05$). Similar research conducted on the factors associated with the incidence of hypertension has shown that there was a relationship between work and the incidence of hypertension with a p value of 0.005 ($p < 0.05$).

All this suggests that there is a relationship between work and the incidence of hypertension. This is because a person who experiences stress and overwork tends to experience hypertension. As the respondents in this study were mostly fishermen who have long working hours, even up to a day, they are vulnerable to suffer from hypertension [23, 24].

The relationship between obesity factors and hypertension

As adumbrated earlier, among respondents with normal weight and mild obesity levels there were 166 people (38.8%) with stage I + II hypertension and 81 individuals (18.9%) with stage III hypertension, whereas among those with moderate obesity stage I + II hypertension was found in 40 people (9.3%) and stage III in 141 people (33%). In this regard, the results of the bivariate analysis using the chi-square test obtained a p value of 0,000 ($p < 0.05$) which suggests that there is a relationship between the level of obesity and the incidence of hypertension.

Obesity or overweight where body weight reaches a body mass index of more than 25 (body weight (kg) divided by the square of height (m)) is also a risk factor for hypertension. Obesity is a characteristic of hypertensive populations. Obese hypertension sufferers have a higher risk than non-obese hypertension sufferers. Aerobic physical activity for 30–45 minutes/day actually can reduce peripheral resistance which will reduce blood pressure. In addition to lack of exercise, the risk of obesity will increase, and if salt intake increases, the risk of hypertension will also increase [25–28].

Body weight and body mass index (BMI) correlate directly with blood pressure, especially systolic blood pressure. The relative risk for suffering from hypertension in obese people is 5 times higher compared to a normal-weighted person. Patients with hypertension have been found to have 20–30% higher body weight [48]. In a previous study, there was an association between obesity and primary hypertension in patients [49]. In previous studies conducted by Kamil et al. (2012), it was documented that there is a relationship between the categories of factors on hypertension status in male patients who are obese and have hypertensive offspring. They are more likely to develop stage II hypertension [50].

The same study conducted about the relationship between respondent characteristics and the incidence of hypertension has shown that there was a relationship between obesity and hypertension with a p value of 0.002 ($p < 0.05$) [43]. Similar research conducted on the factors related to the incidence of hypertension has also shown that there was a relationship

between obesity and the incidence of hypertension with a p value of 0.003 ($p < 0.05$). All this leads to a conclusion that there is a relationship between obesity and the incidence of hypertension in which cardiac output and blood volume circulation of hypertensive sufferers of obesity are higher resulting in hypertension [51].

Conclusion

The results of the study suggest that the majority of hypertension sufferers were those aged 51–60 years, male, and worked as fishermen. In this regard, there are a factor of hypertension, obesity in the moderate category, and stage III hypertension. In addition, there is a relationship between the triggering factors of hypertension (age, gender, employment, heredity, obesity) and the incidence of hypertension (p value < 0.005).

Limitations of study

This study only measures the triggering factors of age, sex, occupation, heredity, and obesity level. while other triggers have not been measured such as smoking, alcohol consumption, history of heart disease, history of diabetes mellitus, consumption of sweet foods, consumption of salty foods, consumption of vegetables and fruit, so that future studies can measure these other triggers.

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Authors' contributions

L.PH contributed to the study design, collection of respondents, data entry and data analysis, and manuscript preparation. L.PH and Y.B. worked together in preparing the main concept of the article. Y.B. also contributed to the translation of the manuscript. All authors read and signed the manuscript.

Conflicts of interest

The authors declared that there was no conflict of interest.

Ethical considerations

Ethical issues including plagiarism, double publication, and redundancy have been completely observed by the authors.

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