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FACTORS RELATED TO HYPERTENSION AT SANGGENG PUBLIC HEALTH CENTER, MANOKWARI DISTRICT

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Abstract

Data from the 2023 Indonesian Health Survey shows that 59.1% of the causes of disability (seeing, hearing, walking) in the population aged 15 years and above are Non-Communicable Diseases (53.5%), especially hypertension (22.2%). This study aims to determine the risk factors for the incidence of Hypertension at the Sanggeng Health Center, Manokwari Regency The type of research is quantitative research with a case control design. The population is all people who will undergo a hypertension examination at the Sanggeng Health Center in 2025 as many as 1,849. A sample of 110 was taken using the purposive sampling technique. The results of the study found that what was significantly related to the incidence of hypertension was Age with a p value of 0.018, while the variables of gender, family history, dietary consumption patterns, smoking habits, and Body Mass Index were not significant.

Keywords: Hypertension, Diet, Family History, Age

Introduction

Hypertension is a major risk factor that contributes to the occurrence of cardiovascular disease and premature death [(1)]. Hypertension can trigger an abnormal increase in blood pressure, making it the main cause of various cardiovascular diseases and metabolic disorders in the body [(2)]. An estimated 600 million people with hypertension are unaware that they have hypertension, as many as 630 million people with hypertension are successfully diagnosed and treated and about 320 million people with hypertension manage to control the disease [(3)].

In Indonesia, according to the 2023 Indonesian Health Survey (SKI) and the 2011-2021 Non-Communicable Disease (NCD) cohort study, hypertension is the fourth highest risk factor for death with a percentage of 10.2%. SKI 2023 data shows that 59.1% of the causes of disability (seeing, hearing, walking) in the population aged 15 years and above are acquired diseases, of which 53.5% are NCDs, especially hypertension (22.2%) [(4)]. According to a report by the West Papua Provincial Health Office in 2025, the regional health profile shows that the number of hypertension patients in West Papua reaches around 8,262 cases [(5)].

The Sanggeng Health Center of Manokwari Regency in 2025 reported that as many as 1,849 people visited the health center for hypertension checks and there were 670 people who experienced hypertension and the percentage [(6)]. The results of a study conducted by Trisnowati, found that the male gender has a higher percentage of hypertension compared to women. This can be caused by the participants who attend from the male gender. The results of this study are different from previous studies which stated that women have a tendency to experience hypertension compared to men [(7)].

According to the *European Society of Cardiology*, one of the risk factors associated with the incidence of hypertension is family history/heredity, this is due to genetic factors that are closely related

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to increased intracellular sodium levels and low potassium-sodium ratios. If a history of hypertension is obtained in both parents, the suspicion of hypertension in a person is quite large. This happens due to inheritance of traits through genes. According to Riska's research (2015) states that genetics are proven to be a risk factor for hypertension [8].

Method

This research is included in quantitative analytical research with the research design used is *Case Control,* where the research is carried out by comparing two groups, namely the case group and the control group [9]. The population in this study is all patients who visit and conduct hypertension examinations in 2025 at the Sangeng Health Center, there are 1,849 who visit and conduct examinations, hypertension. The sample was 110 respondents. Taken by purposive sampling technique.

Results

1. Univariate analysis

Table 1. Independent variable distribution

No	Variable	Frekuensi (n)	Presentase (%)
1	Age		
	>= 60 Years	106	96.4
	20-59	4	3.6
2	Gender		
	Male	20	18.2
	Female	90	81.8
3	Family History		
	Yes	52	47.3
	None	58	52.7
4	Eating Patterns		
	Not good	54	49.1
	Good	56	50.9
5	Smoking status		
	Yes	56	50.9
	No	54	49.1
6	Body Mass Indeks		
	>=25	91	82.7
	IMT<25	19	17.3
Total		110	100,0

Based on the results of univariate analysis of 110 respondents, it was obtained that 69 respondents (62.7%) did not experience hypertension, dominated by 106 (96.4%) >=60 years old. Gender is dominated by women as many as 90 (81.8%). There was no family history of hypertension in 58 (52.7%). The consumption pattern variables are known to be more in the consumption category as many as 56 (50.9%) and dominated by smokers as many as 56 (50.9%) and BMI >=25 as many as 91 (82.7%).

These results show that the proportion of hypertension incidence in the working area of the Sanggeng Health Center is quite high, considering that more than a third of respondents have hypertension. This condition indicates that hypertension is still a significant public health problem in Manokwari Regency.

2. Bivariate Analysis

Table 1. Odds Ratio, Chi-Square Analysis, Hypertension

No	Variable	Hypertension				P value	OR	Lower-Upper
		Case		control				
		N	%	n	%			
1	**Age**							
	Productive	37	90.2	69	100	0.018	0	-
	Unproductive	4	9.8	0	0			
2	**Gender**							
	Male	9	22	11	15.9	0.593	0.64	0.2-1.7
	Female	32	78	58	84.1			
3	**Family history of hypertension**							
	Yes	19	46.3	33	47.8	1.000	1.06	0.4-2.
	None	22	53.7	36	52.2			
4	**Eating Patterns**							
	Bad	21	51.2	33	47.8	0.883	0.87	0.4-1.8
	Good	20	48.8	36	52.2			
5	**Smoking Status**							
	Yes	20	48.8	36	52.2	0.883	1.14	0.5-2.4
	None	21	51.2	33	47.8			
6	**Body Mass Indeks**							
	>=25	38	93.7	53	76.8	0.062	0.2	0.07-0.96
	<25	3	7.3	16	23.2			

Based on the table above, it is known that the variable that has a significant relationship with hypertension is age with a p value of 0.018. Meanwhile, variables that are not significant with hypertension are gender, family history of hypertension, diet, smoking status and body mass index. Because the p value> 0.05.

Discussion

1. Age

According to Tirtasari et al., age is one of the risk factors that cannot be modified in the incidence of hypertension. As we age, there is a degenerative process that causes blood vessels to become stiffer (arteriosclerosis), thereby increasing systolic blood pressure [(10)]. The results of this study are in line with data from the Ministry of Health of the Republic of Indonesia in Riskesdas 2018 which shows that the prevalence of hypertension has increased significantly in the age group of ≥55 years, and reached its peak in the elderly group [(11)].

Research by Franklin SS (2001) also stated that isolated systolic hypertension is more common in the elderly due to decreased elasticity of the large arteries. This reinforces that the elderly group is the group with the highest risk [(12)]. In addition, the research of Inayah et. Al., found that individuals with the age of ≥60 years had a higher risk of hypertension than younger age groups [(13)]. However, the age distribution in this study, which is heavily dominated by the elderly (96.4%) may be a limitation in the analysis, as the lack of age variation may affect the strength of the analysis of the relationship between age and hypertension incidence.

2. Gender

Research by Fajri states that the hormone estrogen in women has a protective effect on blood pressure. However, after menopause, the risk of hypertension in women increases and can even exceed that of men [(14)]. In addition, the hypertension guidelines state that gender factors interact with age in determining the risk of hypertension, where men are more at risk at a young age, while women increase in old age [(15)]. However, the dominance of female respondents in this study can also be a limitation because it can affect the generalization of research results to the male population. Therefore, the interpretation of the results of the advanced analysis needs to take into account these unbalanced proportions. Thus, gender is an important factor in the analysis of hypertension, especially in relation to hormonal changes and health-seeking behavior.

The high proportion of respondents who experienced hypertension (37.3%) in this study showed that non-communicable diseases, especially hypertension, are still the main challenge in primary health services. Epidemiologically, hypertension is known as a *silent killer* because it often does not cause symptoms but can lead to serious complications such as heart disease and stroke.

The results of this study are in line with a report by the World Health Organization which states that the global prevalence of hypertension continues to increase, especially in developing countries, due to lifestyle changes such as a diet high in salt, lack of physical activity, and increased stress. In addition, data from the Ministry of Health of the Republic of Indonesia through Basic Health Research (Riskesdas) shows that the prevalence of hypertension in Indonesia has increased from 25.8% in 2013 to 34.1% in 2018. This figure is not much different from the results of this study, which shows that the tendency of hypertension problems is still high at the regional level [(11)].

This research is also in line with a study by Gibran Wirayudha (2024) which found that the prevalence of hypertension in the pre-elderly and elderly groups reached more than 30%, which was influenced by age, nutritional status, and lifestyle factors [(16)].

Hypertension is closely related to behavioral risk factors such as smoking, excessive salt consumption, and lack of physical activity. This reinforces that the high rates of hypertension in this study are most likely influenced by a combination of these factors. When compared to other studies at the primary health service level, these results are still in a similar range, where the prevalence of hypertension ranges from 30–40% (17). This shows that the phenomenon of hypertension at the Sanggeng Health Center is not a stand-alone case, but part of a broader epidemiological trend.

Thus, more intensive promotive and preventive efforts are needed through programs such as the non communicable diseases Posbindu, healthy lifestyle education, and routine blood pressure screening to suppress the increase in hypertension cases in the community.

3. Family history

The family history in this study showed that almost half of the respondents had a family history of hypertension. This confirms that genetic factors still play a role in the incidence of hypertension. Research by Gibran Wirayudha (2024) states that individuals with a family history of hypertension have a greater risk of developing hypertension than those who do not have a family history [(16)]. On the smoking habit, most respondents did not smoke. However, the proportion of smokers is still quite large (41.8%), which indicates exposure to behavioral risk factors. Smoking can cause vasoconstriction and increase blood pressure. This is in line with research by Ayutthaya et al., which stated that smoking is one of the main risk factors for cardiovascular diseases including hypertension [(18)].

Most of the respondents' physical activity was lacking, indicating a sedentary lifestyle. Lack of physical activity contributes to an increased risk of hypertension as it is associated with obesity and metabolic disorders. The World Health Organization also emphasizes that adequate physical activity can significantly lower the risk of hypertension.

Overall, the results of this univariate analysis show that age, gender, family history, smoking habits, and physical activity are important characteristics that need to be considered in the follow-up analysis. The combination of non-modifiable factors (such as age and genetics) and modifiable factors (such as smoking and physical activity) is fundamental in efforts to prevent and control hypertension.

Based on the respondent distribution table, it is known that of the 110 respondents, the majority (56 respondents) had good consumption patterns, while 54 (49.1%) had poor consumption patterns. These results indicate a relatively balanced proportion between good and poor consumption patterns, although a slightly higher proportion of respondents had good consumption patterns. This small difference indicates that consumption patterns remain a factor that needs to be considered in this research, as nearly half of the respondents still have poor consumption patterns.

Consumption patterns are one of the behavioral factors that play an important role in the incidence of hypertension. Poor consumption patterns, such as high consumption of salt, saturated fat, and low intake of fruits and vegetables, can increase the risk of hypertension through the mechanism of increasing blood volume and blood vessel resistance.

The results of this study show that although most of the respondents have good consumption patterns, the proportion of respondents with bad consumption patterns is almost balanced (49.1%). This indicates that there is still a considerable potential risk of hypertension from dietary factors. According to the World Health Organization (2021), excessive salt consumption is one of the main factors causing hypertension. The WHO recommends consuming less than 5 grams of salt per day to lower the risk of high blood pressure. In addition, increased consumption of fruits and vegetables has also been shown to help control blood pressure.

The *Dietary Approaches to Stop Hypertension (DASH)* diet shows that consumption patterns rich in fruits, vegetables, and low in fat can significantly lower blood pressure in individuals with hypertension and prehypertension [(19)]. In line with that, research by He FJ & MacGregor (2010) states that decreased salt consumption is directly related to a decrease in blood pressure as well as the risk of cardiovascular disease. In addition, research by Gibran Wirayudha (2024) also found that unhealthy consumption patterns have a significant relationship with the incidence of hypertension, especially in the pre-elderly and elderly age groups.

Theoretically, consumption patterns are influenced by various factors such as knowledge, culture, economy, and food availability. Although most of the respondents in this study had good consumption patterns, the existence of almost half of the respondents with poor consumption patterns showed that health promotion interventions are still very necessary, especially in education related to healthy diets.

Thus, consumption patterns remain an important factor that can be modified in efforts to prevent hypertension. Improving diet through reducing salt, increasing fruit and vegetable consumption, and restricting fatty foods need to be encouraged as the main strategy in controlling hypertension.

4. Smoking

The proportion of respondents who smoke in this study reached 50.9%, slightly higher than those who did not smoke (49.1%). These findings suggest that smoking behavior is still a fairly dominant habit in the study population and has the potential to be an important determinant in the incidence of hypertension. However, if examined more critically, the relatively small difference in proportion between the smoking and non-smoking groups indicates that smoking is not the only dominant factor, but rather part of a combination of interinteracting risk factors. This means that the presence of hypertension in this population is likely influenced not only by smoking status, but also by other factors such as consumption patterns, physical activity, age, and family history.

Biologically, smoking has a powerful mechanism in increasing blood pressure. Nicotine stimulates the sympathetic nervous system which leads to increased heart rate and vasoconstriction, while chronic exposure to toxic substances in cigarettes causes endothelial dysfunction and arterial

stiffness. This is supported by research by U. Fajri er al., which confirms that smoking contributes to vascular damage both acutely and chronically [14]. Nonetheless, some studies show that the association between smoking and hypertension is not always directly consistent, especially in univariate analyses. In some cases, the effects of smoking on blood pressure can be disguised by other factors such as body mass index, alcohol consumption, or stress levels. This suggests that univariate analysis has limitations in explaining causal relationships, so bivariate and multivariate analyses are needed to ensure the independent contribution of smoking variables.

According to Sonya et al., smoking plays more of an overall role as an overall cardiovascular risk factor than as a direct cause of chronic hypertension, but still worsens the prognosis in individuals with high blood pressure [18]. In other words, smoking may not necessarily increase blood pressure on a regular basis, but it significantly increases the risk of complications such as coronary heart disease and stroke. In addition, the high proportion of smokers in this study may also reflect strong social and cultural factors, such as the normalization of smoking behavior in the community. In this context, individual-based interventions alone are not enough, but need to be supported by public health policies such as the implementation of Smoke-Free Zones (KTR) and community-based education.

When associated with the results of previous research, Gibran Wirayudha (2024) found a relationship between smoking and hypertension, but the strength of the relationship was influenced by other factors. This reinforces the argument that smoking is a contributory, not a single deterministic risk factor [16]. Thus, the findings in this study must be interpreted carefully. The high proportion of smokers indicates a serious public health problem, but to conclude the specific role of smoking in hypertension, further analysis is needed. Therefore, in the context of hypertension control, efforts to reduce smoking behavior remain a priority due to its far-reaching impact on cardiovascular health.

These results show that the majority of respondents are in the overweight/obese category, thus indicating a high proportion of respondents with over-nutrition status. This condition is an important concern because BMI ≥ 25 is one of the main risk factors for non-communicable diseases, including hypertension. Body Mass Index (BMI) is a simple indicator used to assess a person's nutritional status based on a comparison between weight and height. A BMI value of ≥ 25 indicates an overweight or obese condition that is closely related to an increased risk of hypertension.

The results of this study showed that the majority of respondents had a BMI ≥ 25 (82.7%). This finding indicates that overweight is a dominant condition in the study population. Epidemiologically, the high prevalence of overweight/obesity significantly contributes to the increased risk of hypertension. Physiologically, obesity plays a role in increasing blood pressure through several mechanisms, including increased blood volume, insulin resistance, and activation of the sympathetic nervous system and the renin-angiotensin-aldosterone system. This condition leads to increased vascular resistance and cardiac workload.

According to the World Health Organization (2021), overweight and obesity are major risk factors for hypertension and cardiovascular disease. The WHO also confirms that increased BMI is positively correlated with increased blood pressure. Research by Hall JE et al. (2015) shows that obesity is strongly linked to hypertension through complex neurohormonal and metabolic mechanisms. Individuals with obesity have a higher risk of developing hypertension than individuals with a normal weight.

Furthermore, research by Ledoh et al. also found that increased body mass index is a major determinant of the increasing prevalence of hypertension globally [20]. However, it is critical to understand that not all individuals with a high BMI develop hypertension. This suggests that obesity is not the sole causal factor, but rather part of a multifactorial interaction with other variables such as dietary patterns, physical activity, and genetic factors.

The high proportion of respondents with a BMI ≥ 25 in this study also reflects unhealthy lifestyles, such as lack of physical activity and high-calorie consumption. Therefore, interventions

aimed at addressing these factors are highly strategic, as BMI is a modifiable risk factor. Therefore, weight control through healthy lifestyle changes, such as increased physical activity and dietary adjustments, is a crucial step in preventing and controlling hypertension.

The results of the bivariate analysis in this study indicate that the incidence of hypertension is not influenced by a single factor, but rather the result of a complex interaction between biological, behavioral, and environmental factors. The variables analyzed included age, family history, dietary patterns, smoking status, physical activity, and Body Mass Index (BMI). In general, the statistical test results indicate that most variables are associated with the incidence of hypertension, although the strength of the association varies.

The age variable showed a significant association with hypertension ($p<0.05$). This is in line with the theory that increasing age is associated with decreased blood vessel elasticity and increased peripheral resistance. However, there are critical limitations in the data distribution, particularly in the 40–59 age group, which had a very small number of respondents and all of whom had hypertension. This condition has the potential to introduce bias and reduce the stability of the analysis results. Therefore, despite its significance, the age variable is more appropriately positioned as a biological vulnerability factor rather than a primary determinant.

For the family history variable, the analysis results showed a trend toward an association with hypertension. This indicates a role for genetic factors in increasing the risk of hypertension. However, not all respondents with a family history experienced hypertension, thus concluding that genetic factors are predisposing and require interaction with other factors to trigger the disease. This aligns with the World Health Organization's concept of non-communicable diseases as multifactorial.

Consumption pattern variables showed a relationship with the incidence of hypertension, with respondents with unhealthy consumption patterns tending to have a higher risk. Diets high in salt, fat, and low in fiber are known to contribute to increased blood pressure. This finding aligns with research by Appel LJ, which showed that improving consumption patterns can significantly lower blood pressure. However, the relatively balanced distribution of consumption patterns in this study suggests that the primary problem is not extreme dietary patterns, but rather inconsistencies in healthy eating behaviors.

For the smoking status variable, the analysis results showed an association with hypertension, although the strength of the association was not always greater than that of other variables. Smoking is known to increase blood pressure through mechanisms such as sympathetic nervous system stimulation and vascular endothelial damage. Critically, however, smoking plays a more detrimental role as a cardiovascular risk factor than as a direct cause of chronic hypertension, as explained by Whelton PK. Thus, smoking remains an important risk factor, but not a major independent determinant.

Physical activity variables also showed a relationship with hypertension. Respondents with less physical activity tended to have a higher risk of developing hypertension. This is due to the lack of physical activity that contributes to weight gain, insulin resistance, and metabolic disorders. Physical activity is one of the most strategic factors in interventions because it is easily modified and has a broad impact on health.

The variable that showed the strongest association in this study was Body Mass Index (BMI). The analysis showed that respondents with a BMI ≥ 25 had a significantly greater risk of developing hypertension compared to respondents with a normal BMI. This finding confirms that obesity is a dominant risk factor for hypertension. Physiologically, obesity plays a role in increasing blood pressure through various mechanisms, such as increased sympathetic nervous system activity, activation of the renin-angiotensin system, and increased blood volume. This aligns with research by Hall JE, which demonstrated a strong relationship between obesity and hypertension through neurohormonal and metabolic mechanisms.

Conclusion

1. There is a significant relationship between age and the incidence of hypertension at the Sanggeng Community Health Center.
2. There is no significant relationship between gender and the incidence of hypertension at the Sanggeng Community Health Center.
3. There is no significant relationship between family history and the incidence of hypertension at the Sanggeng Community Health Center.
4. There is no significant relationship between consumption patterns and the incidence of hypertension at the Sanggeng Community Health Center.
5. There is no significant relationship between smoking status and the incidence of hypertension, so smoking is not proven to be a direct risk factor in this study.
6. There is no significant relationship between Body Mass Index (BMI) and the incidence of hypertension.

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