Insights in Public Health Journal

DOI: https://doi.org/10.20884/1.iphj.2023.4.1.

Original Article

Analysis of Hypertension-Related Factors In Rural Areas, Banyumas Regency

Asti Nadia Anindita [1], Lu'lu Nafisah [1*]

[1] Public Health, Faculty of Health Sciences, Jenderal Soedirman University, Purwokerto, Indonesia

Corresponding author: Lu'lu Nafisah, Public Health, Faculty of Health Sciences, Jenderal Soedirman University. Jl. Dr. Soeparno, No. 60, Karangwangkal, North Purwokerto, Banyumas Regency, Indonesia. 53122. Email: lulunafisah94@unsoed.ac.id

ABSTRACT

Background : Hypertension is a public health concern since it has the potential to cause consequences such as stroke, coronary heart disease, and renal failure, and eventually become one of the leading causes of premature death worldwide. In many parts of Indonesia, notably rural regions, the prevalence of hypertension is relatively high. Information on hypertension risk factors in rural regions is required to develop effective interventions for the prevention and treatment of hypertension among rural communities. The purpose of this study is to investigate the risk factors associated with the prevalence of hypertension in rural areas.

Methods : The research was conducted in Sudagaran Village, Banyumas District, Banyumas Regency. This research is a quantitative study using a case-control approach with a total sample of 76 respondents. The comparison of the case and control groups in this study was 1:1. The variables studied were age, family history of hypertension, physical activity, consumption of vegetables and fruits, smoking habits, stress levels, and obesity. Questionnaires are used as instruments in data collection. The chi-square test was used to assess the data.

Results : Most of the respondents did not smoke (93.4%), consumed less vegetables and fruit (78.9%), were not stressed (93.4%), and had sufficient levels of physical activity (82.9%). The findings revealed there was a relationship between age and hypertension (p-value = 0.000). Gender (p = 0.753), family history of hypertension (p = 1,000), obesity (p = 0.502), smoking habit (p = 1,000), fruit and vegetable consumption (p = 0.778), level of stress (p = 1000), and physical activity (p = 0.542) were not linked with hypertension

Conclusions : health activities in rural regions must be strengthened in order to monitor public health status (including blood pressure monitoring) and approach the community to increase their involvement in these activities.

Keywords: Age, Blood Pressure, Risk Factors, Hypertension, Rural

INTRODUCTION

Hypertension is a non-communicable disease and is one of the main causes of premature death in the world. WHO estimates that the global prevalence of hypertension in 2019 is 22% of the world population, with an estimated 1 in 5 women and 1 in 4 men. As many as 1.13 billion people worldwide are estimated to suffer from hypertension, most of whom (two-thirds) live in low- and middle-income countries. Southeast Asia occupies the 3rd highest position with a prevalence of 25% of the total population [1]. According to national data, the prevalence rate of hypertension in adults over 18 in Indonesia is 34.11%, an increase from 25.8% in 2013 according to the findings of the 2018 Basic Health Research (Riskesdas). Nationally, the prevalence of hypertension shows an increasing trend from Riskesdas 2007 [2,3]. Urban regions in Indonesia are reported to have a greater incidence of hypertension (34.43%) than rural areas (33.72%) [2].

Hypertension is a potential health problem, which, if left untreated, will cause various complications, even in fatal cases, and can lead to death. Hypertension is a threat to public health because it has the potential to lead to complications such as stroke, coronary heart disease, and kidney failure [4]. Not all people with hypertension are aware of their disease, so hypertension is often called the "silent killer". This is also the reason why the management of hypertension is less than optimal and causes other complications [3]

It is generally accepted that several controllable and uncontrollable factors contribute to hypertension. Age, sex, and heredity are examples of uncontrollable factors [5–7]. The controllable factors include physical activity, fruit and vegetable consumption, stress, smoking habits, and obesity [8–13]. Various risk factors for hypertension are inseparable from the influence of globalization which has spread unhealthy lifestyles to various countries, especially developing countries, and the impact of this globalization is greater in urban areas than in rural areas. Therefore, there is a significant burden of hypertension in rural areas with a prevalence between 1 – 20% [14,15]. Research conducted in India also found that the prevalence of hypertension in urban areas (32.67%) was higher than in rural areas (18.67%) [16]. Meanwhile, analysis of secondary data using the results of basic health research showed that the prevalence of hypertension was not much different between rural areas (40.4%) and urban areas (40.3%) in Banyumas Regency. However, there are slight differences in the factors associated with the incidence of hypertension where age, gender, education and obesity are risk factors for hypertension in both rural and urban areas, while occupation and smoking habits are significantly associated with the incidence of hypertension in urban areas [11]

Hypertension still occupies the largest proportion of all NCDs reported in Central Java, namely 57.10%. Meanwhile, the 2018 Central Java Province Health Profile stated that the percentage of hypertension in the population aged ≥ 15 years in Central Java was 15.14%. Banyumas is one of the districts in Central Java Province which is reported to have a higher percentage of hypertension (30.54%).

Hypertension is a disease that is often reported, including in Sudagaran Village, Banyumas District, which has a population of 3,635 people. Based on the data available at the Banyumas Health Center, it is known that hypertension is always ranked in the top 10 diseases. Generally, hypertension is experienced by the elderly population. Patients with hypertension in Sudagaran Village from January to February 2020 were recorded from various local health services such as PKD, posbindu, puskesmas, and elderly posyandu with a total of 70 cases. Hypertension in rural areas and among younger age groups continues to increase. However, research on risk factors for hypertension in rural areas and in all age groups is still limited. Therefore, this study aims to analyze the factors that influence hypertension in Sudagaran Village, Banyumas District.

METHODS

This research is a quantitative study with a case control design. This research was conducted in Sudagaran Village, Banyumas District, Banyumas Regency from 19 October to 24 November 2020. The dependent variable in this study was hypertension, while the independent variables in this study were risk factors for hypertension itself which included age, sex, family history of hypertension (yes vs. not), physical activity (less vs. enough), consumption of vegetables and fruit (less vs. enough), smoking habits (smokers vs. not smoking), stress (stress vs. not stress) and obesity (1.Obesity; 2.Heavily Overweight; 3.Overweight; 4.Healthy Weight; 5.Under Weight)

The population in this study were all residents of Sudagaran Village, Banyumas District. The research sample consisted of a case group and a control group. Residents who are hypertensive in Sudagaran Village and meet the inclusion criteria are included as a case sample. Meanwhile residents who were not hypertensive patients in Sudagaran Village and met the inclusion criteria were included as a control sample. The comparison of the case and control groups in this study was 1:1. Determination of sample size for case-control studies by considering the Odds Ratio from previous studies. Based on the calculation of the case control sample size according to the Lameshow formula, the largest n value of a number of variables is 38. Thus, the minimum sample size for this study is 38 case samples and 38 control samples. The sample was determined from residents who checked their blood pressure during Posbindu activities. Those with hypertension as a case sample and those without hypertension as a control sample.

Source of data consists of primary data and secondary data. Secondary data was obtained from records and reports from local midwives, the Banyumas Health Center, and the Sudagaran Village Head's Office. Primary data obtained by conducting interviews. Structured interviews were conducted using a list of questions that had been prepared. The questionnaire used in this study was in the form of questions with closed options or short online entries via the Google form. The questionnaire included questions related to the respondent's identity, family history of hypertension, behavior (consumption of vegetables and fruit, smoking, physical activity, obesity), and perceived stress of the respondent. The researcher compiled the questionnaire independently and carried out validity and reliability. As for the contents of the questionnaire, some used standard questionnaires and some took references from previous studies. Collection of physical activity data using the Global Physical Activity Questionnaire (GPAQ) and the results are categorized into 1. Less if < 600

MET and 2. Enough if >= 600 MET. Data related to stress levels were obtained by conducting interviews using the Depression Anxiety Stress Scales (DASS) Questionnaire with answer categories 1. Not stressed (score ≤14); 2. Stress (score> 14). In this study, secondary data was used in the form of information and data on the number of cases and identity of hypertension sufferers in Sudagaran Village, Banyumas District, obtained from community health centers, health cadres, and local midwives.

The data that has been collected is then analyzed using univariate analysis to see the frequency distribution of each variable. The researcher then conducted a bivariate analysis to see if there was a relationship between the independent variables and the dependent variable. Bivariate analysis was performed using the chi-square test.

RESULTS

76 people were involved in this study with the characteristics summarized in table 1. Most of the respondents were in the late elderly age range (56-65 years) (35.5%), female (84.2%), and had a family history of hypertension (40.8%). The majority of respondents had normal BMI (30.3%), overweight with risk (27.6%), and grade I obesity (28.9%). Most of the respondents did not smoke (93.4%), consumed less vegetables and fruit (78.9%), were not stressed (93.4%) and had sufficient levels of physical activity (82.9%).

The results of the chi-square test showed that the variable associated with hypertension in Sudagaran Village, Banyumas District, was age (p value = 0.000). Furthermore, it was concluded that there was no relationship between gender (p value = 0.753), obesity (p value = 0.502), family history of hypertension (p value = 1,000), smoking (p value = 1,000), consumption of vegetables and fruit (p value = 0.778), stress level (p value = 1.000), stress level (p value = 0.542) with hypertension in Sudagaran Village, Banyumas District.

Table 1. Characteristics of Respondents

Characteristic	Total Respondents	
	N	%
Age		
Early Adulthood (26-35 years)	7	9.2
Late Adulthood (26-35 years)	7	9.2
Early Elderly (46-55 years)	13	17.1
Late Elderly (56-65 years)	27	35.5
Older Adults (≥65 years)	22	28.9
Gender		
Male	12	15.8
Female	64	84.2
Family History of Hypertension		
With	31	40.8
No one	45	59.2
Classification of Obecity		
Underweight (IMT <18,5)	3	3.9
Normal (IMT 18,5-22,9)	23	30.3
Overweight with risk (IMT 23-24,9)	21	27.6
Obese class I (IMT 25-29.9)	22	28.9
Obese class II (IMT ≥30)	7	9.2
Smoking Status		
Smoker	5	6.6
Non-smoker	71	93.4
Consumption of vegetables and fruit		
Less (< 5 portion in a day)	60	78.9
Enough (≥5 portion in a day)	16	21.1
Level of Stress		
Not stress (score ≤14)	71	93.4
Stress (score >14)	5	6.6
Level of Physical Activity		
Low (<600 MET)	13	17.1
Enough (≥600 MET)	63	82.9

Table 2. Analysis of the Relationship of Independent Variables with Hypertension in Sudagaran Village, Banyumas District in 2020

Independent Variable	Hypertension Status				*P*
	Hypertension		No Hypertension		
	N	%	N	%	
Age					
Early Adulthood (26-35 years)	0	0.0	7	18.4	
Late Adulthood (26-35 years)	0	0.0	7	18.4	
Early Elderly (46-55 years)	5	13.2	8	21.1	0.000
Late ELderly (56-65 years)	16	42.1	11	28.9	
Older Adults (≥65 years)	17	44.7	5	13.2	
Gender					
Male	7	18.4	5	13.2	0.753
Female	31	81.6	33	86.8	
Family History of Hypertension					
With	15	39.5	16	42.1	1.000
No one	23	60.5	22	57.9	
Classification of Obecity					
Underweight (IMT <18,5)	2	5.3	1	2.6	
Normal (IMT 18,5-22,9)	12	31.6	11	28.9	
Overweight with risk (IMT 23-24,9)	13	34.2	8	21.1	0.502
Obese class I (IMT 25-29.9)	8	21.1	14	36.8	
Obese class II (IMT ≥30)	3	7.9	4	10.5	
Smoking Status					
Smoker	3	7.9	2	42.1	1.000
Nonsmoker	35	92.1	36	94.7	
Consumption of vegetables and fruit					
Low (< 5 portion in a day)	29	76.3	31	81.6	0.778
Enough (≥5 portion in a day)	9	23.7	7	18.4	
Level of Stress					
No stress (score ≤14)	35	92.1	36	94.7	1.000
Stres (score >14)	3	7.9	2	5.3	
Level of Physic Activity					
Low (<600 MET)	5	13.2	8	21.1	
Enough (≥600 MET)	33	86.8	30	78.9	0.542
Total	**38**	**100.0**	**38**	**100.0**	

DISCUSSION

Age has a relationship with systolic blood pressure. Increasing age is a risk factor for pre-hypertension and hypertension [14,15,17,18]. Furthermore, it is stated that the prevalence of hypertension is higher in those aged 35 years and over compared to those aged less than 35 years [14]. Specifically, previous research also found a lower tendency to develop hypertension for women aged 15-19 years [19]. The results of this study are in line with previous research which states that there is a relationship between age and hypertension in both rural and urban areas. The increased risk of developing hypertension is due to the degenerative process that occurs with age. Degeneration causes the arteries to lose their elasticity or flexibility so that the blood vessels gradually narrow, the sensitivity of the blood pressure regulator begins to decrease and triggers an increase in blood pressure [12,14,20,21]. Furthermore, specifically the research by Sakinah et al (2018) which was conducted in Banyumas Regency also revealed that the age factor is related to the incidence of hypertension in rural areas in Banyumas Regency [11]. Recent findings confirm the high prevalence of hypertension among elderly, regardless of sex and associated physio-psychosocial risk factors such as overweight, diabetes, smoking, sleep disorders, sedentary lifestyles, literacy and unemployment. [22].

The results of this study are also in line with previous studies which showed a relationship between age and hypertension. Getting older, the function of human organs will be weaker and more susceptible to disease, such as hypertension [23]. It was found that only a few young respondents had hypertension. However, young respondents can also experience hypertension due to poor diet (eg consumption of high-fat foods), genetic or hereditary factors, obesity, stress, lifestyle that is not good for health (eg rarely exercise). Thus, adopting a healthy lifestyle is necessary to prevent hypertension at both young and old ages. The condition of hypertension sufferers in Sudagaran Village, Banyumas District is dominated by the old age group. Efforts that should be made by the community to prevent hypertension include maintaining a healthy diet, implementing a healthy lifestyle (physical activity, not smoking), and carrying out regular blood pressure checks so that health conditions can be identified and controlled. Periodic blood pressure checks can be carried out at posbindu, or integrated service posts for the elderly (posyandu lansia), prolanis, and so on. Efforts to prevent hypertension need to be implemented from a young age thus the incidence of hypertension can be controlled and suppressed.

In this study, sex was not associated with the incidence of hypertension. This supports previous studies which show that there is no relationship between sex and the incidence of hypertension in rural areas [18]. Various comparisons between men and women have led to various results among experts. In addition, the results of this study were also influenced by the condition of the respondents, most of whom were women (84.2%).

The results of this study are different from other studies which state that there is a relationship between sex and the incidence of hypertension in both rural and urban areas [11,17,24,25]. The incidence of hypertension in women is higher when they go through menopause. Women who have not gone through menopause are protected by the hormone estrogen which plays a role in increasing HDL levels. High levels of HDL cholesterol are a protective factor in preventing atherosclerosis. The protective effect of estrogen is considered to be an explanation for the existence of women's immunity in premenopausal age, the hormone estrogen protects blood vessels from damage. Postmenopausal women experience hormonal changes that cause weight gain and blood pressure to become more reactive to sodium consumption, resulting in an increase in blood pressure [26,27]. As for the research by Amanda and Santi (2018) found that there is a relationship between gender and hypertension. Cases of hypertension in men are more often found due to work problems which are then followed by smoking behavior, also drinking alcohol accompanied by consumption of unhealthy foods. Another condition is that men do more activities so they are often tired and accompanied by an unhealthy diet and lifestyle so that it becomes a risk factor for hypertension. [28]. Thus, it can be concluded that the relationship between sex and hypertension is related to gender-specific behavioral tendencies.

Regarding the history of hypertension in the family, the findings in this study showed that there was no significant relationship between family history of hypertension and hypertension in Sudagaran Village, Banyumas District. In contrast to the findings of this study, previous studies have shown that there is a relationship between genetics and hypertension [18]. The role of factors in the emergence of

hypertension is proven by the finding that hypertension is more common in monozygotic twins (one egg cell) than heterozygous (different egg cells). A patient who has the genetic nature of primary hypertension (essential) if left naturally without therapeutic intervention, together with environmental factors will cause hypertension to develop and in about 30-50 years will appear signs and symptoms. Based on research by Musfirah and Masriadi (2019), the cause of hypertension due to family history is known to be caused by a poor lifestyle. So, families who have a history of hypertension will likely have the potential to develop hypertension as well. However, the risk of developing hypertension can be reduced by adopting a healthy lifestyle (related to diet, rest, physical activity and stress).[5,29,30]. In this study, there were obstacles related to the variable history of hypertension in the family. Some respondents, especially those who were older, did not know whether there was a history of hypertension in the family, so they tended to choose the answer 'no history of hypertension in the family'. This could be due to the very rare medical examinations, especially in the past, so that respondents did not know the health conditions of their own families.

A 10% increase in body weight in men will increase blood pressure by 6.6 mm Hg, blood sugar by 2 mg/dl, and blood cholesterol by 11 mg/dl. In addition, it is also explained that every 10% increase in body weight will increase systolic blood pressure by 7 mmHg. However, this study showed that there was no significant relationship between obesity and hypertension in Sudagaran Village, Banyumas District. This is different from previous research which showed a significant relationship between obesity and the incidence of hypertension in both rural and urban areas [11,17,18,31–33]. The relationship between obesity has long been known and has been widely reported by many researchers, but the mechanism of obesity-related hypertension has not been clear until now. Most researchers focus on the pathophysiology of three main things, namely autonomic system disorders, insulin resistance and abnormalities in the structure and function of blood vessels. These three things can influence each other [34,35]. The results of previous studies found that the percentage of obesity and hypertension in rural and urban areas was not much different. This may be due to urbanization in rural areas, which affects lifestyle patterns, and leads to a decrease in physical activity and changes in food consumption among rural residents. [11].

Previous studies have revealed that cigarette ingredients, especially nicotine, are associated with hypertension. Cigarette smoke which is carbon monoxide (CO) has the ability to bind to red blood cells which carry oxygen to the heart and other tissues will also decrease its capacity. Smoking habits are associated with the incidence of hypertension by looking at the duration of smoking and the type of cigarette, but not the number of cigarettes consumed [36]. However, the results of this study reveal different findings where smoking behavior is not related to hypertension in Sudagaran Village, Banyumas District. The results of this study are in line with previous research which stated that there was no relationship between smoking behavior and hypertension [29,30,37,38]. Specifically, research by Sakinah et al 2018 also showed the same results where smoking habits were shown to be associated with the incidence of hypertension in urban areas, but not in rural areas. [11]. The results of this study were influenced by several factors including most of the respondents did not smoke (93.4%), another assumption was that the majority were female (84.2%). The respondents who smoke are known to have had this habit for years. In this study, most people still consume cigarettes made from tobacco ingredients that are not mixed with chemicals. Apart from that, drinking lots of water will also help to flush out toxins and nicotine that have accumulated in the body after years of smoking.

The results of this study support previous research which stated that there was a relationship between smoking habits and the incidence of hypertension in both rural and urban areas [18,31]. Most rural people in Indonesia consume kretek cigarettes (70.1%) [2]. Supported by the results of a recent study which found that the most widely consumed type of cigarette in Indonesia is kretek (80.4%), and this type has the largest nicotine content compared to other types of cigarettes. [39].

Vegetable and fruit consumption was also not associated with the incidence of hypertension in this study. Previous research also stated that consumption of vegetables and fruit was not proven to be related to the incidence of hypertension in both rural and urban areas [11]. However, other studies have found a relationship between consumption of vegetables and fruit and the incidence of hypertension in both rural and urban areas [18,40,41]. Vegetables and fruit have high fiber, so they can be useful for reducing the absorption of fat from food and preventing the accumulation of fat in blood vessels because they can expedite digestive metabolism. Vegetables and fruit also contain high potassium and are useful for maintaining regular heart rate and lowering blood pressure [42]. As many as 98.3% and 99% of respondents in urban-rural areas have a low frequency of consumption of vegetables and fruit. Research conducted by Rush (2018) found that the income level of residents in both rural and urban

areas has an effect on the ability to buy more expensive foods such as fruit [41].

Increased consumption of vegetables and fruit accompanied by decreased consumption of total fat and saturated fat lowers blood pressure. Consumption of vegetables and fruit in adequate portions acts as a source of antioxidant intake for the body. With increasing age, eating fruits and vegetables can reduce the risk of hypertension. Not only antioxidants play an active role, but also other components such as fiber, potassium and magnesium [9,40]. Consumption of 2-4 grams of potassium supplements per day can help reduce blood pressure, where potassium is generally found in many fruits and vegetables. Consuming fiber sources such as vegetables, fruit, nuts can provide multiple functions for the body. High fiber intake, especially in the form of soluble fiber, is related to the prevention of hypertension. If the intake of fiber is low, it causes obesity which has an impact on increasing blood pressure and degenerative diseases [43,44].

Prolonged stress results in high blood pressure. The incidence of hypertension in urban communities is higher than in rural areas which can be related to the effect of stress experienced by groups of people who live in cities [10]. In this study, stress levels were not related to hypertension that occurred in Sudagaran Village, Banyumas District. These results support previous research which stated that there was no relationship between stress levels and the incidence of hypertension [45]. However, it is different from the results of other studies which show a relationship between stress levels and hypertension. The increase in blood will be greater in individuals who have a tendency to high emotional stress. The relationship between stress and hypertension is caused through sympathetic nerve activity resulting in an increase in heart rate, constriction of blood vessels, and increased water and salt retention. [29,46].

Lack of physical activity is a risk factor for hypertension in rural areas [15]. However, in this study, physical activity was not associated with the incidence of hypertension. The same results were also revealed in previous studies in Banyumas Regency which reported no relationship between physical activity and the incidence of hypertension in both rural and urban areas. [11,18,37,38]. Physical activity affects the occurrence of hypertension, where people who are less active tend to have a higher heart rate so that the heart muscle has to work harder in each contraction. The harder and more frequently the heart muscle pumps, the greater the pressure imposed on the arteries [8,10]. This is caused by the existence of other variables that are stronger as risk factors for hypertension. Based on processed primary data, most of the respondents had sufficient levels of physical activity, both case respondents (sufferers of hypertension) and control respondents (non-hypertensives). Respondents already have awareness that health needs to be maintained, one of which is physical activity or exercise. In the field, it is known that the pandemic situation has caused some physical activity activities that are carried out together (for example gymnastics) to be closed, causing respondents to reduce their physical activity compared to before the pandemic due to the policy to stay at home and avoid crowds.

Interventions for lifestyle changes or non-pharmacological interventions such as health education related to prevention of hypertension, increasing physical activity, reducing smoking behavior and increasing health-seeking behavior (examination of high blood pressure) will be useful as preventive measures in controlling and suppressing the incidence of hypertension [15]. The development of a toolkit for early detection of hypertension and identification of risk factors is also needed considering the increasing number of young adults who experience prehypertension as well as hypertension [22].

CONCLUSION

Most of the respondents were late elderly (56-65 years) and women (84.2%). There is a relationship between age and hypertension in Sudagaran Village, Banyumas District. Gender, family history of hypertension, obesity, physical activity, fruit and vegetable consumption, smoking behavior, and stress levels were not related to hypertension in Sudagaran Village, Banyumas District. Therefore, community-based health interventions must be optimized and targeted at various age groups, from adolescents, adults and the elderly. The media and methods used are also adjusted to the age and health conditions of the participants.

REFERENCES

1. WHO. Hypertension [Internet]. 2019 [cited 2019 Sep 20]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension
2. Kementerian Kesehatan RI. Riset Kesehatan Dasar (Riskesdas) Tahun 2018 [Internet]. Jakarta; 2018. Available from: http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
3. Sahar J, Agus S, Ni MR. Keperawatan Kesehatan Komunitas dan Keluarga. Singapore: Elsevier; 2019.
4. Kementerian Kesehatan RI. Hipertensi Si Pembunuh Senyap. Jakarta: Pusat Data dan Informasi, Kementerian Kesehatan RI; 2019.

5. Musfirah, Masriadi. Analisis Faktor Risiko dengan Kejadian Hipertensi di Wilayah Kerja Puskesmas Takalala Kecamatan Marioriwawo Kabupaten Soppeng. J Kesehat Glob. 2019;2(2):98.
6. Situngkir SUA, Lubis NL, Siregar FA. Factors Associated with Hypertension among Elderly in Medan, Indonesia. J Epidemiol Public Heal. 2019;4(3):215–21.
7. Zhao W, Mo L, Pang Y. Hypertension in adolescents: The role of obesity and family history. J Clin Hypertens. 2021;23:2065–70.
8. Karim NA, Franly O, Vandri K. Hubungan Aktivitas Fisik dengan Derajat Hipertensi pada Pasien Rawat Jalan di Wilayah Kerja Puskesmas Tagulandang Kabupaten Sitaro. E-Journal Keperawatan. 2018;6(1):5.
9. Kim J, Kim J. Association between Fruit and Vegetable Consumption and Risk of Hypertension in Middle-Aged and Older Korean Adults. J Acad Nutr Diet. 2018;118(8):1438–49.
10. Manuntung A. Terapi Perilaku Kognitif pada Pasien Hipertensi. Malang: Wineka Media; 2018.
11. Sakinah MF, Rejeki DSS, Nurlaela S. Factors Related To Hypertension in Rural and Urban. J Kesmas Indones. 2021;13(1):46–63.
12. Sartik, Suryadi T, Zulkarnain M. Faktor – Faktor Risiko dan Angka Kejadian Hipertensi pada Penduduk Palembang. J Ilmu Kesehat Masy. 2017;8(3):182–5.
13. Taslima, H A. Hubungan Riwayat Keluarga dan Gaya Hidup dengan hipertensi pada Lansia di Puskesmas Kuta Alam Bandi Aceh. J Healthc Technol Med. 2017;3(1):121.
14. Kishore J, Gupta N, Kohli C, Kumar N. Prevalence of Hypertension and Determination of Its Risk Factors in Rural Delhi. Int J Hypertens. 2016;2016.
15. Princewel F, Cumber SN, Kimbi JA, Nkfusai CN, Keka EI, Viyoff VZ, et al. Prevalence and risk factors associated with hypertension among adults in a rural setting: The case of Ombe, Cameroon. Pan Afr Med J. 2019;34:1–9.
16. Galav A, Bhatanagar R, Meghawal SC, Jain M. Prevalence of hypertension among rural and urban population in Southern Rajasthan. Natl J Community Med. 2015;6(2):174–8.
17. Hu L, Huang X, You C, Li J, Hong K, Li P, et al. Prevalence and risk factors of prehypertension and hypertension in Southern China. PLoS One. 2017;12(1):1–15.
18. Nisa A, Rokhimah, Siswanto Y, Siswanto, Ita Puji L. Perbedaan Faktor Risiko Hipertensi Pada Masyarakat Perkotaan Dan Pedesaan Di Kecamatan Bergas. Universitas Ngudi Waluyo; 2020.
19. Appiah F, Ameyaw EK, Oduro JK, Baatiema L, Sambah F, Seidu AA, et al. Rural-urban variation in hypertension among women in Ghana: insights from a national survey. BMC Public Health [Internet]. 2021;21(1):1–8. Available from: https://doi.org/10.1186/s12889-021-12204-7
20. Febrianti T, Mustakim M. Analisis Hubungan Faktor Usia, Aktivitas Fisik dan Asupan Makan dengan Kejadian Hipertensi di Puskesmas Wilayah Kerja Tangerang Selatan. Collab Med J. 2019;2(2):57–67.
21. Widjaya N, Anwar F, Sabrina RL, Puspadewi RR, Wijayanti E. Hubungan Usia dengan Kejadian Hipertensi di Kecamatan Kresek dan Tegal Angus, Kabupaten Tangerang. J Kedokt Yars. 2018;26(3):137.
22. Paul GK, Rahman MM, Hamiduzzaman M, Farhana Z, Mondal SK, Akter S, et al. Hypertension and its physio-psychosocial risks factors in elderly people: A cross-sectional study in north-eastern region of Bangladesh. J Geriatr Cardiol. 2021;18(1):75–82.
23. Aristoteles. Korelasi Umur dan Jenis Kelamin Dengan Penyakit Hipertensi di Emergency Center Unit Rumah Sakit Islam Siti Khadijah Palembang 2017. Indones J Perawat. 2018;3(1):14–5.
24. Al Kibria G., Swasey K, Gupta R., Choudhury A, Nayeem J, Sharmeen A, et al. Differences in prevalence and determinants of hypertension according to rural–urban place of residence among adults in Bangladesh. J Biosoc Sci. 2019;51(4):578–90.
25. Kusumawaty J, Nur H, Eko G. Hubungan Jenis Kelamin dengan Intensitas Hipertensi pada Lansia di Wilayah Kerja Puskesmas Lakbok Kabupaten Ciamis. Mutiara Med. 2016;16(2):49.
26. Muhammad Syahril Rafsanjani, Asriati A, Kholidha AN, Alifariki LO. Hubungan Kadar High Density Lipoprotein (HDL) Dengan Kejadian Hipertensi. J Profesi Med J Kedokt dan Kesehat. 2019;13(2).
27. Lulu S, Lijun S, Hui L, Bingqing L, Xiaoxuan Z, Lina Z, et al. Age at natural menopause and hypertension among middle-aged and older Chinese women. J Hypertens. 2018;36(3):594–600.
28. Amanda D, Santi M. Hubungan Karakteristik dan Obesitas Sentral Dengan Kejadian Hipertensi. J Berk Epidemiol. 2018;6(1):47.
29. Arifin M, I W, LKAR N. Faktor-Faktor Yang Berhubungan Dengan Kejadian Hipertensi Pada Kelompok Lanjut Usia Di Wilayah Kerja Upt Puskesmas Petang I Kabupaten Badung Tahun 2016. E-Jurnal Med. 2016;5(7):16.
30. Selly S, TF F. Analisis Hubungan Faktor Genetik Dengan Kejadian Hipertensi Pada Usia Dewasa Muda (19-49 Tahun) Di Puskesmas Bakunase Kota Kupang Tahun 2020. CHMK Heal J. 2020;4(3):220.
31. Singh S, Shankar R, Singh GP. Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Urban Varanasi. Int J Hypertens. 2017;2017.
32. Daştan İ, Erem A, Çetinkaya V. Urban and rural

differences in hypertension risk factors in turkey. Anatol J Cardiol. 2017;18(1):39–47.
33. Ismail I., Kulkarni A., Meundi A., Amruth M. A community-based comparative study of prevalence and risk factors of hypertension among urban and rural populations in a coastal town of South India. Sifa Med J. 2016;3(2):41.
34. Rohkuswara T., S S. Hubungan Obesitas dengan Kejadian Hipertensi Derajat 1 di Pos Pembinaan Terpadu Penyakit Tidak Menular (Posbindu PTM) Kantor Kesehatan Pelabuhan Bandung Tahun 2016. J Epidemiol Kesehat Indones. 2017;1(2):16.
35. Yanti DNA, Rasni H, Susanto T, Susumaningrum LA, Siswoyo S. Hubungan Obesitas dengan Kejadian Hipertensi pada Petani di Wilayah Kerja Puskesmas Panti Kabupaten Jember. J Citra Keperawatan. 2020;8(1):28.
36. Kayame R, Mallongi A. Relationships between Smoking Habits and the Hypertension Occurrence among the Adults of Communities in Paniai Regency, Papua Indonesia. Indian J Public Heal Res Dev. 2018;9(1):332–6.
37. Darmansyah S, Hasuddin. Faktor Resiko Hipertensi Pada Masyarakat Di Dusun Kamaraang Desa Keang Kecamatan Kalukku Kabupaten Mamuju Tahun 2017. J Heal Educ Lit. 2018;1(1):46–7.
38. Imelda, Fidiariani S, PAF P. Faktor-Faktor yang Berhubungan dengan Kejadian Hipertensi pada Lansia di Puskesmas Air Dingin Lubuk Minturun. Heme. 2020;2(2):72–5.
39. Safanta N, Bachtiar A. The Relationship of Smoking Habits to Public Health Status in Effort Tobacco Control in Indonesia (Secondary Data IFLS 5 2014). Kesmas Indones. 2020;12(2):112–34.
40. Ming-Wei L, HJ Y, S Y, Y S, BW T, ZK C, et al. Association between fruit and vegetable intake and the risk of hypertension among Chinese adults: a longitudinal study. Eur J Nutr. 2018;57(7):2639–47.
41. Rush KL, Goma FM, Barker JA, Ollivier RA, Ferrier MS, Singini D. Hypertension prevalence and risk factors in rural and urban Zambian adults in Western Province: A cross-sectional study. Pan Afr Med J. 2018;30:1–8.
42. Li B, Li F, Wang L, Zhang D. Fruit and Vegetables Consumption and Risk of Hypertension: A Meta-Analysis. J Clin Hypertens. 2016;18(5):468–76.
43. Leo AAR, Sry MCW, Deby AB. Hubungan Konsumsi Laru, Garam, Sayur, dan Buah terhadap Resiko Hipertensi Pria Dewasa Kupang. J Ilm Gizi Kesehat. 1(2):1–9.
44. Suryani N, Noviana, Libri O. Hubungan Status Gizi, Aktivitas Fisik, Konsumsi Buah dan Sayur dengan Kejadian Hipertensi di Poliklinik Penyakit Dalam RSD Idaman Kota Banjarbaru. J Kesehat Indones. 2020;10(2):103.
45. Agustina R, Bambang BR. Faktor Risiko yang Berhubungan dengan Kejadian Hipertensi Usia Produktif (25-54 tahun). Unnes J Public Heal. 2015;4(4):148.
46. Sari TW, Sari DK, Kurniawan MB, Syah MIH, Yerli N, Qulbi S. Hubungan Tingkat Stres Dengan Hipertensi Pada Pasien Rawat Jalan Di Puskesmas Sidomulyo Rawat Inap Kota Pekanbaru. Collab Med J. 2018;1(3):62–3.