AMJ
ISSN: 0005-2523

ISSN: 0005-2523
Volume 62, Issue 07, September, 2022

Determinant Factors of Uncontrolled Hypertension in Rural Indonesia

Arif Setyo Upoyo[1*], Yunita Sari[1], Saryono[2]

Nursing Department, Health Sciences Faculty, Universitas Jenderal Soedirman, Indonesia[1]
Health Sciences Faculty, Universitas Jenderal Soedirman, Indonesia[2]

Corresponding author: 1*

Keywords:
Hypertension; Uncontrolled Blood Pressure, behavior, medication adherence, sodium consumption

ABSTRACT

Uncontrolled hypertension can cause heart disease, stroke, kidney failure, so it is necessary to know the factors causing it to be able to provide education and preventive interventions. This study aims to determine the factors that influence uncontrolled hypertension in rural areas. The study used case control. Research respondents consisted of 225 hypertensive patients in rural Indonesia consisting of 194 patients with uncontrolled hypertension and 31 patients with controlled hypertension. The operational definition of uncontrolled blood pressure is if the measurement results in blood pressure $\geq$ 140/90 mmHg. Data were collected using a questionnaire consisting of demographic data, health history and lifestyle consisting of medication adherence, alcohol drinking habits, smoking habits, high sodium consumption, high fat consumption and exercise habits. Data analysis used chi square and logistic regression. Majority of uncontrolled blood pressure (86.2%), age over 55 years old (47.6%), female (78.2%), low education (84.9%), not working (52.4%), Overweight-obese (67.6%). The results of the analysis showed that the level of education (p=0.033; OR=8.735; 95%CI=1.187-64.290), high sodium consumption habits (p= 0.013; OR=3.311; 95%CI= 1.292-8.483) and medication adherence (p=0.002; OR=3.885; 95%CI=1.678-8.998). Education level, high sodium consumption habits and medication adherence influence uncontrolled hypertension in rural areas dominantly.

1. Introduction

Reducing the prevalence of hypertension by 25% by 2025 is one of the global targets for noncommunicable diseases [1]. But in fact, the prevalence of hypertension continues to increase in developing countries without any improvement in the level of awareness or control [2]. The prevalence of hypertension in Indonesia also shows an increase, in 2013 the prevalence of hypertension was 25.8% and increased to 34.1% in 2018 based on basic health research [3].

Based on the results of research, blood pressure in hypertension is influenced by age, gender, ethnicity,

smoking habits, drinking alcohol habits, excessive salt consumption, hypercholesterolemia, and secondary diseases [4- 8]. The prevalence of hypertension is higher in people with comorbidities such as diabetes with a prevalence of 64.5%, transient ischemic attack with a prevalence of 54.7%, and heart disease with a prevalence of 64.4% [9]. The prevalence of uncontrolled hypertension in the world is high. The results of the study in Zimbabwe stated that the prevalence of uncontrolled hypertension was 67.2% [6]. The results of a study at Jimma University Specialized Teaching Hospital, Ethiopia which stated that the incidence of uncontrolled hypertension was more than 52.7% [8], while the results of other studies stated that the prevalence of uncontrolled hypertension in Indonesia was more than 91% of all hypertensive patients [10].

Uncontrolled increase in blood pressure in hypertensive patients can cause organ damage due to structural or functional changes in the arteries and/or the organs they supply, including the brain, heart, kidneys, central and peripheral arteries and eyes. This is called Hypertension-mediated organ damage (HMOD) [11]. The results of the study used the cohort method showed that high blood pressure had a significant effect on the occurrence of heart failure, atrial fibrillation, chronic kidney disease, heart valve diseases, aortic syndromes, coronary heart disease, stroke and dementia [12]. Research states that the prevalence of stroke in hypertensive patients aged 50 years old is 20% of the population with a risk ratio of 4 and the prevalence continues to increase with age [13], whereas according to a study in Indonesia, hypertensive patients have a 2.87 times risk of stroke [14].

Uncontrolled hypertension can also increase the mortality rate of cardiovascular disease. Patients with uncontrolled hypertension have a higher risk of death from cardiovascular disease than patients without hypertension [15], [16]. Therefore, it is necessary to know the factors that influence uncontrolled hypertension as a basis for providing education and interventions to prevent the risk or complications of hypertension. The purpose of the study was to identify the factors that influence the incidence of uncontrolled hypertension in rural areas.

2. Methods

2.1 Research design

This research used case control method. The research was carried out in Banyumas Regency, Central Java, Indonesia from May – July 2021.

2.2 Sample

The sampling technique used purposive sampling. The research sample is patients who have been diagnosed with hypertension for at least 1 year, can communicate well, live in rural areas and are willing to be research respondents. Research respondents consisted of 225 hypertensive patients in rural Indonesia consisting of 194 patients with uncontrolled hypertension and 31 patients with controlled hypertension.

2.3 Research variable

The dependent variable in this study was blood pressure, while the independent variables were age, gender, last education, occupation, body mass index and health history which included a family history of hypertension, a history of heart disease, a history of diabetes mellitus, a history of stroke and a lifestyle consisting of from medication adherence, alcohol drinking habits, smoking habits, high sodium consumption, high fat consumption and exercise habits. The operational definition of uncontrolled blood pressure is if the measurement results in blood pressure > 140/90 mmHg [8].

2.4 Data collection methods and research instruments

ISSN: 0005-2523
Volume 62, Issue 07, September, 2022

Collecting data used a questionnaire consisting of demographic data, health history and lifestyle. Demographic data include age, gender, last education, occupation and mass index. Medical history which includes a family history of hypertension, a history of heart disease, a history of diabetes mellitus and a history of stroke. Answers for medical history were given a score of 1 if there is "yes" and a score of 0 if there is "no". Lifestyle consists of medication adherence, drinking alcohol habits, smoking habits, high sodium consumption, high fat consumption and exercise habits. The adherence behavior questionnaire used the Morisky Medication Adherence Scale (MMAS-8) [17]. The instrument has been translated into Indonesian and has been tested for validity and reliability with the results obtained valid for each question item ($r>0.345$) and reliable with a Cronbach's Alpha value of 0.764 [18]. It is said to be obedient if all aspects are met, if any of the 8 aspects are not fulfilled, it is said to be disobedient. Smoking and drinking alcohol habits were answered with "yes" and "no", if the answer is "yes" a score of 1 and if "no" a score of 0. High sodium consumption if more than 6 gr / day (1 tablespoon of salt) [19], [20]. High-fat eating habits if the respondent regularly consumes fatty foods, coconut milk, high-fat milk and fried foods [19], [20]. Regular exercise habits if the respondent regularly exercises or walks briskly for at least 30 minutes a day, 4-5 times a week [20], [21].

2.5 Data analysis

The data that has been collected is then tabulated and analyzed using the chi square test and logistic regression in SPSS 16.

2.6 Ethical considerations

The research has obtained ethical approval from the ethics committee of the Faculty of Health Sciences, Jenderal Soedirman University with Number: 419/EC/KEPK/V/2021. Before taking the data, the researcher gave informed consent first.

3. Result

3.1 Characteristics of respondents

The characteristics of the respondents can be seen in table 1. The majority of respondents have uncontrolled blood pressure (86.2%), age $\geq$ 55 years old (47.6%), female (78.2%), low education (84.9%), not working (52.4%), Overweight-obese (67.6%). Based on the medical history of respondents with uncontrolled hypertension, it is known that the majority of respondents have a family history of hypertension (52%), no history of heart disease (82.7%), no history of diabetes (74.7%), no history of stroke (82.7%).

The description of the respondent's lifestyle is shown in table 2. All respondents do not have the habit of drinking alcohol. The majority of respondents do not smoke (93.8%) and do not consume high-fat foods (64%). Respondents who experienced uncontrolled hypertension showed that the majority were non-adherent to treatment (69.8%), had high sodium consumption habits (47.1%) and did not have regular exercise habits (61.3%).

3.2 Factors that affect uncontrolled hypertension

The results of the bivariate analysis showed that the characteristics of the respondents that influenced the incidence of uncontrolled blood pressure were education level (p value 0.036; OR = 6.821; 95%CI = 1.312-35.474), while other characteristics of respondents such as age, gender, occupation, BMI, and medical history did not significantly influence the incidence of uncontrolled blood pressure in hypertension ($p > 0.05$).

Lifestyles that have an effect on uncontrolled blood pressure in hypertension are non-adherence to treatment (p value 0.001; OR = 3.978; 95%CI = 1.805-8.767) and high sodium consumption habits (p value 0.001; OR = 3,463; 95%CI = 1,476 -8.124), but the habit of drinking alcohol, smoking, high fat consumption habits and exercise habits did not significantly affect the incidence of uncontrolled blood pressure in respondents (p value > 0.05).

The results of logistic regression analysis in table 3 show the dominant factors that influenced the incidence of uncontrolled hypertension in respondents included: education level (p=0.033; OR=8,735; 95%CI=1.187-64,290), high sodium consumption habits (p=0.013; OR=3.311; 95%CI= 1.292-8.483) and medication adherence (p=0.002; OR= 3.885; 95%CI=1.678-8.998).

4. Discussion

The dominant factors that significantly influence the incidence of uncontrolled hypertension based on the results of the study are the level of education, medication adherence and high sodium consumption habits. The majority of respondents have low education. Education level is correlated with knowledge and level of understanding of a person towards health information. Knowledge of risk is the basis for behavioral change [22], [23]. One of the problems faced by hypertensive patients is lack of knowledge. The results of a study in Uzbekistan stated that 35.5% of hypertensive patients had inadequate knowledge about hypertension [24]. The results of a study in Iran stated that more than 50% of hypertensive patients studied with the Hypertension Knowledge Level Scale (HK-LS) had knowledge at the average level, while more than 19% had poor knowledge [25], even in a Sri Lankan study mentioned that 92% of hypertensive patients had inadequate knowledge of hypertension [26]. The results of the study in Zimbabwe also stated that in rural areas knowledge related to hypertension was low [27].

Hypertensive patients who have low knowledge about hypertension treatment and the risk of complications due to hypertension will tend to behave that is not in accordance with their lifestyle to prevent blood pressure from being controlled. Awareness of risk has a significant effect on behavior or lifestyle of hypertensive patients to prevent stroke [28].

The results showed that the habit of consuming sodium had an effect on uncontrolled blood pressure in hypertension. This result is also in accordance with previous studies which stated that excessive salt consumption was at risk of causing uncontrolled blood pressure [6], [7]. High blood sodium levels can cause fluid retention in the vasculature so that stroke volume increases which results in an increase in blood pressure. Rural people with low knowledge without realizing have the habit of consuming foods that are high in sodium. Foods that are often consumed with high sodium content include instant noodles, flavorings and salted fish [19], [20].

Medication adherence affects uncontrolled blood pressure significantly. The results of a systematic review and meta-analysis also showed that medication adherence had an effect on uncontrolled blood pressure in stroke patients with a history of hypertension [29]. Non-adherence to treatment in hypertensive patients because hypertension treatment takes a long time. High blood pressure in hypertensive patients may be asymptomatic. Hypertensive patients mostly take medication if they are symptomatic and stop the drug if they are asymptomatic. The results of the study stated that the factors that influence non-adherence to treatment include: forgetfulness, unexpected side effects, asymptomatic, unaffordable access to treatment services and irresponsibility for their health [30]. Hypertensive patients can take antihypertensives throughout their lives. Hypertensive patients are also disobedient due to lack of knowledge. The results of previous studies stated that lack of knowledge about therapy, lack of education, less permanent perception

ISSN: 0005-2523
Volume 62, Issue 07, September, 2022

and lack of awareness of complications that arise due to hypertension have a significant effect on the incidence of uncontrolled hypertension [6], [8], [31].

5. Conclusion

The majority of hypertensive patients in rural areas show uncontrolled blood pressure. Education level, medication adherence, high sodium consumption habits dominantly influence uncontrolled hypertension in rural areas. In order to control blood pressure in hypertensive patients, it is recommended to increase knowledge about lifestyle in hypertensive patients, reduce sodium consumption and improve medication adherence.

Conflict of interest

The authors declare no conflict of interest related to this study

Acknowledgement

Thank you to LPPM Universitas Jenderal Soedirman Purwokerto Indonesia for funding this research through the Unsoed basic superior research scheme.

6. References

[1] World Health Organization. (2019, September 13). Hypertension. https://www.who.int/news-room/fact-sheets/detail/hypertension

[2] Mohsen Ibrahim M. (2018). Hypertension in Developing Countries: A Major Challenge for the Future. Current hypertension reports, 20(5), 38. https://doi.org/10.1007/s11906-018-0839-1. PMID: 29717393.

[3] Ministry of Health of the Republic of Indonesia. (2019, April 10). The reports of the results of basic health research. https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-riskesdas/

[4] Degli Esposti, E., Di Martino, M., Sturani, A. (2004).. Risk factors for uncontrolled hypertension in Italy. Journal of Human Hypertenson: 18, 207–213 https://doi.org/10.1038/sj.jhh.1001656

[5] Cordero, A., Bertomeu-Martínez, V., Mazón, P., Fácila, L., Bertomeu-González, V., Cosín, J., Galve, E., Núñez, J., Lekuona, I., & González-Juanatey, J. R. (2011). Factors associated with uncontrolled hypertension in patients with and without cardiovascular disease]. Revista espanola de cardiologia, 64(7), 587–593. https://doi.org/10.1016/j.recesp.2011.03.008

[6] Goverwa, T.P., Masuka, N., Tshimanga, M., Gombe, N.T., Takundwa, L., Bangure, D., Wellington, M. 2014. Uncontrolled hypertension among hypertensive patients on treatment in Lupane district, Zimbabwe, 2012. BMC Research Notes, 7:703. https://doi.org/10.1186/1756-0500-7-703

[7] Yang, L., Xu, X., Yan, J. (2014). Analysis on associated factors of uncontrolled hypertension among elderly hypertensive patients in Southern China: a community-based, cross-sectional survey. BMC Public Health 14, 903 https://doi.org/10.1186/1471-2458-14-903

[8] Tesfaye, B., Haile, D., Lake, B., Belachew, T., Tesfaye, T., Abera, H. 2017. Uncontrolled hypertension and assosiated factors among adult hypertensive patients on follow-up at Jimma University Teaching and Speliazed Hospitals: cross-sectional study. Research Report in Clinical Cardiology, 8:21-29. doi https://doi.org/10.2147/RRCC.S132126

[9] Saju, M. D., Allagh,K.P., Scaria,L., Joseph, S., Thiyagarajan, J.A. (2020). Prevalence, Awareness, Treatment, and Control of Hypertension and Its Associated Risk Factors: Results from Baseline Survey of SWADES Family Cohort Study. International Journal of Hypertension, Volume 2020, 1-7 https://doi.org/10.1155/2020/4964835

[10] Hussain, M.A., Al Mamun, A., Reid, C., Huxley, R.R., (2016). Prevalence, Awareness, Treatment and Control of Hypertension in Indonesia Adults Aged > 40 years : Findings from the Indonesia family life survey (IFLS). Plose one, 11(8):e0160922. DOI: 10.1371/journal.pone.0160922

[11] Unger, T., Borghi, C., Charchar, F. et al. (2020). 2020 International Society of Hypertension Global Hypertension Practice Guidelines. Hypertension. 75:1334-1357. doi: 10.1161/HYPERTENSIONAHA.120.15026.

[12] Fuchs, F. D., Whelton, P. K. (2020). High Blood Pressure and Cardiovascular Disease. Hypertension,75:285–292. https://doi.org/10.1161/HYPERTENSIONAHA.119.14240

[13] Goldstein, L.B., Adams, R., Albert, M.J., Appel, L.J., Brass, L.M., Bushnell, C.D. (2006). Primary prevention of ischemic stroke. Stroke, 37:1583–1633. https://doi.org/10.1161/01.STR.0000223048.70103.F1

[14] Ghani, L., Mihardja, L.K., Delima. (2016). Dominant risk factors of stroke in Indonesia. Buletin Penelitian Kesehatan, 44(1):49-58. DOI : 10.22435/bpk.v44i1.4949.49-58

[15] da Silva, T. L., Klein, C. H., Nogueira, A., Salis, L. H., de Souza E Silva, N. A., & Bloch, K. V. (2015). Cardiovascular mortality among a cohort of hypertensive and normotensives in Rio de Janeiro - Brazil - 1991-2009. BMC public health, 15, 623. https://doi.org/10.1186/s12889-015-1999-4

[16] Zhou, D., Xi, B., Zhao, M., Wang, L., & Veeranki, S. P. (2018). Uncontrolled hypertension increases risk of all-cause and cardiovascular disease mortality in US adults: the NHANES III Linked Mortality Study. Scientific reports, 8(1), 9418. https://doi.org/10.1038/s41598-018-27377-2

[17] Krousel-Wood, M., Islam, T., Webber, L. S., Re, R. N., Morisky, D. E., Muntner, P. (2009). New medication adherence scale versus pharmacy fill rates in seniors with hypertension. The American journal of managed care, 15(1), 59–66. PMID: 19146365

[18] Sinuraya, R.K., Destiani, D.P., Puspitasari, I.M. Diantini, A. (2018). Tingkat Kepatuhan Pengobatan Pasien Hipertensi di Fasilitas Kesehatan Tingkat Pertama di Kota Bandung Medication Adherence among Hypertensive Patients in Primary Healthcare in Bandung City. Jurnal Farmasi Klinik Indonesia, 7(2). doi: https://doi.org/10.15416/ijcp.2018.7.2.124

[19] Ministry of Health of the Republic of Indonesia. (2016, September 30). Regulation of the Minister of Health of the Republic of Indonesia Number 41 of 2014 concerning guidelines for balanced nutrition. https://kesmas.kemkes.go.id/perpu/konten/permenkes/pmk-no.-41-ttg-pedoman-gizi-seimbang

[20] Kementrian Kesehatan R I. (2013). Pedoman teknis penemuan dan tatalaksana hipertensi, Dirjen P2PTM, Jakarta. http://p2ptm.kemkes.go.id/uploads/2016/10/Pedoman-Teknis-Penemuan-dan-Tatalaksana-Hipertensi.pdf

ISSN: 0005-2523
Volume 62, Issue 07, September, 2022

[21] Williams, B., Mancia, G., Spiering, W., Agabiti Rosei, E., Azizi, M., Burnier, M., Clement, D. L., Coca, A., de Simone, G., Dominiczak, A., Kahan, T., Mahfoud, F., Redon, J., Ruilope, L., Zanchetti, A., Kerins, M., Kjeldsen, S. E., Kreutz, R., Laurent, S., Lip, G., … ESC Scientific Document Group (2018). 2018 ESC/ESH Guidelines for the management of arterial hypertension. European heart journal, 39(33), 3021–3104. https://doi.org/10.1093/eurheartj/ehy339

[22] Bandura A. (2004). Health promotion by social cognitive means. Health education & behavior : the official publication of the Society for Public Health Education, 31(2), 143–164. https://doi.org/10.1177/1090198104263660

[23] Beauchamp, M.R., Crawford, K.L. Jackson, B. (2018). Social cognitive theory and physical activity: Mechanisms of behavior change, critique, and legacy. Psychology of Sport and Exercise, 42,110–7. https://doi.org/10.1016/j.psychsport.2018.11.009

[24] Malik, A., Yoshida, Y., Erkin, T., Salim, D., Hamajima, M., (2014). Hypertension-related knowledge, practice and drug adherence among inpatients of a hospital in Samarkand, Uzbekistan. Nagoya Journal of Medical Sciences, 76: 255-263. PMID: 25741034; PMCID: PMC4345680.

[25] Zinat Motlagh, S. F., Chaman, R., Ghafari, S. R., Parisay, Z., Golabi, M. R., Eslami, A. A., & Babouei, A. (2015). Knowledge, Treatment, Control, and Risk Factors for Hypertension among Adults in Southern Iran. International journal of hypertension, 2015, 897070. https://doi.org/10.1155/2015/897070

[26] Kisokanth, G., Ilankoon, I.M.P.S., Arulanandem, K., Goonewardena, C.S.E, Sundaresan,K.T., Joseph, J., (2016). Assesment of knowledge on the didease, its complications and management strategies among hypertensive patients attending medical clinics at teaching hospital, Batticaloa, Sri Lanka. Journal of postgraduate institute of medicine, 3(E30): 1-11. http://doi.org/10.4038/jpgim.8097

[27] Chimberengwa, P.T., Naidoo, M. (2019). Knowledge, attitudes and practices related to hypertension among residents of a disadvantaged rural community in southern Zimbabwe. PLoS ONE, 14(6): e0215500. https://doi.org/10.1371/journal. pone.0215500

[28] Upoyo AS, Isworo A, Sari Y, Taufik A, Sumeru A, Anam A. Determinant Factors Stroke Prevention Behavior among Hypertension Patient in Indonesia. Open Access Maced J Med Sci. 2021;9(E):336-9. https://doi.org/10.3889/oamjms.2021.6040

[29] Upoyo, .AS., Setyopranoto, I., Pangastuti, HS. (2021). The Modifiable Risk Factors of Uncontrolled Hypertension in Stroke: A Systematic Review and Meta-Analysis. Stroke research and treatment, Volume 2021. https://doi.org/10.1155/2021/6683256

[30] Dave, G. J., Bibeau, D. L., Schulz, M. R., Aronson, R. E., Ivanov, L. L., Black, A., & Spann, L. (2013). Predictors of uncontrolled hypertension in the Stroke Belt. Journal of clinical hypertension (Greenwich, Conn.), 15(8), 562–569. https://doi.org/10.1111/jch.12122

[31] Wang, T. J., & Vasan, R. S. (2005). Epidemiology of uncontrolled hypertension in the United States. Circulation, 112(11), 1651–1662. https://doi.org/10.1161/CIRCULATIONAHA.104.490599

Table 1. Characteristics of research respondents (n=225)

Characteristics	Hypertension		p	OR (CI 95%)
	Uncontrolled (n=194)	Controlled (n=31)		
Age (years old)				
<55	87 (38.7%)	17 (7.6%)	0.400	1.493
≥55	107 (47.6%)	14 (6.2%)		(0.697-3.199)
Gender				
Male	18 (8%)	3 (1.3%)	>0.999	0.955
Female	176 (78.2%)	28 (12.4%		(0.264-3.453)
Education Level				
Elementary-Junior high school	191(84.9%)	28(12.4%)	0.036	6.821 (1.312-35.474)
Senior-College	3(1.3%)	3(1.3%)		
Working				
No work	118(52.4%)	15(6.7%)	0.266	1.656
Active work	76(33.8%)	16(7.1%)		(0.774-3.545)
BMI				
Overweight-obesity	152(67.6%)	24(10.7%)	>0.999	1.056 (0.425-2.619)
Normal	42(18.7%)	7(3.1%)		
History of HT in family				
Yes	117(52%)	16(7.1%)	0.473	1.425
No	77(34.2%)	15(6.7%)		(0.666-3.049)
History of Heart diseases				
Yes	8(3.6%)	4(1.8%)	0.066	0.290
No	186(82.7%)	27(12%)		(0.082-1.030)
History of DM				
Yes	26(11.6%)	5(2.2%)	0.778	0.805
No	168(74.7%)	26(11.6%)		(0.284-2.282)
History of Stroke				
Yes	5(2.2%)	1(0.4%)	0.594	0.794
No	189(84%)	30(13.3%)		(0.090-7.030)

Table 2. Lifestyle of research respondents (n=225)

Characteristics	Hypertension		p	OR (CI 95%)
	Uncontrolled	Controlled		
Medication adherence				
Non adherence	157(69.8%)	16(7.1%)	0.001	3.978
adherence	37(16.4%)	15(6.7%)		(1.805-8.767)
Drinking Alcohol				
Yes	-	-	-	-
No	194(86.2%)	31(13.8%)		
High sodium consumption				

ISSN: 0005-2523
Volume 62, Issue 07, September, 2022

Yes	106(47.1%)	8(3.6%)	0.003	3.463
No	88(39.1%)	23(10.2%)		(1.476-8.124)
High-fat consumption				
Yes	75(33.3%)	6(2.7%)	0.060	2.626
No	119(52.9%)	25(11.1%)		(1.029-6.700)
Smoking				
Yes	12(5,3%)	2(0.9%)	>0.999	0.956
No	182(80.9%)	29(12.9%)		(0.203-4.493)
Regular exercise				
No	138(61.3%)	23(10.2%)	0.892	0.857
Yes	56(24.9%)	8(3.6%)		(0.362-2.030)

Table 3. The results of multivariable analysis using logistic regression

Variables	*p*	OR/Exp(B)	CI 95%
Education Level	0.033	8.735	1.187-64.290
Medication Adherence	0.002	3.885	1.678-8.998
High sodium consumption	0.013	3.311	1.292-8.483
High-fat consumption	0.259	1.786	0.652-4.893