



Analysis of Influencing Factors of Adherence to Taking Medication among Hypertensive Patients

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Abstract. Obedience to medication is essential for people with hypertension to control their disease and lower the risk of complications and death. Several conditions shape this behavior. This study aimed to analyze the influence of factors of age, sex, ethnicity, income, employment, education, marital status, genetic history, length of illness, blood pressure, limited conditions, physical complaints, use of complementary medicine, motivation, attitudes toward treatment, affordability of health facilities, distance to health facilities, transportation availability, family support, health workers support, and media information, on adherence to taking medication. The study used an analytical design through a cross-sectional approach. Samples of 86 hypertensive patients were brought in Krembangan Selatan Community Health Center with a consecutive sampling technique. Research instruments are questionnaires compiled by researchers. Multiple logistic regression was used to analyze factors' influence on adherence to taking medication. The results showed no effect on age, sex, ethnicity, income, education, marital status, blood pressure, limited conditions, physical complaints, use of complementary medicine, motivation, attitudes toward treatment, family support, health workers support, and information media. Three factors are genetic history, length of illness, and employment that are influential against adherence to taking medication (p-value 0.000; 0.009; 0.000). The genetic history is the most dominant factor in compliance (OR 50,122). The inherited history of hypertension will be a reference in providing nursing services to this group, especially in modifying behavior to prevent hypertension from an early age so that the risk of illness can be avoided.

Keywords: Adherence, Taking medication, Hypertension.

1 Introduction

More people die each year from cardiovascular diseases than from any other cause. Hypertension is one of the most important preventable contributors to disease and death worldwide, especially in low and middle-income countries; it causes myocardial infarction, stroke, and kidney failure if not detected early and treated appropriately [7, 29, 31,

32]. Over three-quarters of heart disease and stroke-related deaths occur in low-income and middle-income countries. Hypertension can be defined using specific systolic and diastolic blood pressure levels or reported use of antihypertensive medications. An estimated 1.4 billion people worldwide have high blood pressure, but just 14% have it under control [3, 14, 20, 32, 34, 35]. Previous studies stated more than 50% hypertensive patients not adherence to taking medication [2, 14, 15].

Several previous studies stated adherence to taking medication has a significant effect on maintaining normal or controlled blood pressure [3, 7, 14, 36]. Several things contribute to the formation of behavior to adhere to taking hypertension medication, including age, sex, ethnicity, income, employment, education, marital status, genetic history, length of illness, blood pressure, limited conditions, physical complaints, use of complementary medicine, motivation, attitudes toward treatment, family support, health workers support, and media information [1, 4, 5, 12, 22, 24, 26, 30, 33, 36].

Treatment compliance is very necessary to reduce morbidity, complications and mortality due to hypertensive crisis. Non-optimal treatment for hypertension sufferers is caused by several factors, such as a long therapy process, lack of knowledge and skills in the family, inability to make decisions, and lack of family support in changing healthy lifestyles both in terms of food consumed and daily physical activity [4, 6, 23].

The role of health workers, especially public health nurses, is needed to overcome the advanced clinical conditions in this case, including through environmental modification, facilitating families with hypertensive patients to be able to adapt to stressors, facilitating the achievement of developmental tasks, and maintaining the function and structure of the family so that it remains healthy [23, 24, 28].

This study aimed to analyze the influence of factors of age, sex, ethnicity, income, employment, education, marital status, genetic history, length of illness, blood pressure, limited conditions, physical complaints, use of complementary medicine, motivation, attitudes toward treatment, affordability of health facilities, distance to health facilities, transportation availability, family support, health workers support, and media information, on adherence to taking medication.

2 Material and Method

The study used an analytical design through a cross-sectional approach. Samples of 86 hypertensive patients were taken in Krembangan Selatan Community Health Center with a consecutive sampling technique in July 2023. Dependent variable is adherence to taking medication, and several factors contribute are age, sex, ethnicity, income, employment, education, marital status, genetic history, length of illness, blood pressure, limited conditions, physical complaints, use of complementary medicine, motivation, attitudes toward treatment, affordability of health facilities, distance to health facilities, transportation availability, family support, health workers support, and media information. Research instruments are questionnaires compiled by researchers. Data categorical is nominal. Multiple logistic regression (method backward LR) was used to analyze factors' influence on adherence to taking medication (α 0.005). The factor most affected concluded based on the highest Odds ratio. Ethical approval letter was gained

from the from the Health Research Ethics Commission of the Indonesian Strada Institute of Health Sciences number: 3613/KEPK/IX/2022 at 2nd September 2022.

3 Result

The results of the research include data on factors that contribute to adherence to taking medication among hypertensive patients and the results of analysis of 3 factors that influence the adherence.

3.1 Data of Factor of Adherence to Taking Medication among Hypertensive Patients

The factors that contribute to adherence to taking medication among hypertensive patients were identified through survey using questionnaire shows in table 1. Almost patients are not adherence (55.8%). Most of hypertensive patients (73.3%) are elderly. Females are dominant (82.6%). The most ethnicity is Javanese (74.4%). Most of them are not working (65.1%) and most of their income is less than Regional Minimum Wage (76.7%). Most their education is not higher education (82.6%). Most of them are married (86%). Most of hypertensive patients have genetic history (75.6%). Moat of length of illness is less than 5 years (51.2 %). Their blood pressure is normal (55.8%). Most of them have limited conditions in their live (53.5%). Hypertensive patients have more than one physical complaint (55.8%). They did not use complementary medicine (57%). Most of them have high motivation to obey their medication (75.6%) and positive attitudes toward treatment (75.6%). All patients stated that Affordability health facilities are available and the health facilities are near their homes. They noted that their families (88.4%) and health worker (87.2%) provide high support. They also utilize media information for their medication (79.1%).

Table 1. Factor of Adherence to Taking Medication among Hypertensive Patients in Krembangan Selatan Community Helath Center, Surabaya, July 2023 (n=86)

Factor of Adherence to Taking Medication	Categories	Frequency (n)	Percentage (%)
Adherence to taking medication	Adeherence	38	44.2
	Not adherence	56	55.8
Age	Adult	23	26.7
	Elderly	63	73.3
Sex	Male	15	17.4
	Female	71	82.6
Ethnicity	Javanese	64	74.4
	Others	18	20.9
Income	Less than Regional Minimum Wage	66	76.7
	More than Regional Minimum Wage	20	23.3
Employment	Working	30	34.9
	Not working	56	65.1
Education	Higher Education	15	17.4
	No higher education	71	82.6

Factor of Adherence to Taking Medication	Categories	Frequency (n)	Percentage (%)
Marital status	Married	74	86.0
	No married	12	14.0
Genetic history	Have genetic history	65	75.6
	No genetic history	21	24.4
Length of illness	Less than 5 years	44	51.2
	More than 5 years	42	48.8
Blood pressure	Normal	48	55.8
	Abnormal	38	44.2
Limited conditions	Have limited conditions	46	53.5
	No limited condition	40	46.5
Physical complaints	Just once complaint	38	44.2
	More than one complaint	48	55.8
Use of complementary medicine	Using complementary medicine	37	43.0
	Not using complementary medicine	49	57.0
Motivation	High	65	75.6
	Low	21	24.4
Attitudes toward treatment	Positive	65	75.6
	Negative	21	24.4
Affordability of health facilities	Available	100	100
	Not available	0	0
Distance to health facilities	Near from home	100	100
	Far from home	0	0
Availability transportation	Available	100	100
	Not available	0	0
Family support	High	76	88.4
	Low	10	11.6
Health workers support	High	75	87.2
	Low	11	12.8
Media information	Utilize	68	79.1
	Not utilize	18	20.9

3.2 Regresi Logistic of Factor Influence of Adherence to Takong Medication among Hypertensive Patients

From twenty-one factors are contribute to the adherence, there are three variables, namely Affordability of health facilities, distance to health facilities, and Availability of transportation, were not processed in statistical tests because the data proportion was 100% in one category. Seven factors taking part of multiple logistic regression (method backward LR) are age, genetic history, length of illness, employment, income, health worker support, and media information that shows in table 2.

Three factors have significant affect to adherence are genetic history, employment, and length of illness (p value 0.000; 0.000; 0.009) (OR 50.122; 32.386; 0.071) . Hypertensive patients with a hereditary history are the most affected and 50.126 times more compliant with taking medication than patients who do not have a genetic history of hypertension.

Table 2. Regresi Logistic of Factor of Adherence to Taking Medication among Hypertensive Patients in Krembangan Selatan Community Health Center, Surabaya, July 2023 (n=86)

Factor of Adherence to Taking Medication	Sig.	Exp(B)	95% C.I.for EXP(B)	
			Lower	Upper
Age	.998	.000	.000	.
Genetic history	.000	50.126	5.810	432.435
Length of illness	.009	.071	.010	.514
Employment	.000	32.386	5.528	189.741
Income	.205	.198	.016	2.428
Health workers support	.532	.445	.035	5.622
Media information	.998	.000	.000	.
Constant	.998	4771252755871608400000000000.000		

4 Discussion

Obedience to medication is the only way for people with hypertension to control their disease and lower the risk of complications and death. Suboptimal adherence, which includes failure to initiate pharmacotherapy, to take medications as often as prescribed, and to persist on therapy long-term, is a well-recognized factor contributing to the poor control of blood pressure in hypertension. Previous studies stated several conditions shape this behavior[7]. Several categories of factors including demographic, socioeconomic, concomitant medical-behavioral conditions, therapy-related, healthcare team and system-related factors, and patient factors are associated with nonadherence [7].

There is no effect on age, sex, ethnicity, income, education, marital status, blood pressure, limited conditions, physical complaints, use of complementary medicine, motivation, attitudes toward treatment, family support, health workers’ support, and information media [5, 10, 16, 18, 19, 25, 37]. Three factors are genetic/familial history, length of illness, and employment that are influential against adherence to taking medication (p-value 0.000; 0.009; 0.000) (OR 50.122; 32.386; 0.071) [10, 17, 25, 26]. Busy work activities often make hypertension sufferers forget to take their medication according to schedule. Hypertension treatment that has been undertaken for an extended period (more than five years) tends to make patients bored of taking medication and eventually stop [26].

Hypertensive patients with a genetic history are 50.122 times more compliant with taking medication than patients who do not have a genetic history of hypertension. Genetic history is one of the unmodified factors of hypertension [11]. The experience of being part of a family with hypertension and following the stages of the disease and the treatment that must be undertaken can be a learning experience for someone. This experience triggers internal solid motivation, with the hope that the illness will not worsen [7, 8]. Previous study stated that the aspect of decision-making in adherence behavior,

the association between medication adherence and three loci proximal to the GCC1 gene [9, 21]

Increasing medication compliance positively reduces blood pressure (systolic and diastolic) in hypertensive patients [13, 36]. Improving eating patterns according to the hypertension diet, appropriate physical exercise, and patient and family involvement in treatment is enough to help achieve optimal conditions for hypertensive patients [15, 27]. All interventions to achieve treatment compliance need to be based on the patient's internal motivation, supported by good knowledge from the patient. The patient and family require good understanding, so the role of information media will be essential in this case [22, 24].

5 Conclusion

This study aimed to analyze the influence of factors of age, sex, ethnicity, income, employment, education, marital status, genetic history, length of illness, blood pressure, limited conditions, physical complaints, use of complementary medicine, motivation, attitudes toward treatment, affordability of health facilities, distance to health facilities, transportation availability, family support, health workers support, and media information, on adherence to taking medication.

There are three factors, namely genetic history, length of illness, and employment which are influential against adherence to taking medication. Genetic history is the most dominant factor in compliance. The experience of being part of a family with hypertension is a stimulant factor that strengthens sufferers to adhere to treatment, especially when taking hypertension medication.

The inherited history of hypertension will be a reference in providing nursing services to this group, especially in modifying behavior to prevent hypertension from an early age so that the risk of illness can be avoided.

References

1. Agrawal, M. et al.: HERBAL REMEDIES FOR TREATMENT OF HYPERTENSION Manish. 1, 5, 1–21 (2010).
2. Akoko, B.M. et al.: Knowledge of Hypertension and Compliance with Therapy Among Hypertensive Patients in the Bamenda Health District of Cameroon: A Cross-sectional Study. *Cardiol. Ther.* 6, 1, 53–67 (2017). <https://doi.org/10.1007/s40119-016-0079-x>.
3. Al-Makki, A. et al.: Hypertension pharmacological treatment in adults: A world health organization guideline executive summary. *Hypertension.* 79, 1, 293–301 (2022). <https://doi.org/10.1161/HYPERTENSIONAHA.121.18192>.
4. Aunguroch, Y. et al.: How a self-management program affects blood pressure among indonesians with hypertension: A quasi-experimental study. *Iran. J. Nurs. Midwifery Res.* 27, 3, 229–235 (2022). https://doi.org/10.4103/ijnmr.IJNMR_244_20.
5. Bae, S. et al.: Impact of cardiovascular disease and risk factors on fatal outcomes in patients with COVID-19 according to age: a systematic review and meta-analysis. *Heart.* 0, 1–8 (2020). <https://doi.org/10.1136/heartjnl-2020-317901>.

6. Boonyathee, S. et al.: Effects of a social support family caregiver training program on changing blood pressure and lipid levels among elderly at risk of hypertension in a northern Thai community. *PLoS One*. 16, 11, 1–20 (2021). <https://doi.org/10.1371/journal.pone.0259697>.
7. Burnier, M., Egan, B.M.: Adherence in Hypertension: A Review of Prevalence, Risk Factors, Impact, and Management. *Circ. Res.* 124, 7, 1124–1140 (2019). <https://doi.org/10.1161/CIRCRESAHA.118.313220>.
8. Choudhry, N.K. et al.: Medication adherence and blood pressure control: A scientific statement from the American Heart Association. *Hypertension*. 79, 1, E1–E14 (2022). <https://doi.org/10.1161/HYP.000000000000203>.
9. Cooper-DeHoff, R.M.: HHS Public Access Author manuscript *Nat Rev Nephrol*. Author manuscript; available in PMC 2017 February 01. Published in final edited form as: *Nat Rev Nephrol*. 2016 February; 12(2): 110–122. doi:10.1038/nrneph.2015.176. Hypertension pharmacogenomics: in s. *Nat Rev Nephrol*. 12, 2, 1–28 (2016). <https://doi.org/10.1097/00001504-199208000-00012>.
10. Forouzanfar, M.H. et al.: Global burden of hypertension and systolic blood pressure of at least 110 to 115mmHg, 1990–2015. *JAMA - J. Am. Med. Assoc.* 317, 2, 165–182 (2017). <https://doi.org/10.1001/jama.2016.19043>.
11. Kemenkes RI: Situasi kesehatan jantung. Pus. data dan Inf. Kementerian. Kesehatan. RI. 3 (2014). <https://doi.org/10.1017/CBO9781107415324.004>.
12. Kementerian Kesehatan RI: Hipertensi. Pus. Data dan Inf. Kementerian. Kesehatan. RI. 1–6 (2014).
13. Lin, H. et al.: Long-Term Effects of Ambient PM_{2.5} on Hypertension and Blood Pressure and Attributable Risk among Older Chinese Adults. *Hypertension*. 69, 5, 806–812 (2017). <https://doi.org/10.1161/HYPERTENSIONAHA.116.08839>.
14. Lu, J. et al.: Prevalence, awareness, treatment, and control of hypertension in China: data from 1.7 million adults in a population-based screening study (China PEACE Million Persons Project). *Lancet*. 390, 10112, 2549–2558 (2017). [https://doi.org/10.1016/S0140-6736\(17\)32478-9](https://doi.org/10.1016/S0140-6736(17)32478-9).
15. Margolius, D. et al.: Health coaching to improve hypertension treatment in a low-income, minority population. *Ann. Fam. Med.* 10, 3, 199–205 (2012). <https://doi.org/10.1370/afm.1369>.
16. Mattei da Silva, Â.T. et al.: Nursing case management for people with hypertension in primary health care: A randomized controlled trial. *Res. Nurs. Heal.* 43, 1, (2020). <https://doi.org/10.1002/nur.21994>.
17. NCT04411355: The Effect of Chronic Care Model Based Education on Disease Management in Hypertensive Patients. <https://clinicaltrials.gov/show/NCT04411355>. (2020).
18. Ng, R. et al.: Smoking, drinking, diet and physical activity - Modifiable lifestyle risk factors and their associations with age to first chronic disease. *Int. J. Epidemiol.* 49, 1, 113–130 (2020). <https://doi.org/10.1093/ije/dyz078>.
19. Nguyen, T.P.L. et al.: Adherence to hypertension medication: Quantitative and qualitative investigations in a rural northern Vietnamese community. *PLoS One*. 12, 2, 1–13 (2017). <https://doi.org/10.1371/journal.pone.0171203>.
20. Rahmadiyahanti, N.H.: Penerapan Higiene dan Sanitasi Warung Makan Di Pasar Ngasem

- Sebagai Penunjang Wisata Kuliner Di Yogyakarta. *Skripsi*. 4, 147 (2018).
21. Seo, I. et al.: Genome-Wide Association Study of Medication Adherence in Chronic Diseases in the Korean Population. *Genomics Inform.* 12, 3, 121 (2014). <https://doi.org/10.5808/gi.2014.12.3.121>.
 22. Shen, W. et al.: Race and Sex Differences of Long-Term Blood Pressure Profiles from Childhood and Adult Hypertension: The Bogalusa Heart Study. *Hypertension*. 70, 1, 66–74 (2017). <https://doi.org/10.1161/HYPERTENSIONAHA.117.09537>.
 23. Shen, Y. et al.: Family member-based supervision of patients with hypertension: A cluster randomized trial in rural China. *J. Hum. Hypertens.* 31, 1, 29–36 (2017). <https://doi.org/10.1038/jhh.2016.8>.
 24. Shen, Y. et al.: Prevalence and risk factors associated with hypertension and prehypertension in a working population at high altitude in China: A cross-sectional study. *Environ. Health Prev. Med.* 22, 1, (2017). <https://doi.org/10.1186/s12199-017-0634-7>.
 25. Sinuraya, R.K. et al.: Medication Adherence among Hypertensive Patients in Primary Healthcare in Bandung City. *Indones. J. Clin. Pharm.* 7, 2, 124–133 (2018). <https://doi.org/10.15416/ijcp.2018.7.2.124>.
 26. Soesanto, E. et al.: Factors affecting medication adherence in hypertension patients: A literature review. *Bali Med. J.* 10, 3 Special issue ICONURS, 1364–1370 (2021). <https://doi.org/10.15562/bmj.v10i3.3038>.
 27. Stacey, A.W. et al.: Hypertensive emergency presenting as blurry vision in a patient with hypertensive chorioretinopathy. *Int. J. Emerg. Med.* 8, 1, 6–9 (2015). <https://doi.org/10.1186/s12245-015-0063-6>.
 28. Sukpattanasrikul, S. et al.: Comparison of hypertensive outcomes after the implementation of self-management program for older adults with uncontrolled hypertension in Krabi, Thailand: a quasi-experimental study. *J. Heal. Res.* 36, 4, 641–651 (2022). <https://doi.org/10.1108/JHR-12-2020-0626>.
 29. Unger, T. et al.: 2020 International Society of Hypertension Global Hypertension Practice Guidelines. *Hypertension*. 75, 6, 1334–1357 (2020). <https://doi.org/10.1161/HYPERTENSIONAHA.120.15026>.
 30. Verulava, T., Mikiashvili, G.: Knowledge, awareness, attitude and medication compliance in patients with hypertension. *Arter. Hypertens.* 25, 3, 119–126 (2021). <https://doi.org/10.5603/AH.a2021.0021>.
 31. WHO: Guideline for the pharmacological treatment of hypertension in adults. In: *American Family Physician*. pp. 763–765 (2021).
 32. WHO: Tool for the development of a consensus protocol for treatment of hypertension. (2018).
 33. Wolf, J. et al.: Effectiveness of interventions to improve drinking water, sanitation, and handwashing with soap on risk of diarrhoeal disease in children in low-income and middle-income settings: a systematic review and meta-analysis. *Lancet*. 400, 10345, 48–59 (2022). [https://doi.org/10.1016/S0140-6736\(22\)00937-0](https://doi.org/10.1016/S0140-6736(22)00937-0).
 34. World Health Organization: Guideline for the pharmacological treatment of hypertension in adults. (2021).
 35. World Health Organization: Hypertension, <https://www.who.int/news-room/fact-sheets/detail/hypertension>.

36. Wu, S. et al.: Blood Pressure Classification of 2017 Associated with Cardiovascular Disease and Mortality in Young Chinese Adults. *Hypertension*. 76, 1, 251–258 (2020). <https://doi.org/10.1161/HYPERTENSIONAHA.119.14239>.
37. Zhou, B. et al.: Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet*. 398, 10304, 957–980 (2021). [https://doi.org/10.1016/S0140-6736\(21\)01330-1](https://doi.org/10.1016/S0140-6736(21)01330-1).

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