

Original Article

Determinant factors of treatment adherence of hypertensive patients in a rural area of Indonesia

Visuddho Visuddho¹, Putu Astiswari Permata Kurniawan¹, Salsabilla Firdausi Rafidah¹, Ramadhani Rizki Zamzam¹, Ezrin Syariman Bin Roslan¹, Muhammad Raihan Habibi¹, Muhammad Gazi Yasargil¹, Atika Atika^{2*}, Atni Supratiwi³

Abstract

Background: The surging prevalence of hypertension due to lifestyle brought forth an increase in degenerative diseases. Adherence is important in achieving the effectiveness of therapy. This study aims to analyze the factors affecting medication adherence in patients with hypertension.

Methods: A cross-sectional study was conducted between 20-24 February 2023 at Turirejo Village, Lawang District, Malang, Indonesia. Participants were hypertensive patients currently receiving treatment. The MMAS-8 questionnaire was used to classify adherence to medication for hypertension. Analysis with binary logistic regression test was performed on variables to display odds ratio values was conducted at a significance level of $p < 0.05$.

Results: A total of 37 adults diagnosed with hypertension participated in this study. Patients were dominantly consisting of elderly (≥ 56 years old; 73.0%) and females (86.0%). Seventy-six percent of patients have low adherence, twenty-four percent of patients have moderate adherence, and no patient has high adherence. Duration of illness, knowledge, and attitude variables significantly affect adherence (low and moderate) to medication for hypertension. Multivariate analysis showed that patients with a duration of illness above 10 years (Adjusted OR 18.27; 95% CI 1.72-194.47; p -value 0.016) and positive attitude towards treatment (Adjusted OR 12.76; 95% CI 1.25-130.40; p -value 0.032, respectively) increase the possibility of moderate adherence towards the medication of hypertension.

Conclusion: Improvements in factors that affect adherence to hypertension treatment are needed to increase the success of the Non-Communicable Disease Prevention Program. Further research in identifying factors of economic capacity and access to health service providers is needed to validate the results of this study.

Keywords: Hypertension, Medication Adherence, Knowledge, Attitude, Duration of Illness, Indonesia

Background

Indonesia is currently facing a shift in disease patterns, from communicable diseases to non-communicable diseases. The increase in the prevalence of non-communicable diseases occurs as a result of unhealthy lifestyles triggered by urbanization, modernization, and globalization. Increasing life expectancy in line with socio-economic improvements and health services, has the consequence of increasing degenerative diseases [1]. Hypertension is one of the most common and most common cardiovascular diseases in society and is the biggest

cause of premature death in the world. Around 1.28 billion adults aged 30-79 years in the world suffer from hypertension [2]. As many as 8.4% of the population aged ≥ 18 years in Indonesia suffer from hypertension [3]. Patient compliance in carrying out the recommended therapy is a common problem. Several factors such as the length of time a person suffers from hypertension or the many types of antihypertensive drugs used will reduce the level of adherence to treatment [4-6]. Through discussions with Turirejo Village officials and a preliminary study on February 20, 2023, the researchers were able to collect survey results from the 31 respondents.

The results of the preliminary study found that the most common diseases encountered were hypertension (12 people; 38.7%), diabetes (4 people; 12.9%), and acute respiratory

*Correspondence: atika@fk.unair.ac.id

²Department of Public Health, Faculty of Medicine Universitas Airlangga, Surabaya – 6013, Indonesia

A full list of author information is available at the end of the article



infections (5 people; 16.1%), and six of 12 patients with hypertension (50%) patients felt that they were not taking antihypertensive drugs regularly. Knowledge and awareness of a person's illness are important factors in medication adherence [6]. Lack of knowledge regarding the course of the disease, hypertension therapy, and a healthy lifestyle will worsen the effectiveness of therapy in patients [7].

Other factors, such as gender, age, place of residence, medical expenses, and socioeconomic status were found to affect medication adherence in hypertension patients [8]. It is necessary to identify factors of adherence of hypertensive patients in using drugs, in an effort to plan a more comprehensive therapeutic strategy in order to increase the effectiveness of therapy. Therefore, this study aims to analyze the factors that influence adherence to hypertension treatment in hypertension sufferers in Turirejo Village.

Methods

Study design and setting

This research is an observational analytic study with a cross-sectional study design. The research took place between 20-24 February 2023 at Turirejo Village, Lawang District, Malang, Indonesia. The research used primary data collected using a questionnaire instrument which was answered by respondents through face-to-face interviews with five medical students. Each interviewer spread in a region of Turirejo Village accompanied by local health cadres to each patient's home. The sampling technique was carried out using the consecutive sampling method, collecting one by one respondent for one day.

Study Location

Turirejo Village is one of ten villages and two sub-districts located in Lawang District, Malang Regency. Topographically, Turirejo Village is plain with an average elevation of approximately 491 m above sea level. The condition of the land in Turirejo Village is classified as hilly, the soil surface is brown with a slope of less than 15.0%. The average temperature is 22°C to 32°C, with a tropical climate and an average rainfall of 160 mm/year. The livelihoods of the residents of the Turirejo Village area range from civil servants, police, private employees, farmers, farm laborers, traders, breeders, transportation services, entrepreneurs, and others. In terms of facilities and infrastructure, Turirejo Village has health facilities, namely the Ponkesdes of Turirejo Village, Lawang District [9].

Inclusion and exclusion criteria

The population in this study were adult hypertensive patients (over 18 years) registered at the Turirejo Ponkesdes in 2022, totaling 112 people. The inclusion criteria were hypertensive patients who were registered in the data and coverage of the Ponkesdes (Village Health Board) of Turirejo Village who were currently in Turirejo Village. Exclusion criteria were participants who did not give consent to participate in the study, patients who could not be found, or patients who had never received treatment for hypertension.

Sample size

The sample size was obtained by five to ten rules of thumb for determining sample size Roscoe [10]. Since there are six variables included for regression analysis, by the rule of five,

there are a minimum of 30 samples included in this study. Roscoe suggested that a sample size greater than 30 and less than 500 is suitable for most behavioral studies [10].

Study tool and the variables

The dependent variable in this study was adherence to treatment. Compliance was measured using a questionnaire that was compiled based on a previous study [11]. This questionnaire has been tested for construct validity and reliability by previous studies [12]. The results of the analysis showed that the MMAS-8 questionnaire used was valid with the r count of all questions > r table (0.355) at a significance of 0.05. The results of the analysis also show that the instrument is reliable with a reliability coefficient of 0.729 [12]. Assessment of adherence to hypertension treatment was carried out using the MMAS-8 which included eight questions (Table 2).

Questions number 1-7 use "yes" and "no" answer choices, while question number 8 has 5 answer choices, namely always, usually, sometimes, occasionally, and never. Respondents are said to have high compliance if they have a score of 8, moderate compliance with a score of 6-7, and low compliance if a score < 6 [11]. The independent variables in this study were age, education level, length of illness with hypertension, participation with health insurance, knowledge of hypertension treatment, and attitude towards hypertension treatment. Knowledge of hypertension treatment was measured using a questionnaire that was prepared based on questions regarding the basic knowledge that hypertension sufferers need to know regarding hypertension treatment (Table 3).

The questionnaire consists of 8 questions, with each correct answer given a value of 1. The validity and reliability test found that all questions were valid with a Cronbach alpha value = 0.619. If the total score is correct ≥ 7 then the respondent's knowledge is categorized as good, whereas if the total score is correct < 7 then the respondent's knowledge is categorized as lacking. Attitudes toward treatment were measured using a questionnaire compiled based on statements that should be made by hypertensive patients (Table 4).

The questionnaire consists of 8 statements with answers in the form of a Likert scale (1-4). The maximum total score from the accumulation of the Likert scale is 32. The validity and reliability tests found that all questions were valid with a Cronbach alpha value = 0.691. If the total score is ≥ 25 then the attitude of the respondent is categorized as positive, whereas if the total score is < 25 then the attitude of the respondent is categorized as negative.

Statistical analysis

Analysis was performed using IBM SPSS statistics ver. software. 23. Variables with nominal and ordinal data scales are presented in the form of amounts and percentages. Each independent variable was subjected to a bivariate logistic regression test on the dependent variable to display the odds ratio (OR) value. The independent variable with the results of the bivariate logistic regression test that has a p -value < 0.25 will be subjected to a multivariate logistic regression test with the backward entry method based on the likelihood ratio. All analyzes were performed at a significance level of $p < 0.05$ with 95% confidence intervals.

Results

Socio-demographic characteristics of study participants

A total of 37 adult hypertensive patients out of 112 patients diagnosed with hypertension at the Turirejo Ponkesdes participated in this study (Table 1). Most of the participants were over 56 years old (73.0%) and had less than 9 years of education (73.0%). There were 29 patients (73.0%) who had been sick for less than 10 years and the rest (27.0%) had had hypertension for more than 10 years. More than half of the participants (57.0%) took part in a health insurance program.

The average knowledge score of all participants was 5.83 ± 1.8 with the distribution of the number of participants with a score below 7 of 19 people (51.0%) and a score above or equal to 7 of 18 people (49.0%). The average attitude score of all participants was 24.14 ± 4.2 with the distribution of the number of participants with a score below 25 of 28 people (76.0%) and a score above or equal to 25 of 9 people (24.0%). From the results of adherence calculated by the MMAS-8 score, there were no patients who had high compliance or a score of 8. Most of the participants had low adherence (76.0%) and the rest had moderate adherence (24.0%). Table 2-4 described the distribution of answers to the knowledge, attitude, and MMAS-8 questionnaire. We found that most patients were disobedient because they forgot to take their medication (76.0%) and stopped their medication on their own because they felt their condition was improving (controlled blood pressure) (76.0%).

The statement that most patients obeyed was not forgetting to bring medicine when traveling (59.0%).

Table 1: Demographics and other characteristics of the sample (n=37)

| Variables | Categories | N (%) |
|--|-----------------|----------|
| Age | < 56 years old | 10 (27%) |
| | ≥ 56 years old | 27 (73%) |
| Gender | Male | 5 (14%) |
| | Female | 32 (86%) |
| Educational Level | < 9 years | 27 (73%) |
| | ≥ 9 years | 10 (27%) |
| Duration of Illness | < 10 years | 29 (78%) |
| | ≥ 10 years | 8 (22%) |
| Health Insurance Participation | Non-Participant | 16 (43%) |
| | Participant | 21 (57%) |
| Knowledge of Hypertension Medication | Score < 7 | 19 (51%) |
| | Score ≥ 7 | 18(49%) |
| Attitude towards Hypertension Medication | Score < 25 | 21 (57%) |
| | Score ≥ 25 | 16 (43%) |
| Medication Adherence | Low Adherence | 28 (76%) |
| | Mid Adherence | 9 (24%) |
| | High Adherence | 0 |

Table 2: Distribution of Answers to the MMAS-8 Questionnaire

| No. | MMAS-8 | Non-Compliant n (%) | Compliant n (%) |
|-----|---|---------------------|-----------------|
| 1. | Do you sometimes forget to take your pills? | 28 (76) | 9 (24) |
| 2. | People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you didn't take your medicine? | 23 (62) | 14 (38) |
| 3. | Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it? | 23 (62) | 14 (38) |
| 4. | When you travel or leave home, do you sometimes forget to bring along your medicine? | 15 (41) | 22 (59) |
| 5. | Did you take all your medicine yesterday? | 18 (49) | 19 (51) |
| 6. | When you feel like your symptoms are under control, do you sometimes stop taking your medicine? | 28 (76) | 9 (24) |
| 7. | Taking medicine every day is a real inconvenience for some people. Have you ever felt hassled about sticking to your treatment plan? | 20 (54) | 17 (46) |
| 8. | How often do you have difficulty remembering to take all your medicine? (a) Never/rarely; (b) Once in a while; (c) Sometimes; (d) Usually; (e) All the time. | 23 (62) | 14 (38) |

Table 3: Distribution of Answers for Knowledge Regarding Hypertension Treatment Questionnaire

| No | Questions | Correct Answer N (%) | Wrong Answer N (%) |
|----|---|----------------------|--------------------|
| 1. | Can antihypertensive drugs be taken without a doctor's advice? | 23 (62) | 14 (37) |
| 2. | Are antihypertensive drugs only taken when there are symptoms? | 21 (56) | 16 (43) |
| 3. | Do antihypertensive drugs still need to be consumed even though you exercise routinely? | 28 (75) | 9 (24) |
| 4. | Do antihypertensive (high blood pressure) drugs have to be taken at the same time every day? | 24 (64) | 13 (35) |
| 5. | Is taking antihypertensive medication addictive? | 29 (78) | 8 (21) |
| 6. | Do people who have long suffered from hypertension (high blood pressure) still need to take medication? | 28 (75) | 9 (24) |
| 7. | Can antihypertensive drugs (high blood pressure) be added alone if there are symptoms of dizziness? | 31 (83) | 6 (16) |
| 8. | Do people with hypertension have to come to the doctor regularly? | 32 (86) | 5 (13) |

Table 4: Distribution of Answers for Attitude Regarding Hypertension Treatment Questionnaire

| No. | Statement | Strongly Disagree (%) | Disagree (%) | Agree (%) | Strongly Agree (%) |
|-----|--|-----------------------|--------------|-----------|--------------------|
| 1. | I want to take antihypertensive (high blood pressure) medication every day to maintain my health | 3 (8) | 6 (16) | 13 (35) | 15 (40) |
| 2. | I don't take antihypertensive medication (high blood pressure) if there are no complaints | 9 (24) | 14 (37) | 7 (18) | 7 (18) |
| 3. | I feel that taking medication every day interferes with my daily activities | 5 (13) | 6 (16) | 13 (35) | 13 (35) |
| 4. | I feel that taking the antihypertensive medication regularly can damage my kidneys | 4 (10) | 10 (27) | 11 (29) | 12 (32) |
| 5. | I want to regularly check with the doctor for the treatment of hypertension (high blood pressure) | 2 (5) | 3 (8) | 14 (37) | 18 (48) |
| 6. | I feel that my hypertension (high blood pressure) will get better if I take medication regularly | 1 (2) | 0 (0) | 7 (18) | 29 (78) |
| 7. | I will continue to take antihypertensive medication even though my blood pressure is normal | 10 (27) | 6 (16) | 11 (29) | 10 (27) |
| 8. | If I forget to take my antihypertensive medication, I feel the need to double the dose of the next | 0 (0) | 4 (10) | 13 (35) | 20 (54) |

Bivariate analysis

Bivariate analysis shows the effect of the independent variables on the dependent variable (Table 5). There was no significant effect of age, education, and health insurance participation on participant compliance in treating hypertension. The length of illness variable, knowledge score, and attitude score had a significant effect on participant adherence in carrying out hypertension treatment.

Multivariate analysis

Multivariate analysis using multiple logistic regression was performed to look for factors that simultaneously affect adherence to hypertension treatment. There are three steps in the multivariate logistic regression analysis test; the first step was followed by four independent variables (age, length of illness, knowledge, and attitude). The final step leaves two variables, namely length of illness and attitude (Table 6).

The Omnibus Tests and the Hosmer and Lemeshow tests show that the analytical model formed is fit to the data. Participants with an illness of more than 10 years were eighteen times more obedient than participants with an illness of less than 10 years (Adjusted OR 18.27; 95% CI 1.72-194.47; $p=0.02$). Participants with an attitude score of more than or equal to 25 were twelve times more obedient than participants with an attitude score below 25 (Adjusted OR 12.76; 95% CI 1.25-130.40; $p=0.03$). It can be concluded that the longer the illness and the higher the attitude score, the more likely the participants are to comply with hypertension treatment. The constants of the multivariate binary logistic regression mathematical model are negative. This means that before the addition of the variable length of illness or attitudes toward hypertension treatment, there were already other factors that lead to low adherence. Supported by Nagelkerke R Square of 46.3%, there are still many factors that have not been successfully included in this analysis model.

Table 5: Result of bivariate analysis (n=37)

| Variables | Categories | Low Adherence n (%) | Mid Adherence n (%) | β | OR | (95% CI) | p-value |
|--|---------------------|---------------------|---------------------|---------|-------|---------------|---------|
| Age | < 56 years old | 9(90) | 1(10) | 1.33 | 3.79 | (0.41-35.07) | 0.241 |
| | \geq 56 years old | 19 (70.3) | 8(29.7) | | | | |
| Education | < 9 years | 21 (77.8) | 6 (22.2) | 0.41 | 1.50 | (0.29-7.65) | 0.626 |
| | \geq 9 years | 7 (70) | 3 (30) | | | | |
| Duration of Illness | < 10 years | 25 (86.2) | 4 (13.8) | 2.34 | 10.42 | (1.76-61.67) | 0.010* |
| | \geq 10 years | 3 (37.5) | 5 (62.5) | | | | |
| Health Insurance Participation | Non-Participant | 12 (75) | 4 (25) | -0.07 | 0.94 | (0.20-4.26) | 0.933 |
| | Participant | 16 (76.2) | 5 (23.8) | | | | |
| Knowledge of Hypertension Medication | Score < 7 | 18 (94.7) | 1 (5.3) | 2.67 | 14.40 | (1.57-132.31) | 0.018* |
| | Score \geq 7 | 10 (55.6) | 8 (44.4) | | | | |
| Attitude towards Hypertension Medication | Score < 25 | 19 (90.5) | 2 (9.5) | 2 | 7.39 | (1.27-42.96) | 0.026* |
| | Score \geq 25 | 9 (56.3) | 7 (43.7) | | | | |

*Significant $p < 0.05$ **Table 6:** Results of multivariate binary logistic regression (N=37)

| Variables | Categories | β | Adjusted OR | (95% CI) | P-value |
|--|-----------------|---------|-------------|---------------|---------|
| Duration of Illness | ≥ 10 years | 2,91 | 18,27 | 1.72-194.47 | 0.016 |
| | < 10 years | | Reference | | |
| Attitude towards Hypertension Medication | Score < 25 | 2,55 | 12,76 | (1,25-130,40) | 0,032* |
| | Score ≥ 25 | | Reference | | |

*significant $p < 0.05$. Only significant variables are included in the table.

Discussion

The health behavior of an individual is influenced by several factors. This study measured the influence of factors on medication adherence, including the level of knowledge, attitudes, and demographic factors. In this study, most of the participants had low adherence according to the results of the preliminary studies conducted. Based on data from the results of the distribution of answers to the MMAS-8 questionnaire, it was found that most patients did not comply because they forgot to take their medication and stopped their own medication because they felt that their condition was improving (controlled blood pressure). Patients with hypertension in general are often accompanied by other comorbid diseases [12]. This causes a large number of drugs to be taken together with hypertension drugs so that many patients are confused or even forget to take their medication [12]. The study by Vrijens et al. [13] stated that the burden of more pills makes the habit of taking daily medication more complicated, often a barrier to optimal medication adherence. Respondents who stopped self-medication could be due to a misunderstanding about the absence of symptoms as a cure [14, 15]. The wrong perception that hypertension drugs are ineffective in controlling blood pressure also plays a role in non-compliance [16, 17]. Ineffective communication between patients and health workers can hinder the delivery of disease-related education, including the importance of taking antihypertensive drug therapy in asymptomatic conditions [18]. The results of this study found that older respondents (≥ 56 years) had better adherence (22%) than respondents aged < 56 years (3%), although there was no significant difference. The insignificant effect of age can occur due to factors that both encourage and hinder adherence in older and younger groups [18, 19]. The factors that encourage adherence in the older age group are better health awareness and the presence of cadres who often conduct counseling and encourage people to comply with taking medication [20, 21]. Obstacles are decreased cognitive ability, physical function, difficulty swallowing medication, ability to care for oneself, and a lower likelihood of living with other people [22–24]. The results showed that there was no significant relationship between recent education and adherence to taking antihypertensive medication [25]. Even though a higher level of education is considered to have more potential to maintain health, people with low levels of education are also considered to be able to access health information just as well [26]. The existence of counseling for various groups of people can be a reason for the balance of information between groups of community education. Insurance participation has no significant effect on adherence to hypertension treatment [27,28]. This is due to the small number of people using insurance, namely those living in rural areas.

People tend to choose to buy their own medicines at pharmacies compared to coming to take advantage of health insurance [29]. Another factor is the government's policy regarding the price of drugs, which refers to drug price margins that can be reached by the public, making it easier to buy drugs independently [30]. In this study, the patient's length of time with hypertension affects adherence to hypertension treatment. This is similar to previous studies [31–34]. The longer a person suffers from a disease, the more knowledge and understanding he will have about the disease [5]. Greater concern about symptoms due to hypertension can also increase adherence [34–35]. Health knowledge is defined as all the results of finding out about an object, therefore health knowledge is the result of finding out with all the senses about health [36]. Patients with a good level of knowledge generally have better adherence [37,38]. This is because these patients understand more about how to treat hypertension and the dangers if not routinely treated [37]. Patients with more knowledge can also discuss with health workers to determine the most suitable treatment method [38–40]. Similar to knowledge, there is a significant relationship between patient attitudes and adherence to hypertension treatment [41]. This is because attitude statements show an individual's tendency to act [42]. Both attitude and duration of illness can interact to influence adherence. Patients who are sick longer generally gain more experience so that they have a positive attitude [31]. In addition, patients who were ill for longer were found to have a good doctor-patient relationship and have greater confidence in the doctor's advice [31]. Patients with long-standing hypertension are more prone to complications, thus adding to the patient's consideration to continue to comply to avoid complications [43]. This research has several drawbacks. First, the number of hypertensive patients participating in this study is still limited, this is because the population of hypertensive patients is limited and the public's willingness to be interviewed is quite low. Second, there are still many factors that have not been identified, such as the economy, distance to health access, availability of companions, and places to buy medicines. Third, the questionnaire used in this study was in the form of a closed questionnaire. This resulted in not conducting in-depth interviews for every answer regarding the factors that influence compliance. In-depth interviews are expected to help identify the reasons for their decision.

Conclusion

Length of hypertension illness, knowledge of hypertension treatment, and attitudes regarding hypertension treatment affect adherence to hypertension treatment in hypertensive patients in Turirejo Village. This research supports an increase in service and assistance for cadres, especially for the elderly, most of

whom are hypertensive patients. Further research by including variables such as economy, distance to health access, presence of companions, and places of purchase of drugs accompanied by in-depth interviews with open questionnaires is needed to validate the results we are doing.

Abbreviation

MMAS-8: Morisky Medication Adherence Scale-8; OR: Odds Ratio

Declaration

Acknowledgment

We acknowledged the contribution of the Turirejo Village Government and Health Cadre in providing the demographical data and access for conducting this study.

Funding

The authors received no financial support for their research, authorship, and/or publication of this article.

Availability of data and materials

Data will be available by emailing visuddho-2018@fk.unair.ac.id

Authors' contributions

Visuddho Visuddho and Putu Astiswari Permata Kurniawan participated in conceptualization, methodology, formal analysis, project administration, writing, and original drafting. Salsabilla Firdausi Rafidah, Ramadhani Rizki Zamzam, Ezrin Syariman Bin Roslan, Muhammad Raihan Habibi, and Muhammad Gazi Yasargil participated in conceptualization, data curation, writing, and original drafting. Atika, Atni Supratiwi participated in conceptualization, methodology, writing, review, and editing.

Ethics approval and consent to participate

We conducted the research following the Declaration of Helsinki. The protocol was granted by the Health Research Ethical Committee of the Faculty of Medicine Airlangga University, Indonesia (51/EC/KEPK/FKUA/2023).

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

Open Access

This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article unless otherwise stated.

Author Details

¹Medical Program, Faculty of Medicine Universitas Airlangga, Surabaya, Indonesia.

²Department of Public Health, Faculty of Medicine Universitas Airlangga, Surabaya, Indonesia.

³UPT, Latkesmas Murnajati Lawang, Malang, Indonesia.

Article Info

Received: 20 March 2023

Accepted: 17 May 2023

Published: 26 May 2023

References

1. Ministry of Health of the Republic of Indonesia. Pedoman Teknis Penemuan dan Tatalaksana Hipertensi. Jakarta: 2013.
2. World Health Organization. Hypertension 2021. <https://www.who.int/news-room/fact-sheets/detail/hypertension> (accessed March 5, 2023).
3. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI. Riset Kesehatan Dasar 2018. Jakarta: Lembaga Penerbit Bdan Penelitian dan Pengembangan Kesehatan (LPB); 2019.
4. Apriyanti W, Ramatillah DL. Evaluasi Tingkat Kepatuhan Penggunaan Antihipertensi pada Pasien Hipertensi Menggunakan Kuesioner MMAS-8 di Penang Malaysia. *Social Clinical Pharmacy Indonesia Journal*. 2020;5(1):23–33. <https://doi.org/10.52447/scpij.v5i1.1863>
5. Pan J, Wu L, Wang H, Lei T, Hu B, Xue X, et al. Determinants of hypertension treatment adherence among a Chinese population using the therapeutic adherence scale for hypertensive patients. *Medicine*. 2019;98(27):1–7. <https://doi.org/10.1097/MD.00000000000016116>
6. Viera AJ, Cohen LW, Mitchell CM, Sloane PD. High blood pressure knowledge among primary care patients with known hypertension: A North Carolina Family Medicine Research Network (NC-FM-RN) Study. *Journal of the American Board of Family Medicine*. 2008;21(4):300–8. <https://doi.org/10.3122/jabfm.2008.04.070254>
7. Paczkowska A, Hoffmann K, Kus K, Kopciuch D, Zaprutko T, Ratajczak P, et al. Impact of patient knowledge on hypertension treatment adherence and efficacy: A single-centre study in Poland. *Int J Med Sci*. 2021;18(3):852–60. <https://doi.org/10.7150/ijms.48139>
8. Choudhry NK, Kronish IM, Vongpatanasin W, Ferdinand KC, Pavlik VN, Egan BM, et al. Medication adherence and blood pressure control: A scientific statement from the American heart association. *Hypertension*. 2022;79(1):E1–14. <https://doi.org/10.1161/HYP.0000000000000203>
9. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive Validity of a Medication Adherence Measure in an Outpatient Setting. *The Journal of Clinical Hypertension*. 2008;10(5):348–54. <https://doi.org/10.1111/j.1751-7176.2008.07572.x>
10. Rosyida L, Priyandani Y, Sulistyarini A, Nita Y. Kepatuhan Pasien pada Penggunaan Obat Antidiabetes dengan Metode Pill-Count dan MMAS-8 di Puskesmas Kedurus Surabaya. *Jurnal Farmasi Komunitas*. 2015;2(2):36–41.
11. Malang Regency Government Health Office. Profil Kesehatan Desa Turirejo Tahun 2022. Malang: 2023.
12. Imanda M, Darliana D, Ahyana. Kepatuhan Minum Obat Pasien Hipertensi. *Jurnal Ilmiah Mahasiswa Fakultas Keperawatan*. 2021;5(1):187–96.
13. Vrijens B, Antoniou S, Burnier M, De la Sierra A, Volpe M. Current situation of medication adherence in hypertension. *Front Pharmacol*. 2017; 8:1–8. <https://doi.org/10.3389/fphar.2017.00100>.
14. Burnier M, Egan BM. Adherence in Hypertension: A Review of Prevalence, Risk Factors, Impact, and Management. *Circ Res*. 2019;124(7):1124–40. <https://doi.org/10.1161/CIRCRESAHA.118.313220>.
15. Hill MN, Miller NH, Degeest S. Adherence and persistence with taking medication to control high blood pressure. *Journal of the*

- American Society of Hypertension. 2011;5(1):56–63. <https://doi.org/10.1016/j.jash.2011.01.001>.
16. Burnier M. Drug adherence in hypertension. *Pharmacol Res.* 2017;125:142–9. https://doi.org/10.1007/978-3-319-15961-4_43.
 17. Haskard Zolnieriek KB, Dimatteo MR. Physician communication and patient adherence to treatment: A meta-analysis. *Med Care.* 2009;47(8):826–34. <https://doi.org/10.1097/MLR.0b013e31819a5acc>.
 18. Bakurawang IN, Agustine U. Kepatuhan Minum Obat pada Penderita Hipertensi yang Berobat ke Balai Pengobatan Yayasan Pelayanan Kasih A dan A Rahmat Waingapu. *Jurnal Kesehatan Primer.* 2016;1(2):114–22. <https://doi.org/10.5281/jkp.v1i2.74>.
 19. Algabbani FM, Algabbani AM. Treatment adherence among patients with hypertension: Findings from a cross-sectional study. *Clin Hypertens.* 2020;26(1):1–9. <https://doi.org/10.1186/s40885-020-00151-1>.
 20. Natasya DE. Pengaruh Pemberian Edukasi Kesehatan pada Kader Posyandu Lansia terhadap Peran Kader dan Kepatuhan Minum Obat Pasien Hipertensi yang Mengikuti Posyandu Lansia. Universitas Brawijaya, 2018.
 21. Janz NK, Becker MH. The Health Belief Model: A Decade Later. *Health Educ Q.* 1984;11(1):1–47. <https://doi.org/10.1177/109019818401100101>.
 22. Jackevicius CA, Mamdani M, Tu J V. Adherence With Statin Therapy in Elderly Patients With and Without Acute Coronary Syndromes. *J Am Med Assoc.* 2002;288(4):462–7. <https://doi.org/10.1001/jama.288.4.462>.
 23. Lam P, Lum C, Leung M. Drug non-adherence and associated risk factors among Chinese geriatric patients in Hong Kong. *Hong Kong Medical Journal.* 2007;13(4):284–92.
 24. Lee Sunmin, Jeong K-H, Lee Seoyoon, Park H. A Study on Types of Medication Adherence in Hypertension among Older Patients and Influencing Factors. *Healthcare.* 2022;10(11):2322. <https://doi.org/10.3390/healthcare10112322>.
 25. Indriana N, Swandari MTK, Pertiwi Y. Hubungan Tingkat Pengetahuan Dengan Kepatuhan Minum Obat Pada Pasien Hipertensi Di Rumah Sakit X Cilacap. *Jurnal Ilmiah JOPHUS: Journal Of Pharmacy UMUS.* 2020;2(1):1–10. <https://doi.org/10.46772/jophus.v2i01.266>.
 26. Sihombing TFH, Artini IGA. Tingkat Pengetahuan Mengenai Hipertensi dan Pola Kepatuhan Pengobatan pada Penderita Hipertensi yang Berkunjung ke Tenda Tensi Tim Bantuan Medis Janar Dūta Fakultas Kedokteran Universitas Udayana. *E-Jurnal Medika.* 2017;6(12):164–9.
 27. Makatindu MG, Nurmansyah M, Bidjuni H. Identifikasi Faktor Pendukung yang Berhubungan dengan Minum Obat pada Penderita Hiperensi di Puskesmas Tatelu Kabupaten Minahasa Utara. *Jurnal Keperawatan.* 2021;9(1):19–26. <https://doi.org/10.35790/jkp.v9i1.36765>.
 28. Liberty IA, Pariyana, Roflin E, Waris L. Determinan Kepatuhan Berobat Pasien Hipertensi Pada Fasilitas Kesehatan Tingkat I. *Jurnal Penelitian Dan Pengembangan Pelayanan Kesehatan.* 2017; 1:58–65. <https://doi.org/10.22435/jpppk.v1i1.428>.
 29. Susilo AI, Meinisasti R. Analisa Praktik Swamedikasi di Kota Bengkulu. *Journal of Nursing and Public Health.* 2022;10(2):242–54. <https://doi.org/10.37676/jnph.v10i2.3203>.
 30. Suryani A, Hasanbasri M, Priyatni N. Pelaksanaan Kebijakan Obat Generik di Apotek Kabupaten Pelalawan Provinsi Riau. *Jurnal Kebijakan Kesehatan Indonesia.* 2013;2(2):53–60.
 31. Lee GKY, Wang HXH, Liu KQL, Cheung Y, Morisky DE, Wong MCS. Determinants of Medication Adherence to Antihypertensive Medications among a Chinese Population Using Morisky Medication Adherence Scale. *PLoS One.* 2013;8(4). <https://doi.org/10.1371/journal.pone.0062775>.
 32. Boratas S, Kilic HF. Evaluation of medication adherence in hypertensive patients and influential factors. *Pak J Med Sci.* 2018;34(4):959–63. <https://doi.org/10.12669/pjms.344.14994>.
 33. Uchmanowicz B, Chudiak A, Uchmanowicz I, Rosińczuk J, Froelicher ES. Factors influencing adherence to treatment in older adults with hypertension. *Clin Interv Aging.* 2018;13:2425–41. <https://doi.org/10.2147/CIA.S182881>.
 34. Listiana D, Effendi S, Saputra YE. Faktor-faktor yang Berhubungan dengan Kepatuhan Penderita Hipertensi dalam Menjalani Pengobatan di Puskesmas Karang Dapo Kabupaten Muratara. *Journal of Nursing and Public Health.* 2020;8(1):11–22. <https://doi.org/10.37676/jnph.v8i1.1005>.
 35. Ihwatu S, Ginandjar P, Saraswati LD, Udiyono A. Faktor-faktor yang Berhubungan dengan Kepatuhan Pengobatan pada Penderita Hipertensi di Wilayah Kerja Puskesmas Pudukpayung Kota Semarang Tahun 2019. *Jurnal Kesehatan Masyarakat.* 2020;8(3):352–59. <https://doi.org/10.14710/jkm.v8i3.26396>.
 36. Octaviana DR, Ramadhani RA. Hakikat Manusia: Pengetahuan (Knowledge), Ilmu Pengetahuan (Sains), Filsafat Dan Agama. *Jurnal Tawadhu.* 2021;5(2):143–59. <https://doi.org/10.52802/twd.v5i2.227>.
 37. Dilianty OM, Sianturi SR, Marlina PW. Peningkatan Kepatuhan Berobat Melalui Edukasi Bagi Penderita Hipertensi di Kabupaten Flores Timur. *Jurnal Ilmiah Kesehatan Keperawatan.* 2019;15(2):55–63. <https://doi.org/10.26753/jikk.v15i2.305>.
 38. Wulansari J, Ichsan B, Usdiana D. Hubungan Pengetahuan Tentang Hipertensi dengan Pengendalian Tekanan Darah pada Pasien Hipertensi di Poliklinik Penyakit Dalam RSUD Dr.Moewardi Surakarta. *Biomedika.* 2013;5(1):17–22. <https://doi.org/10.23917/biomedika.v5i1.271>.
 39. Nurhanani R, Susanto HS, Udiyono A. Hubungan Faktor Pengetahuan dengan Tingkat Kepatuhan Minum Obat Antihipertensi (Studi Pada Pasien Hipertensi Essential di Wilayah Kerja Puskesmas Bandarharjo Kota Semarang). *Jurnal Kesehatan Masyarakat.* 2020;8(1):114–21. <https://doi.org/10.14710/jkm.v8i1.25932>.
 40. Padaunan E, Pitoy FF, Wongkar GH. Pengetahuan Penderita Hipertensi Tentang Penyakitnya terhadap Kepatuhan Obat. *Jurnal Skolastik Keperawatan.* 2022;8(1):10–8. <https://doi.org/10.35974/jsk.v8i1.2847>.
 41. Tambunan A. Hubungan Pengetahuan dan Sikap terhadap Kepatuhan Pasien TBC di UPT Puskesmas Belawan. *Institut Kesehatan Helvetia,* 2019.
 42. Notoatmodjo S. *Promosi Kesehatan dan Perilaku Kesehatan.* Jakarta: PT. Rineka Cipta; 2012.
 43. Oh JS, Lee CH, Park J il, Park HK, Hwang JK. Hypertension-Mediated Organ Damage and Long-term Cardiovascular Outcomes in Asian Hypertensive Patients without Prior Cardiovascular Disease. *J Korean Med Sci.* 2020;35(48):1–11. <https://doi.org/10.3346/jkms.2020.35.e400>