

## Effectiveness of Amlodipine and Captopril Drug Therapy in Reducing Blood Pressure in Hypertensive Patients

Arifani Siswidiarsari<sup>1\*</sup>, Yanti Purnama Sari<sup>2</sup>

<sup>1</sup>Kadiri University, <sup>2</sup>Indonesian Islamic University

**Corresponding Author** Arifani Siswidiarsari [arifani@unik-kediri.ac.id](mailto:arifani@unik-kediri.ac.id)

---

### ARTICLE INFO

**Keywords:** Amlodipine, Blood Pressure, Captopril

*Received : 10 July*

*Revised : 12 August*

*Accepted : 30 September*

©2025 Siswidiarsari, Sari:  
This is an open-access article  
distributed under the terms of  
the [Creative Commons  
Attribusi 4.0 Internasional](https://creativecommons.org/licenses/by/4.0/).



### ABSTRACT

The incidence of hypertension in Indonesia continues to increase significantly from year to year. Hypertension treatment aims to prevent and reduce mortality rates due to hypertension. The purpose of this study was to determine the effectiveness of amlodipine and captopril drug therapy in reducing blood pressure. This study was an observational study with a cross-sectional approach using purposive sampling. Data collection involved reviewing the medical records of hypertensive patients at the Bangil Community Health Center with a total of 48 respondents. Data analysis used statistical tests, namely the Mann-Whitney test. The demographic data showed that 25 people (52.1%) were female, 24 people (50%) were aged 36-45 years, 17 people (35.4%) had high school education, and 37 people (77.1%) had comorbidities. Blood pressure using amlodipine obtained an average initial systolic blood pressure of 178.95 mmHg and final systolic 138.36 mmHg, an average initial diastolic blood pressure of 101.36 mmHg and final diastolic 85.05 mmHg. Meanwhile, captopril obtained an average initial systolic blood pressure of 166.62 mmHg and final systolic 136.46 mmHg, an average initial diastolic blood pressure of 95.08 mmHg and final diastolic 83.81 mmHg. The results of the analysis of the effectiveness of amlodipine and captopril drug therapy showed no significant difference with a p value of 0.311

---

## **INTRODUCTION**

The incidence of hypertension in Indonesia continues to increase significantly from year to year. Hypertension treatment aims to prevent and reduce mortality rates due to hypertension. Hypertension treatment can be divided into non-pharmacological and pharmacological approaches. Non-pharmacological therapy for hypertension can include weight loss if overweight, increased physical activity, reduced sodium intake, and decreased caffeine and alcohol consumption. Pharmacological therapy is a treatment effort to control blood pressure in hypertensive patients, which can be initiated at primary health care facilities such as community health centers or clinics (Rejo dan Nurhayati, 2020).

The prevalence of hypertension in Indonesia in 2013, East Java was ranked 6th. The number of hypertension cases in East Java Province in 2015 was 685.994 residents and experienced a fairly high increase in 2016 of 935.736 residents, with a proportion of men of 13.78% (387.913 residents) and women of 13.25% (547.823 residents) (Agustina et al, 2018).

Hypertension is a degenerative disease that requires long-term treatment or therapy, even lifelong. Captopril, an antihypertensive drug from the Angiotensin Converting Enzyme Inhibitor (ACEI) class, is a first-line therapy for treating hypertension in chronic kidney failure. However, other studies have shown that amlodipine, a Calcium Channel Blocker (CCB), is very effective in lowering blood pressure in hemodialysis patients or those on hypertension caused by volume overload, as occurs in patients with chronic kidney failure (Nasution et al, 2020).

The effectiveness of amlodipine and captopril drug therapy in lowering blood pressure in hypertensive patients is a key aspect of this study. This study aims to demonstrate the therapeutic effects of amlodipine and captopril, either in single doses or in combination. Based on the literature, the effectiveness of these drugs can be determined by measuring blood pressure. If a patient experiences a decrease in blood pressure, this indicates an increase in the effectiveness of the drug (Loloan et al., 2019).

According to research conducted by Kristanti (2015), regarding the comparison of therapeutic effectiveness and side effects of antihypertensive drugs, it was stated that captopril was effective in lowering blood pressure in patients reaching 91% and amlodipine was effective reaching 100%. The percentage of side effects due to captopril use was 36% and amlodipine 45%. It can be seen that amlodipine has a higher effectiveness compared to captopril in lowering blood pressure, but the side effects caused by amlodipine are greater than captopril. The study also showed that the effectiveness of captopril is not much different from amlodipine in lowering blood pressure. The results of the study are the same as those conducted by Wirawan (2020) and Kamri et al. (2021), that both drugs, amlodipine and captopril, have the same therapeutic effectiveness, but with different side effects. The study explained that the side effects of amlodipine can be tolerated, while the side effects of captopril cannot be tolerated because it experiences a dry cough that interferes with daily activities.

Based on these data, researchers are interested in conducting research on the effectiveness of Amlodipine and Captopril drug therapy in reducing blood pressure in hypertensive patients.

## LITERATURE REVIEW

According to research conducted by Wahyudi (2022), women are 27.5% more likely to suffer from hypertension than men, who are 5.8%. The risk of hypertension increases in women after menopause, particularly at the age of 45 and above. Women who have not yet gone through menopause are protected by the hormone estrogen which plays a role in increasing High Density Lipoprotein (HDL) levels. High HDL levels are a protective factor in preventing the process of increasing blood pressure in premenopausal age. The protective effect of estrogen is considered to explain the existence of immunity in premenopausal women to prevent high blood pressure. The age of menopause is more susceptible to experience it because at the age of 45-55 years the production of the hormone estrogen begins to decline drastically (Tumanduk et al, 2019).

Herziana's (2017) research at the Basuki Rahmat Health Center in Palembang, namely respondents who are at greater risk of experiencing hypertension are those aged >56 years. The results of this study are in line with research by Tamamilang (2019) which reported a significant relationship between age and the incidence of hypertension at the Paceda Community Health Center in Bitung City ( $p=0.003$ ).

Musfirah's (2019) research identified educational levels as having no education (6%), elementary school (28%), middle school (34%), high school (28%), and college (14%). This suggests that education level is not a predictor of reduced hypertension risk but rather depends on access to information and public awareness of healthy lifestyles.

Padungge's (2020) showed that almost the majority of respondents, amounting to 87 people (87%), experienced hypertension without comorbidities (heart disease, stroke, diabetes mellitus and other disease complications), which means that most respondents were aware of a healthy lifestyle but were unable to control their blood pressure well.

Hypertension increases with age due to structural changes in large blood vessels, narrowing the lumen and stiffening the walls, resulting in increased systolic blood pressure (Suprayitno and Iswandari, 2017). This aging process can lead to physical, mental, social, economic, and psychological problems. Physical changes affect various body systems, including the cardiovascular system. Health problems resulting from aging often affect the cardiovascular system, which is a degenerative process, including hypertension (Isnaini and Purwito, 2019).

Based on the research results of Andhyka et al. (2019), it was stated that the blood pressure of respondents given amlodipine for a 30-day period decreased by an average of 101.93 mmHg in end-systolic blood pressure and an average of 86.83 mmHg in end-diastolic blood pressure. Amlodipine works by inhibiting the entry of calcium ions into blood vessel smooth muscle cells through calcium channels, resulting in vasodilation. Meanwhile, patients given captopril saw an average decrease in end-systolic blood pressure of 135.87 mmHg and an

average end-diastolic blood pressure of 84.74 mmHg. Captopril is an ACE inhibitor that reduces the formation of angiotensin II, resulting in a decrease in blood pressure.

Based on the research results of Kamri et al. (2021), a comparison of the therapeutic effectiveness of amlodipine with captopril at both low and high doses showed that the amlodipine group had better therapeutic effectiveness than the captopril group. These results align with research conducted by Wirawan (2020) and Kristanti (2015), which found that amlodipine was the first-line antihypertensive drug with greater effectiveness, while captopril was second.

## **METHODOLOGY**

This study was an observational study with a prospective cross-sectional approach. Secondary data were collected from medical records of hypertension patients in 2023. Inclusion criteria were patients diagnosed with hypertension undergoing outpatient care at the Bangil Community Health Center, adults over 18 years of age, and patients taking amlodipine and single-dose captopril. Exclusion criteria were illegible medical records, patients referred to other facilities, and deceased patients. This study was conducted at the Bangil Community Health Center in September 2023. A sample of 48 patients was used. The study analysis was performed using the Mann-Whitney test

## **RESEARCH RESULT**

### **Demographics of Hypertension Patients**

Based on the data obtained, the majority of the gender was female, 25 people (52.1%), aged 36-45 years 24 people (50%), high school education 17 people (34.4%), occupation farmers 15 people (31.3%) and there were comorbidities 37 people (77.1%).

Table 1. Deographic Data of Hypertension Patients

| <b>Demographic Data</b> | <b>f</b> | <b>%</b> |
|-------------------------|----------|----------|
| <b>Gender</b>           |          |          |
| Man                     | 23       | 47.9     |
| Woman                   | 25       | 52.1     |
| <b>Age</b>              |          |          |
| 26-35 year              | 10       | 20.8     |
| 36-45 year              | 24       | 50       |
| 46-55 year              | 14       | 29.2     |
| <b>Education</b>        |          |          |
| No School               | 4        | 8.3      |
| SD                      | 7        | 14.6     |
| SMP                     | 9        | 18.8     |
| SMA                     | 17       | 35.4     |
| PT                      | 11       | 22.9     |
| <b>Work</b>             |          |          |
| IRT                     | 10       | 20.8     |
| Farmer                  | 15       | 31.3     |
| Trader                  | 9        | 18.8     |
| Private Employees       | 4        | 8.3      |
| PNS                     | 7        | 14.6     |
| Other                   | 3        | 6.3      |
| <b>Comorbidities</b>    |          |          |
| There is                | 37       | 77.1     |
| There isn't any         | 11       | 22.9     |

### Blood Pressure of Hypertension Patients

Based on the data obtained, it shows that in patients using amlodipine, the average initial systolic blood pressure was 178.95 mmHg and the average final systolic blood pressure was 138.36 mmHg. The average initial diastolic blood pressure was 101.36 mmHg and the average final diastolic blood pressure was 85.05 mmHg. Meanwhile, in patients using captopril, the average initial systolic blood pressure was 166.62 mmHg and the average final systolic blood pressure was 136.46 mmHg. The average initial diastolic blood pressure was 95.08 mmHg and the average final diastolic blood pressure was 83.81 mmHg.

Table 2. Blood Pressure Data of Hypertension Patients

| Types of Drugs | Blood Pressure  | N  | Mean   | SD    |
|----------------|-----------------|----|--------|-------|
| Amlodipine     | Early Systolic  | 22 | 178.95 | 17855 |
|                | End Systolic    | 22 | 138.36 | 18028 |
|                | Early Diastolic | 22 | 101.36 | 9599  |
|                | End Diastolic   | 22 | 85.05  | 6336  |
| Captopril      | Early Systolic  | 26 | 166.62 | 19135 |
|                | End Systolic    | 26 | 136.46 | 16839 |
|                | Early Diastolic | 26 | 95.08  | 11285 |
|                | End Diastolic   | 26 | 83.81  | 5261  |

### Effectiveness of Hypertension Drug Therapy

Based on the data obtained, it can be seen that of the 48 patients, 32 people (66.7%) had controlled therapy effectiveness (<140/90 mmHg) and 16 people (33.3%) had uncontrolled therapy effectiveness (>140/90 mmHg). In the use of captopril, the results showed that 19 people (73.1%) had controlled therapy effectiveness (<140/90 mmHg) and 7 people (26.9%) had uncontrolled therapy effectiveness (>140/90 mmHg). Meanwhile, the use of amlodipine showed that 13 people (59.1%) had controlled therapy effectiveness (<140/90 mmHg) and 9 people (40.9%) had uncontrolled therapy effectiveness (>140/90 mmHg).

Table 3. Effectiveness Data for Hypertension Drug Therapy

| Effectiveness  | Amlodipine |            | Captopril |            | Sig.  |
|----------------|------------|------------|-----------|------------|-------|
|                | f          | %          | f         | %          |       |
| Controlled     | 13         | 59.1       | 19        | 73.1       | 0.311 |
| Not Controlled | 9          | 40.9       | 7         | 26.9       |       |
| <b>Total</b>   | <b>22</b>  | <b>100</b> | <b>26</b> | <b>100</b> |       |

The comparative analysis of the effectiveness of amlodipine and captopril hypertension drug therapy on reducing blood pressure in patients using the non-parametric Mann-Whitney statistical test obtained a significance value of 0.311 or  $p > 0.05$ . These results indicate there is no significant difference between amlodipine and captopril therapy in reducing blood pressure, or it can be said that amlodipine and captopril therapy have the same chance of reducing blood pressure.

## DISCUSSION

A person is diagnosed with hypertension, or high blood pressure, when their systolic blood pressure (SBP) is  $\geq 140$  mmHg and/or their diastolic blood pressure (DBP) is  $\geq 90$  mmHg after repeated blood pressure checks. This measurement result applies to all individuals or patients aged 18+. Hypertension, or high blood pressure, is a condition in which blood pressure rises above the normal threshold of 120/80 mmHg (Telaumbanua & Rahayu, 2021).

Hypertension is divided into two types based on its cause: primary (essential) hypertension and secondary hypertension. Primary hypertension occurs frequently in the adult population, between 90% and 95%. Primary hypertension cannot be cured, but it can be controlled with appropriate therapy. Factors thought to be associated with the development of primary hypertension, a form of high blood pressure that tends to develop gradually over many years, include genetics, gender, age, diet, weight, and lifestyle. Secondary hypertension is characterized by elevated blood pressure and a specific cause. The prevalence of secondary hypertension is less than 10%. Common causes of secondary hypertension are underlying diseases or the use of certain medications. Factors contributing to secondary hypertension include oral contraceptive use, coarctation of the aorta, neurogenic factors (brain tumors, encephalitis, psychiatric disorders), pregnancy, increased intravascular volume, burns, and stress. Secondary hypertension can also be acute, indicating that there is a change in cardiac output (Telaumbanua & Rahayu, 2021).

According to PERHI (2019), a pharmacotherapy algorithm has been developed to provide practical recommendations for the treatment of hypertension. Some of the main recommendations are: a). Initiate treatment in most patients with a combination of two drugs. If possible in the form of SPC, to improve patient compliance; b). The combination of two drugs that is often used is a RAS blocker (Renin-angiotensin system blocker), namely ACEi or ARB, with CCB or diuretic; c). The combination of beta blockers with diuretics or other drugs is recommended if there are specific indications, such as angina, heart failure and for heart rate control; d). Consider monotherapy for patients with stage 1 hypertension with low risk (SBP  $< 150$  mmHg), patients with normal-high blood pressure and very high risk, very elderly ( $\geq 80$  years) or frail patients; e). Use of a triple drug combination consisting of a RAS blocker (ACEi or ARB), CCB, and diuretic if BP is not controlled by the combination of two drugs; f). Addition of spironolactone for the treatment of resistant hypertension, unless there are contraindications; g). Addition of other classes of drugs in certain cases if BP is not controlled with the combination of the above classes of drugs; h). The combination of two RA inhibitors is not recommended.

Amlodipine is an antihypertensive drug used to treat hypertension. Amlodipine is included in the antihypertensive drugs used as a first-line treatment. Amlodipine is classified as a dihydropyridine calcium channel blocker (CCB) (PERHI, 2019). Calcium channel blockers (CCBs) work to reduce myocardial oxygen demand by decreasing peripheral vascular resistance and lowering blood pressure. In addition, CCBs will also increase myocardial oxygen

supply through coronary vasodilation (Soenarta et al., 2015). Amlodipine's antihypertensive mechanism is by directly relaxing blood vessel smooth muscle. Amlodipine works slowly but effectively as an antihypertensive that can last up to 24 hours (long-acting), so it is sufficient to use it once a day. Amlodipine is a first-line treatment for hypertension and can be used to control blood pressure in most hypertensive patients. Examples of dihydropyridine CCB drugs are amlodipine, felodipine, nifedipine, and lercanidipine (Aryzki et al., 2018).

Angiotensin Converting Enzyme Inhibitor (ACEI) drugs act as ACE inhibitors in converting angiotensin I to angiotensin II, so that angiotensin II is not formed and the vasoconstriction effect does not occur. This inhibition process causes vasodilation and decreased aldosterone secretion. Vasodilation has an impact on lowering blood pressure, while reduced aldosterone has an impact on increased water and sodium reabsorption in the kidneys, as well as potassium retention. Side effects that occur are cough, skin rash, hyperkalemia, hepatotoxicity, glycosuria and proteinuria are rare side effects. Examples of the ACEI group are captopril, enalapril and lisinopril (NCBI, 2021).

## CONCLUSIONS AND RECOMENDATIONS

The results showed that there was no significant difference between the use of Amlodipine and captopril drug therapy on reducing blood pressure in hypertensive patients with a p value of 0.311.

## REFERENCES

- Admin YA, Oktianti D, Dyahariesti n. Tingkat Kepatuhan Minum Obat Antihipertensi pada Pasien Hipertensi Tanpa Penyakit Penyerta di Puskesmas Sumowono. *Journal of Holistics and Health Science*. 2021;2(2):78–84.
- Agustina W, Oktafirnanda Y, Wardiah W. Faktor Risiko yang Berhubungan dengan Kejadian Hipertensi pada Wanita Usia Reproduksi di Wilayah Kerja Puskesmas Langsa Lama Kota Langsa. *Jurnal Bidan Komunitas*. 2018;1(1):48–58.
- Andhyka I, Sidrotullah M, Elvvi E. Profil Efektivitas Obat Hipertensi Captopril dan Amlodipin pada Pasien Hipertensi Rawat Jalan di Wilayah Kerja Puskesmas Selaparang Periode Juni Tahun 2017. 2017;7(1):5–9.
- Aryzki, S., Aisyah, N., Hutami, H., & Wahyusari, B. Evaluasi Rasionalitas Pengobatan Hipertensi Di Puskesmas Pelambuan Banjar Masin Tahun 2017. *Jurnal Ilmiah Manuntung*. 2018; 4(2), 119–128. <https://doi.org/10.51352/JIM.V4I2.191>
- Herziana H. Faktor Resiko Kejadian Penyakit Hipertensi di Puskesmas Basuki Rahmat Palembang. *Jurnal Kesmas Jambi (JKMJ)*. 2017;1(1):31–9.

- Isnaini N, Purwito D. Edukasi Pengetahuan Hipertensi dan Penatalaksanaan Warga Aisyiah Desa Karang Talun Kidul. Pengembangan Sumberdaya Maju Masyarakat. 2019;2(3):117-22.
- Kamri AM, Kosman R, Rahayu D. Analisis Efektivitas Biaya Penggunaan Amlodipin Dibandingkan Kaptopril pada Pasien Hipertensi di RSUD Majene. Jurnal Ilmiah Ibnu Sina. 2021;6(2):262-71.
- Kristanti P. Efektifitas dan Efek Samping Penggunaan Obat Antihipertensi pada Pasien Hipertensi di Puskesmas Kalirungkut Surabaya. Jurnal Ilmiah Mahasiswa Universitas Surabaya. 2015;4(2):1-13.
- Laloan MMC, Tiwow GAR, Palandi RR, Tumbel SL. Analisis Efektivitas Biaya Terapi Antihipertensi Kombinasi Amlodipin Bisoprolol Dibandingkan Kombinasi Amlodipin-Captopril pada Pasien Rawat Inap di Rumah Sakit Gunung Maria Tomohon. Biofarmasetikal Tropis. 2019;2(2):85-9.
- Nasution SH, Syarif S, Musyabiq S. Stage 5 Based on Determinants of Age, Gender, and Diagnosis of Etiology in Indonesia in 2018. JK Unila. 2020;4(2):152-60.
- PERHI. Konsensus Penatalaksanaan Hipertensi. Indonesian Society Hipertensi Indonesia. 2019;1-90.
- Podungge Y. Hubungan Umur dan Pendidikan dengan Hipertensi pada Menopause. Gorontalo Journal of Public Health. 2020;3(2):154-61.
- Puchem NCBI. Amlodipine. National Library of Medicine NCBI. 2021. <https://pubchem.ncbi.nlm.nih.gov/compound/Amlodipine>
- Rejo R, Nurhayati I. Hubungan Tingkat Pengetahuan Keluarga Tentang Hipertensi dengan Klasifikasi Hipertensi. Media Publikasi Penelitian. 2020;18(2):72-80.
- Supriyanto W, Iswandari R. Kecenderungan Sivitas Akademika dalam Memilih Sumber Referensi untuk Penyusunan Karya Tulis Ilmiah di Perguruan Tinggi. Berkala Ilmu Perpustakaan dan Informasi. 2017;13(1):79-85.
- Telaumbanua, A. C., & Rahayu, Y. Penyuluhan Dan Edukasi Tentang Penyakit Hipertensi. Jurnal Abdimas Saintika. 2021; 3(1), 119.
- Tumanduk WM, Nelwan JE, Asrifuddin A. Faktor-Faktor Risiko Hipertensi yang Berperan di Rumah Sakit Robert Wolter Mongisidi. E-CliniC. 2019;7(2):119-25.

- Wahyudi Y. Perbedaan Kualitas Hidup Pasien di Puskesmas PaL III Kota Pontianak Yang Menggunakan Terapi Amlodipin dan Kaptopril Melalui European Quality of Life 5 Dimensions (Eq-5d) Questionnaire. JKI. 2022;10(1):41-52.
- Wirawan W. Analisis Efektivitas Biaya Terapi Penyakit Hipertensi dengan Perbandingan Terapi Obat Amlodipin dan Captopril di Rumah Sakit Wirabuana Palu. Jurnal Farmasi. 2020;5(1):1-6.