

## The Profile of Antihypertensive Drug Prescriptions and Interactions at Pindad General Hospital

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### Abstract

Hypertension is a major problem in the world. World Health Organization (WHO) reported that 1.13 billion people in the world suffer from hypertension. This study aimed to determine the profile of antihypertensive prescriptions and drug interactions in outpatient installation at Pindad General Hospital, Bandung in January 2019. This study was non-experimental observational studies with retrospective data collection. There were 381 patients with hypertension (50.13% female and 49.87% male). The most widely used antihypertensive drug is amlodipine (33.28%) and calcium channel blocker drug (34.20%). Moreover, we found 74.07% was moderate drug-drug interaction (DDI) with amlodipine and lisinopril as the most common cases (21.08%). We concluded that 15.7% prescription contain antihypertensive drugs and moderate DDI occurred in the use of amlodipine and lisinopril. DDI should get more attention due to the clinical manifestations that may occur in patients.

**Keywords :** antihypertensive, prescription percentage, drug interaction

### Introduction

Hypertension occurs when the blood pressure in the arteries is persistently elevated.<sup>1</sup> It currently becomes a major problem in the world because 1.13 billion people suffer from hypertension and only 36.8% of them take medicine.<sup>2</sup> The number of people with hypertension in the world continues to increase every year due to poor lifestyle changes, such as smoking, obesity, alcohol consumption, and inadequate physical activity.<sup>3</sup>

Along with the increase of hypertensive cases, the use of drugs is an important element in achieving the quality of health. When drug treatment is indicated, we need to choose which drug to be used first. The treatment

should be decided by the proper evidence to reduce the risk of adverse drug reaction and drug interaction.<sup>3</sup>

Hypertension remains one of the leading causes of the burden of disease in several countries. Nearly one-half of all Indonesians aged over 40 years were hypertensive but only 7% had their blood pressure adequately controlled.<sup>4,5</sup> Hypertensive cases in Indonesia reached 25.8% and the most commonly used drug is angiotensin-converting enzyme inhibitors (ACEI).<sup>6</sup>

Regarding to this finding, we aimed to determine antihypertensive prescription profile and drug interaction in outpatient installation at Pindad General Hospital.

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## Methods

This research was a retrospective observational study that conducted at Pindad General Hospital. The data were shown in tables and figures. Inclusions criteria was the prescription with antihypertensive drugs that was daily taken at peak hours at the hospital. Whereas, exclusion criteria was the prescription without antihypertensive drugs.

## Samples

Samples were prescriptions with antihypertensive drugs that entered to outpatient installation. The number of samples was calculated using the Slovin's formula to determine the minimum sample size (n), number of population (N) error tolerance limits (e). By calculation, we used 381 samples (Figure 1).

## Research Object

Research object was data taken from prescription, including drug name, number of cases, and drug-drug (DDI) interaction. DDI was analysed by interactions checker on

drugs.com and was accessed on [http://www.drugs.com/drug\\_interactions.html](http://www.drugs.com/drug_interactions.html).

## Results and Discussion

There were 1255 prescriptions with antihypertensive drugs. Of these, 381 prescriptions (49.87% female and 50.13 male) were chosen to be identified. We categorized the number of patients by age. The result is shown in Table 1.

Hypertension attacks most in the aged over 65. The risk for suffering from hypertension in populations over 55 years who previously had normal blood pressure is 90%.<sup>7</sup> Blood pressure tends to increase with age. This increase is mostly associated with structural changes, especially large artery stiffness or hardening of peripheral arteries causes decrease in elasticity and very similar to those resulting from the ageing process.<sup>8</sup> Other pathophysiological shows decreased baroreceptor sensitivity, increased responsiveness to sympathetic nervous system stimuli, altered renal and sodium

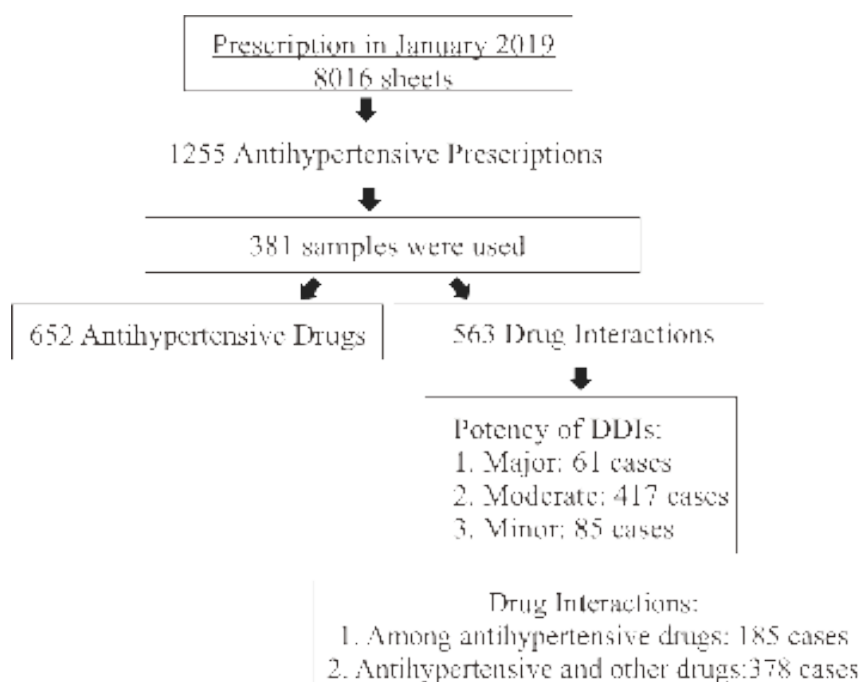


Figure 1. Flow of Calculation of Research Samples

**Table 1. Number of Patients by Age**

Age Range	Number	Percentage (%)
Toddler (aged 0-5)	0	0
Children (aged 5-11)	0	0
Early Teenager (aged 12-16)	0	0
Late Teenager (aged 17-25)	2	0.52
Early Adult (aged 26-35)	2	0.52
Late Adult (aged 36-45)	20	5.25
Early Elderly (aged 46-55)	81	21.26
Late Elderly (aged 56-65)	128	33.60
Seniors (aged over 65)	148	38.85
Total	381	100

**Table 2. Antihypertensive Drugs Classification**

Class of Drugs	Drugs	Frequency	Percentage	Total
ACE-Inhibitor	Captopril	5	0.77	15.34
	Lisinopril	90	13.80	
	Ramipril	5	0.77	
Angiotensin Receptor Blocker	Candesartan	32	4.91	8.44
	Irbesartan	16	2.45	
	Losartan	3	0.46	
	Telmisartan	4	0.61	
Alpha Blocker	Tamsulosin	34	5.21	5.21
Beta Blocker	Propanolol	6	0.92	12.88
	Bisoprolol	78	11.96	
Calcium Channel Blocker	Amlodipine	217	33.28	34.20
	Diltiazem	6	0.92	
Diuretic	Furosemide	79	12.12	23.93
	Spironolactone	77	11.81	
Total		652	100.00	100.00

metabolism and an altered renin-aldosterone relationship.<sup>9</sup> Thus, we have to carefully pay attention about this case to improve the quality life of senior age.

#### *Drugs Prescription Profile*

Joint National Committee (JNC) recommends several antihypertensive drugs, including ACE inhibitors, angiotensin receptor blockers, beta blockers, calcium channels blockers, and diuretics. The prescription profile is shown in Table 2.

Appropriate antihypertensive drug therapy is important as the prevalence of hypertension has risen dramatically these days. In our study, antihypertensive drugs were used in 652 cases. The most commonly prescribed is amlodipine (33.28%). Based on antihypertensive drug classes, the most commonly prescribed are calcium channel blockers (34.20%) followed by diuretics and beta blockers, though diuretics are the first line of medication for the management of hypertension according to the JNC VII guideline. Diuretics were

**Table 3. Drug-Drug Interactions Among Antihypertensive Drugs**

Interactions	Frequency	Percentage (%)
Amlodipine - Lisinopril	39	21.08
Bisoprolol - Spironolactone	29	15.68
Lisinopril - Spironolactone	27	14.59
Amlodipine - Bisoprolol	24	12.97
Furosemide - Lisinopril	19	10.27
Bisoprolol - Furosemide	18	9.73
Candesartan - Spironolactone	7	3.78
Amlodipine - Captopril	4	2.16
Furosemide - Tamsulosin	3	1.62
Amlodipine - Ramipril	2	1.08
Bisoprolol - Diltiazem	2	1.08
Irbesartan - Spironolactone	2	1.08
Propanolol - Spironolactone	2	1.08
Captopril - Furosemide	1	0.54
Diltiazem - Lisinopril	1	0.54
Diltiazem - Tamsulosin	1	0.54
Furosemide - Propanolol	1	0.54
Furosemide - Rapimipril	1	0.54
Losartan - Spironolactone	1	0.54
Ramipril - Spironolactone	1	0.54
Total	185	100

prescribed more often which is comparable to studies conducted in several countries including India and USA.<sup>10</sup>

#### *Drug-Drug Interactions*

There were 563 cases of DDI (Major: 61; Moderate: 417; and Minor: 85). Of these, 185 cases are drug pairs among the antihypertensive drugs (shown in table 3) and 378 cases are interaction between antihypertensive drugs with other drugs.

DDIs occur when the effect of one drug is altered by the co-administration of another drug. The alterations may result either from changes in the drug's effect independent of concentration (pharmacodynamic interaction) or from changes in the drug's concentration (pharmacokinetic interaction).

The common interacting drug pairs among the antihypertensive drugs were amlodipine/lisinopril, bisoprolol/spironolactone, lisinopril/spironolactone, and amlodipine/bisoprolol that similar to previous studies.<sup>11,12</sup> Combination treatment using antihypertensive agents of two different classes are useful and promising in controlling blood pressure in patients with hypertension.

Among the data, amlodipine and lisinopril was the highest interaction occurred in hypertensive patient prescription. Calcium channel blockers and angiotensin converting enzyme (ACE) inhibitors may cause hypotension. These drugs are often safely used together, but monitoring of the systemic blood pressure is recommended. Captopril and furosemide is moderate DDI that can cause

hypotension, that may relate to vasodilatation and relative intravascular volume depletion.<sup>13</sup>

Amlodipine and meloxicam were the common interaction between antihypertensive drugs and other drugs. This interaction was found in 93 cases (10.5%) and had moderate potency. Combination of amlodipine and meloxicam may reduce the antihypertensive effect of amlodipine. Meloxicam will inhibit kidney prostaglandin synthesis that cause blood vessel dilation and increase blood pressure.<sup>14</sup>

### Conclusion

Based on the results of this study it can be concluded that antihypertensive drugs have found in 15.7% from the total number of prescriptions. We used 381 prescriptions, Amlodipine (33.28%) was the most common drug used. Moreover, we found 74.07% DDI with moderate potency. Adverse consequences of DDI may result from either lower therapeutic effect or toxicity. DDI is usually preventable, when detected, pharmacist should determine appropriate prevention or management strategies.

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### Conflict of Interest

None declared

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