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Prescription Pattern and Costs of Angiotensin II Receptor Blockers in Hypertensive Outpatients

Nurmainah Nurmainah, Nur Anisyah
Department of Pharmacy, Faculty of Medicine, Tanjungpura University,
Pontianak, West Kalimantan, Indonesia

Abstract

Angiotensin II receptor blockers (ARBs) have been widely prescribed for primary hypertension. Nevertheless, the cost of ARBs are relatively expensive. The objective of this study was to describe prescribing pattern and the cost of ARBs in hypertensive outpatients. This study used descriptive observational method based on cross-sectional study. Data source was hypertensive outpatients medical records and prescriptions at Pemangkat General Hospital, West Kalimantan, Indonesia, during 2014-2015. The most frequently prescribed anti-hypertensive medication in 1,506 patients were ARBs. There was an increasing trend in the use of ARBs during 2014-2015 (31-38%). The most frequently prescribed ARBs were 8 mg and 18 mg of candesartan, and 80 mg of valsartan. ACE inhibitors were the least prescribed anti-hypertensive drugs (4-8%). The largest portion of anti-hypertensive drugs expenditure was spent on ARBs, both in 2014 and 2015, respectively accounted for IDR 50,493,876.00 (67%) and IDR 58,903,112.00 (79%). In conclusion, the prescribing of ARBs increased during study period and it represented the largest contributor on total expenditures of anti-hypertensive drugs.

Keywords: Angiotensin II receptor blockers, cost, hypertensive patients

Introduction

The prevalence of hypertensive patients in Indonesia is approximately 26%.[1] Uncontrolled blood pressure could lead to organ damage. Efforts for controlling hypertension include non-pharmacological and pharmacological intervention. Regular exercise, reducing salt intake, and avoiding smoking habit are non-pharmacological interventions for hypertension.[2] Based on Joint National Committee (JNC) VII, the first-line pharmacological treatment for hypertension is either thiazide diuretics or combination of thiazide diuretics with other antihypertensive drug.[3]

Angiotensin II receptor blocker (ARBs) have been increasingly prescribed worldwide, since ARBs have relatively less side effect compared to thiazide group and angiotensin converting enzymes (ACE) inhibitors.[2] Research by Bharatia *et al* showed that 70.6% of 4,725 hypertensive patients in India were treated with ARBs. In Sweden, the most commonly used ARBs were candesartan

Corresponding author: Nurmainah Nurmainah. Department of Pharmacy, Faculty of Medicine, Tanjungpura University. Pontianak, West Kalimantan, Indonesia. Email: nurmainah@pharm.untan.ac.id
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and losartan.[3,4] In the United Kingdom (UK), losartan was commonly prescribed in primary care setting.[5] ARBs are considered appropriate medication for hypertensive patients with comorbid condition, such as renal failure, myocardial infarcyion, left ventricular systolic dysfunction (LVSD), and diabetic neuropathy.[5-9] In addition, previous study showed that ARBs had better compliance and persistence rate compated to other anti-hypertensive drugs.[10,11] In term of cost, ARBs have relatively higher price compared to other anti-hypertensive drugs. Losartan and irbesartan are the most affordable ARBs.[5,11-13] These two drugs have been extensively used in primary care setting in several developed countries.[12,13]

Since the introduction of national health insurance system in Indonesia, treatment guideline for hypertension is mainly based on the national formulary. ARBs listed in national formulary are candesartan (8 mg and 16 mg), irbesartan (150 mg and 300 mg), telmisartan (40 mg and 80 mg), and valsartan (80 mg and 160 mg). National formulary is the list of recommended drugs which are selected based on evidence on safety, efficacy, and cost-effectiveness. The cost of drugs included in this list can be reimbursed in national health insurance system. Nevertheless, there is limited information regarding prescribing pattern and cost of ARBs in Indonesia. Thus, this study was aimed to describe prescribing pattern and the cost of ARB in hypertensive outpatients in Pemangkat General Hospital, West Kalimantan, Indonesia.

Methods

This study used descriptive observational method based on cross-sectional study. Data sources were hypertensive outpatients medical records and prescriptions at Pemangkat General Hospital, West Kalimantan, Indonesia during 2014-2015. The diagnosis of hypertension patients was based on ICD-10 codes. Hypertension is defined as a long-term medical state in which the blood pressure in the arteris is persistenly increased.

Inclusion criteria was hypertensive patients,

Table 1. Characteristics of Subjects

No	Characteristics of Subjects	N=1,506	
		Number of patients	Percentage (%)
1	Gender		
	a. Male	585	38.84
	b. Female	921	61.16
2	Age		
	a. <40 years old	96	6.37
	b. ≥40 years old	1,410	93.63
3	Type of anti-hypertensive		
	a. Mono-therapy	1,094	72.64
	b. Combination therapy	412	27.36

Table 2. Cost of Anti-Hypertensive Drugs in Pemangkat General Hospital during 2014-2015

No	Types of Anti-Hypertensive Drugs	2014 (N=2,102 drugs)		2015 (N=2,671 drugs)	
		Cost (Rp)	Percentage (%)	Cost (Rp)	Percentage (%)
1	ARBs	50,493,876.00	67	58,903,112.00	79
2	ACEIs	3,148,550.00	4	874,350.00	1
3	CCBs	11,948,175.00	16	9,691,855.00	13
4	BBs	8,293,295.00	11	3,436,740.00	5
5	Diuretics	1,296,250.00	2	1,183,000.00	2

aged >18 years. From each medical records, the following information was extracted; demographic characteristics, type of anti-hypertensive drug, and its respective cost. Descriptive analysis was performed to determine the trend of prescribing pattern and cost distribution. Analysis was perfomed using Microsoft Excel.

Results and Discussions

Characteristics of subjects

During study period, the number of hypertensive patients who received anti-hypertensive drugs were 1,506 patients. As can be seen in the Table 1, most of the patients were female (61.16%), aged ≥ 40 years old. 72.64% of the patients were given monotherapy anti-hypertensive drug. The total number of the prescriptions were 3,543, with 4,773 anti-hypertensive drugs. The number of prescriptions in 2014 were 1,626 prescription (45.90%) with 2,102 anti-hypertensive drugs. In 2015, there were 1,917 prescription (54.10%) with 2,671 anti-hypertensive drugs.

The most frequently used anti-hypertensive medication in 1,506 patients were ARBs. There was an increasing trend in the use of

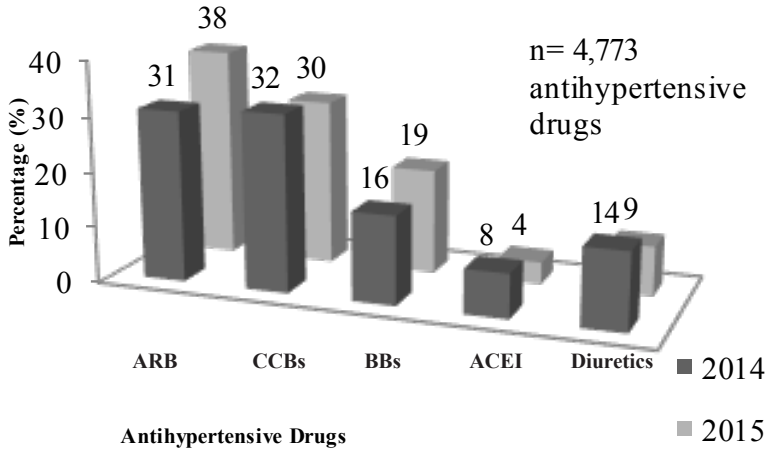

Figure 1. Percentage of anti-hypertensive drugs use during 2014-2015

ARBs during 2014 and 2015 (31% to 38%). The most frequently prescribed ARBs were 8 mg and 18 mg of candesartan, and 80 mg of valsartan. ACEIs were the least prescribed anti-hypertensive drugs (4%-8%)(Figure 1).

The total cost of anti-hypertensive drugs were IDR 75,180,146.00 and IDR 74,089,057.00 in 2014 and 2015, respectively. The largest portion of anti-hypertensive drugs expenditure was spent on ARBs, both in 2014 and 2015, respectively accounted for IDR 50,493,876.00 (67%) and IDR 58,903,112.00 (79%). The results can be seen in the Table 3. Among other ARBs, candesartan had the most expensive price. The price of 16 mg and 8 mg of candesartan were IDR 9,831.00 and IDR 6,606.00 per tablet, respectively, while that of valsartan (80 mg) was IDR 5,000.00. It indicated that the selection of ARB in Pemangkat general hospital was not cost-efficient. Our finding was different compared to previous study, showing that the most common ARBs prescribed in UK primary

Table 3. Cost of Anti-Hypertensive Drugs in Pemangkat General Hospital during 2014-2015

No	Class and Name of Anti-Hypertensive Drugs	2014		2015	
		Number of drugs	Cost (IDR)	Number of drugs	Cost (IDR)
1	ARBs				
	a. Candesartan 8 mg	293	19,614,932.00	424	20,503,767.00
	b. Candesartan 16 mg	303	29,728,944.00	571	37,849,345.00
	c. Valsartan 80 mg	22	1,150,000.00	18	550,000.00
2	ACEIs				
	a. Captopril 12.5 mg	10	73,050.00	24	57,900.00
	b. Captopril 25 mg	77	298,000.00	79	277,200.00
	c. Captopril 50 mg	0	0	1	1,750.00
	d. Lisinopril 10 mg (noverten)	47	2,392,500.00	5	275,000.00
	e. Lisinopril 5 mg	11	385,000.00	8	262,500.00
3	CCBs				
	a. Amlodipine 5 mg	193	2,322,375.00	432	3,686,000.00
	b. Amlodipine 10 mg	441	9,619,800.00	372	5,986,855.00
	c. Nifedipine 10 mg	1	6,000.00	5	19,000.00
4	BBs				
	a. Atenolol 50 mg	12	180,.000.00	0	0
	b. Beta One/ Concor 2.5 mg	102	4,072,000.00	450	3,284,305.00
	c. Bisoprolol 5 mg	173	3,883,545.00	2	43,535.00
	d. Propanolol HCl 10 mg	35	157,750.00	42	108,900.00
5	Diuretics				
	a. Hydrochlortiazide	63	31,250,00	0	0
	b. Spironolactone	210	1,265,000,00	237	1,183,000.00
	Total	2,102	75,180,146,00	2,671	74,089,057.00

care setting was losartan, which was the least expensive ARBs.[14]

The selection of ARBs should consider clinical benefit and cost-effectiveness of the drugs. Losartan has relatively poor efficacy in controlling hypertension with comorbid disease such as diabetes, kidney failure, and heart failure. This might affect the cost of whole treatment, resulting in the changes of health care policy. In the UK, losartan was then replaced by candesartan to help reduced the risk of cardiovascular events in hypertensive patients.[3,12]

Previous study showed that among the ARBs, candesartan exhibited better reduction in systolic blood pressure, compared with irbesartan, losartan, dan valsartan.[13-15] Candesartan has longer half-life and duration of action, than valsartan or losartan.[16] Another study indicated that the use of candesartan 32 mg once daily provided good clinical effects in older hypertensive patients with heart failure and left ventricular ejection fraction (LVEF) > 0.40. Results of these studies implied that candesartan was an appropriate medication for hypertensive patients with co-morbid conditions, such as diabetes, chronic kidney disease, and heart failure.[17,18] In addition, the use of candesartan was reported to be more cost effective than losartan in preventing cardiovascular events.[4,15]

Selection of ARBs should also consider safety profile of the drugs. Side effects of candesartan is generally minor such as headache, upper respiratory tract infection, backache, and dizzy.[16,19,20] Side effects among the elderly who might have impaired renal function include hypercalemia, increased creatinine serum, and hypotension.[21]

Limitation of this study include limited generalizability of the finding since it was conducted only in one hospital. For further research, cost-effectiveness analysis regarding the use of candesartan may be necessary to provide evidence on medication value of ARBs on hypertension patients.

Conclusions

The prescribing of ARBs increased during study period and it represented the largest contributor on total expenditures of anti-hypertensive drugs.

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Conflicts of Interest

None declared.

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