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Description Of Antihypertensive Drugs Use In Hypertensive Outpatients With Diabetes Mellitus At Panembahan Senopati Bantul Hospital

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Abstract

Hypertension (HT) is still a health problem in the world, including in Indonesia. Hypertension in patients with type 2 diabetes mellitus (T2DM) will have an impact on worsening conditions and multi-complications, including macrovascular, microvascular, and insulin resistance complications. This can be prevented by providing appropriate and rational therapy so that the effectiveness of therapy is achieved and avoids worsening conditions and complications. This study aims to determine the pattern of antihypertensive drug use in HT patients with comorbid T2DM in the outpatient installation of Panembahan Senopati Hospital, Bantul for August 2023. The study was designed with a descriptive non-experimental method, cross-sectional with a retrospective approach. The source of research data is secondary data derived from medical records of HT patients with T2DM for August 2023 with data collection by purposive sampling. A total of 157 HT patients met the inclusion criteria in this study with the prevalence of women (n = 106; 67.50%) and men (n = 51; 32.50%), most ages in the 55-65 year range (n = 57; 36.30%). A total of 66 patients (42.10%) received monotherapy, while 91 (57.90) patients received polytherapy. Candesartan (n=80; 27.68%) and Amlodipine (n=78; 26.99%) monotherapy with oral administration were the most common treatment options in this study. Overall, the most widely used drug classes were Angiotensin Receptor Blockers (ARB) (41.18%), Calcium Channel Blockers (CCB) (32.5%), and Diuretics (14.1%). While the most common combination of drug groups is ARB + CCB (24.8%). This study concluded that the use of drugs mainly was polytherapy and in general the use of antihypertensive drugs consisted of 7 classes of drugs namely Angiotensin Receptor Blockers, Calcium Channel Blockers, Diuretics, ß- blockers, Centrally-acting Agents, ACE-Inhibitors, Vasodilators . .

Keywords : *Antihypertensive agent, anti -diabetic mellitus agent , polytherapy, monotherapy, hospital .*

1. INTRODUCTION

Hypertension and diabetes mellitus often occur without signs and symptoms ("silent killer") [1]–[8] . Hypertension is the leading cause of premature death worldwide. An estimated 1.28 billion adults aged 30-79 worldwide suffer from hypertension and 46% of sufferers are unaware they have the disease. Most (two-thirds) are in low- and middle-income countries. Less than half of adults (42%) with hypertension are diagnosed and treated. About 1 in 5 adults (21%) with hypertension can control it. One of the global targets for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030 [9] .

The World Health Organization (WHO) estimates the current global prevalence of hypertension at 22% of the world's population. Of this number, only less than a fifth makes efforts to control their blood pressure. The highest prevalence of hypertension in 2019 at 37.8% was in the Eastern Mediterranean region, followed by Europe at 36.9%, Africa at 35.5% and the Americas at 35.4%, Southeast Asia at 25% while the Western Pacific Region had the lowest rate at 28.3% [10] . In the Southeast Asian region, the burden of hypertension is enormous with more than 245 million people over 30 years of age estimated to have elevated blood pressure. Almost half of people with hypertension are unaware of their condition and only a third (only one in three people) undergo treatment, increasing the risk of heart attack, stroke, kidney failure, and other organ damage [11] .

Nationally, Riskesdas data (2018) showed that the prevalence of hypertension in Indonesia was 34.1%, an increase compared to the prevalence of hypertension in the 2013 Riskesdas of 25.8% [12], [13] . The prevalence of hypertension in the Special Region of Yogyakarta (DIY) was 11.01%, higher than the national rate (8.8%) [12] . This prevalence places DIY in 4th place as a province with high hypertension cases. Hypertension (first place) and diabetes mellitus (second place) have always been included in the top 10 diseases as well as the top 10 causes of death in Yogyakarta for the past few years based on Integrated Disease Surveillance (STP) and Hospital STP [14] [15] .

According to data from the Yogyakarta Health Office based on the integrated disease surveillance report of hospitals in Yogyakarta, new cases of hypertension in 2020 were recorded at 6,171 (inpatient) and 33,507 (outpatient) [16] and increased in 2021 by 8,446 (inpatient) and 45,115 (outpatients) [14] . The total estimated number of people with hypertension aged ≥ 15 years is 251,100 cases. Of those who have received health services 129,420 cases or 51.5%. Bantul is one of the regencies in Yogyakarta which has a high incidence of hypertension of 58,255 patients in 2021 [14] . Meanwhile, diabetes mellitus cases in 2021 were 83,568 cases and those who received health services according to standards were 50,530 cases (60.5%) [14] .

Hypertension and diabetes remain the leading causes of non-communicable disease (NCD)-related morbidity and mortality globally. This condition is predicted to continue in the coming years due to the growing number of elderly population and modern lifestyle. The coexistence of hypertension and diabetes has been noted in previous studies [17]–[19] . Previous studies have shown different levels of hypertension among DM patients in different regions of Indonesia.

Only a few studies have discussed antihypertensive drugs in hypertensive patients with diabetes mellitus in Indonesia, especially in Bantul, Yogyakarta [23] . Therefore, we conducted this study to determine the pattern of antihypertensive drug use in hypertensive patients with comorbid T2DM in the outpatient installation of Panembahan Senopati Hospital, Bantul.

2. MATERIALS AND METHODS

This study used an observational analysis design with a retrospective approach. The data used was secondary data sourced from medical records. This study was conducted at Panembahan Senopati Regional General Hospital (RSUD), Bantul, Yogyakarta Special Region, Indonesia. The research was conducted from July to September 2023. This study has received ethical approval by the Ahmad Dahlan University research ethics committee with Number: 022306073 dated July 10, 2023.

The population in this study was 159 patients diagnosed with hypertension with diabetes mellitus. 157 patients were obtained at Panembahan Senopati Bantul Hospital in August 2023 who met the inclusion criteria, namely outpatients with a diagnosis of hypertension along with diabetes mellitus, aged >30 years, receiving antihypertensive therapy both oral and injection, monotherapy or polytherapy. Exclusion criteria in this study were incomplete medical record data in both manual and electronic medical records. The research data was taken using a purposive sampling technique.

Univariate analysis in this study was carried out on the characteristics of the research subjects consisting of age and gender. This analysis was also carried out on treatment characteristics in the form of drug names, drug groups, treatment patterns, and methods of drug administration.

3. RESULTS AND DISCUSSION

Hypertension is a gateway to various cardiovascular diseases. Hypertension is the major modifiable risk factor for premature death and disability worldwide [2]. Coexistence of hypertension and diabetes is associated with a 4-fold increase in mortality [9]. The results of this study show that the rate of hypertension with DM still tends to be high .

The prevalence of hypertensive patients with diabetes mellitus was highest in women (n=106; 67.50%) compared to men (n=51; 32.50%) (Table 1) . Cross - sectional descriptive study by Naseri et al. that women tend to have more hypertension with diabetes mellitus than men (76.8% and 59.7% respectively) [24] .

The same thing was also reported by Wang et al. in 14,422 patients that women had more hypertension with diabetes mellitus than men (64.6% and 35.4%) [25] . Another study by Hi et al. on COVID-19 patients with hypertension at Panembahan Hospital in 2020-2021 that women (52.2%) had a higher incidence rate [8] . WHO (2023) reports that in Africa, the Eastern Mediterranean and Southeast Asia, the prevalence in women is always consistently higher [26] . This occurs due to hormonal influences and life style. Post-menopausal women experience changes in the hormone cycle and are more prone to stress, which can cause disruption to the cardiovascular system [8] .

The age prevalence of hypertensive patients with diabetes mellitus was highest in the age range of 55-65 years (n = 57; 36.30%). These results are in line with the research of Abdelbagi et al. in North Sudan that women aged > 45 years have a high prevalence of DM with hypertension (85.8%) [18] . Increased sympathetic nerve activity in women, especially elderly women, may be an important contributor to the increased prevalence of hypertension after menopause. Hypertensive women were found to have more arterial stiffness, heart failure with preserved ejection fraction, atrial fibrillation, RAAS activation, oxidative stress, obesity and dementia in the elderly compared to hypertensive men [8] .

Table 1 . Prevalence of hypertension with diabetes mellitus (DM) and the general characteristics of the respondents (N=157)

Variable ice	Number (n)	Per centage (%)
Age (years)		
30-54	32	20.40
55-65	57	36.30
66-74	54	34.40

75-90	14	8.90
Gender		
Male	51	32.50
Female	106	67.50

Antihypertensive medication therapy in this study was differentiated based on the number of antihypertensive medications prescribed including the use of monotherapy in 66 patients (42.10%) and 91 (57.90) patients received polytherapy. Candesartan monotherapy (n=80; 27.68%) and amlodipine (n=78; 26.99%) with oral administration were the most common treatment options in this study. In line with this, a prospective, randomized, open-label study with blinded assessment on 4728 HT patients with DM in Japan showed that the administration of candesartan and amlodipine monotherapy regimen was able to make the blood pressure of patients with an average age of 63.8 years increasingly well controlled (systolic blood pressure/diastolic blood pressure: 136.1/77.3 mmHg for candesartan regimen and 134.4/76.7 mmHg for amlodipine regimen after 3 years). The conclusion also stated that candesartan was more effective in preventing the onset of diabetes mellitus than amlodipine [27] . In line with this, research by MacGregor et al. candesartan is an effective and well-tolerated antihypertensive drug when used alone or in combination with either amlodipine or amlodipine + hydrochlorothiazide in the treatment of moderate to severe hypertension. In addition, candesartan is also effectively used in patients who are not responsive to monotherapy [28] .

Overall, the most widely used drug classes were Angiotensin Receptor Blockers (ARB) (41.18%), Calcium Channel Blockers (CCB) (32.5%), and Diuretics (14.1%) (Table 2). Meanwhile, the most common drug group combination was ARB + CCB (24.8%) (Table 3).

Table 2. Characteristics of Antihypertensive Treatment in Hypertensive Patients with Diabetes Mellitus at Panembahan Hospital, August 2023.

Antihypertensive Agents	**Variables**	**Number (n)**	**Percentage (%)**
Antihypertensive	Candesartan	80	27.68
	Amlodipine	78	26.99
	Valsartan	37	12.80
	Furosemide	33	11.42
	Bisoprolol	23	7.96
	Nifedipine	10	3.46
	Spironolactone	6	2.08
	Clonidine	6	2.08
	Captopril	3	1.04
	HCT	2	0.69
	Irbesartan	2	0.69
	Lisinopril	1	0.35
	Ramipril	1	0.35
	Terazosin	1	0.35
	Diltiazem	6	2.08%
	Total	**289**	**100**
	Angiotensin Receptor Blockers (ARB)	119	41.18

Antihypertensive Groups	Calcium Channel Blockers (CCB)	94		32.53
	Diuretics cs	41		14.19
	Beta-Blockers (BB)	23		7.96
	Centrally-acting Agents (CAA)	6		2.08
	Angiotensin Converting Enzyme-Inhibitor (ACE-I)	5		1.73
	Vasodilators	1		0.35
Total		**289**		**100**
Treatment Patterns	Antihypertensive monotherapy	66	42	
	Antihypertensive polytherapy	91	58	
Total		**157**	**100**	
Medication Administration Method	Orally	157	100	
	Parenteral	0		
Total		**157**	**100**	

Table 3. Characteristics of Antihypertensive Use Based on Antihypertensive Drug Groups in Hypertensive Patients with Diabetes Mellitus at Panembahan Regional Hospital, August 2023. (N=157)

Antihypertensive characteristics	Number (n)	Percentage (%)
Single Antihypertensive Drug		
ARB	34	21.7
BB	1	0.6
CCB	26	16.6
DIURETICS	5	3.2
2-Combination Antihypertensive Drugs		
ARB+BB	7	4.5
ARB+CCB	39	24.8
ARB+DIURETICS	7	4.5
ARB+CAA	1	0.6
ACE-I+CCB	4	2.5
BB+DIURETICS	1	0.6
BB+CCB	1	0.6
3-Combination Antihypertensive Drugs		
ARB+BB+DIURETICS	6	3.8
ARB+ACE-I+DIURETICS	1	0.6
ARB+CCB+DIURETICS	14	8.9

ARB+CCB+VASODILATORS	1	0.6
ARB+BB+CCB+CAA	2	1.3
ARB+BB+CCB	1	0.6
4- Combination Antihypertensive Drugs		
ARB+BB+CCB+DIURETICS	3	1.9
ARB+CCB+CAA+DIURETICS	2	1.3
5-Combination Antihypertensive Drugs		
ARB+BB+CCB+CAA+DIURETICS	1	0.6
Total	**157**	**100.0**

Angiotensin receptor blockers (ARBs) are the main line of therapy for hypertensive patients with T2DM. ARBs have been shown to have protective effects on various organs by controlling inflammation [29], [30] and reducing oxidative stress [31] in hypertensive patients without arteriosclerosis [32] .

Overall, candesartan (ARB) monotherapy or combination therapy resulted in statistically significant increases in mean DBP and SBP after 4 weeks of therapy, whereas no significant changes occurred in patients who continued candesartan treatment regarding their blood pressure.

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CONCLUSION

The most widely used drug classes in Panembahan Senopati Bantul Hospital were Angiotensin Receptor Blockers (ARB) (41.18%), Calcium Channel Blockers (CCB) (32.5%), and Diuretics (14.1%). The antihypertensive monotherapy pattern consisted of 66 patients (42.10%), while 91 (57.90) patients received polytherapy. The use of drugs is mostly polytherapy and in general, the use of antihypertensive drugs consists of 7 classes of drugs namely Angiotensin Receptor Blockers, Calcium Channel Blockers, Diuretics, ß- blockers, Centrally-acting Agents, ACE-Inhibitors, Vasodilators.

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