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Research Article

Study of prescribing pattern of antihypertensive drugs in diabetes patients

Aghili M, Shekar HS

Department of Pharmacy Practice, Kempedowda Institute of Medical Science Hospital and Research Centre, V.V Puram, Bangalore, Karnataka, India.

Address for Correspondence:
Shekar H.S.
Email: shekarhs@gmail.com

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ABSTRACT

The monitoring pattern of antihypertensive drugs can provide important vision into control of hypertension and prevention of related comorbidities. The aim of this study was to evaluate utilization patterns of antihypertensive agents among diabetes and to determine the extent of conformity with international guidelines JNC-8.A total of 720 hypertensive people with type 2 diabetes mellitus aged ≥ 18 years from medicine department of Kempegowda Institute of Medical Science (KIMS) and Research Center, Bangalore, India, were included in this study for period of 12 months. Monotherapy was prescribed more commonly than polytherapy (60.14% vs 39.86%). Only 27% of patients met JNC 8 goal for systolic blood pressure. The majority of patients was treated with Calcium channel blockers. In both therapeutic regimen, mono- and polytherapy amlodipine was found to be most prescribed drug. Ninety patients (12.5%) of total subjects presented with chronic kidney disease, followed by ischemic heart disease 82 patients (11.39%), stroke 78 patients (10.83%) and heart failure 40 patients (5.56%).Stroke incident was found to be high among elder women than men. We found although prescribing pattern of antihypertensive medicines showed adherence with JNC-8 guideline, but combination antihypertensive regimens must be followed to achieve controlled blood pressure and avoid clinical inertia.

Key words: *Hypertension, Diabetes Mellitus, Prescribing Pattern, Antihypertensive Drugs, Clinical Inertia.*

INTRODUCTION

Hypertension is a common disease that is defined simply as persistently elevated arterial blood pressure (BP).[1] It is one of the most significant risk factor for cardiovascular disease. Hypertension is reported to be the fourth contributor to premature death in developed countries and seventh in developing countries. Approximately one-third of the adult population in the Southeast Asian region has high blood pressure. Many studies in urban and rural areas of India have been carried out and these have shown steadily increasing trend of hypertension in India.[2, 3]

The World Health Organization describes hypertension as the number one risk factor for cardiovascular diseases (CVD).The guidelines of hypertension and cardiology societies emphasize that hypertension treatment should aim at reducing the long-term risk of morbidity and mortality.[4,5] Systemic hypertension is the single largest contributor to death worldwide. One in three adults (around 1 billion people) worldwide are affected and the number is expected to increase to 1.6 billion by 2025.[6]Hypertension is a particularly important issue among people with diabetes, a combination of both further increases risk of complications such as kidney failure, retinopathy and increasing cardiovascular mortality.[7]Cardiovascular disease is the primary cause of mortality and morbidity in patients with type 2diabetes and several risk factors including smoking, hypertension and dyslipidemia have been shown to accelerate the progression of CVD.[8]

The world prevalence of diabetes among adults (aged 20–79 years) demonstrated between 2010 and 2030, there will total 54% increase in diabetes patient which 36% of the anticipated absolute global increase is projected to occur in India and China alone.[9]

Most hypertensive individuals require two antihypertensive drugs to reduce their BP and maintain it within acceptable

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ranges.[7, 10-11]Randomized clinical trials have documented that in diabetes, BP reductions by drug treatment are associated with a reduction of diabetes-related macrovascular and microvascular complications.[12]Although lifestyle modification is important in hypertension management, most hypertensive individuals require 2 antihypertensive drugs to reduce their BP and maintain it within acceptable ranges.[10]The 2014 Evidence-Based Guideline for the Management of High Blood Pressure in adults, the Eighth Joint National Committee (JNC 8) recommended four classes of antihypertensive drugs including thiazide diuretic, calcium channel blocker, angiotensin converting enzyme inhibitor and angiotensin receptor blocker for hypertensive patients with diabetes.This national hypertension treatment guideline recommended a systolic blood pressure goal of lower than 140 mmHg and a diastolic blood pressure goal lower than 90 mmHg in the population aged 18 years or older with diabetes based on expert opinion.[13]

MATERIALS AND METHODS

Place of Study

The present study was conducted in the medicine department of Kempegowda Institute of Medical Science (KIMS) and Research Center, Bangalore, India.

Study Design

A hospital based prospective study was conducted on 720 patients who have been diagnosed with hypertension according to JNC-8 guideline, type 2 diabetes as well and admitted to medicine inpatient department (IPD) of the KIMS Hospital and Research Center, Bangalore, India to review the current prescribing pattern of antihypertensive drugs. Patient data relevant to the study was obtained from patient case sheet, medications orders and laboratory reports and the study was conducted for a period of 12 months. Data was collected with respect to demographic details (names, age, and sex of patients), diagnosis, admission and discharge date. The prescribed drug data including brand and generic name of all antihypertensive drugs, dose, dose frequency and route of administration were recorded.

Inclusion Criteria

Eligible participants were men and women aged 18 years and above with both hypertension and type 2 diabetes mellitus (T2DM).

Exclusion Criteria

Type 1 diabetic patient, gestational hypertension and breast feeding woman were excluded.

RESULTS

A total 720 antihypertensive patients with type 2 diabetes mellitus were selected during the period of study (August 2014-September 2015); 61% were male and 39% were female. The mean (± SD) age of patients was 58.1±12.8 years. Among hypertensive patients with diabetes 40.27% patients were with the comorbidities; chronic kidney disease was found in 43.42% of male patients and stroke in 39.13% of female patients. In my observation, the highest number of patients with stroke were female above 55 years which showed more than twice chance of stroke occurrence in comparison with men at same age distribution; female: 51.28% vs male: 24.36% (Table No.1).

Table 1: Age Distribution, Comorbidities and Stroke Incidence among Patients

Demographic Parameter	Male		Female	
	Number	%	Number	%
	438	61.00	282	39.00
Age Distribution (year)				
21-40	47	10.73	46	16.31
41-60	215	49.09	123	43.62
61-80	168	38.36	97	34.40
≥ 81	8	1.83	16	5.67
Comorbidities				
Heart Failure	18	11.84	22	15.94
Chronic Kidney Disease	66	43.42	24	17.39
Ischemic Heart Disease	44	28.95	38	27.54
Stroke	24	15.79	54	39.13
Stroke Incidence Age Distribution				
30-54	3	3.85	2	2.56
55-74	19	24.36	40	51.28
≥ 75	2	2.56	12	15.38

It has been observed in the period of study, patients were treated with different classes of antihypertensive drugs in which 60.14% patients were on monotherapy and 39.86% were on polytherapy regimen. Calcium channel blocker, loop diuretic, angiotensin receptor blocker and β blocker were the most common antihypertensive classes with 34.09, 19.82, 15.17 and 13.13% respectively. The total number of drugs prescribed was 1226, amlodipine (29.04%) was the most common prescribed drug, followed by furosemide and telmisartan with 17.46 and 12.4% respectively. Twenty seven percent of patients had controlled systolic blood pressure and 52.5% had controlled diastolic blood pressure (Table No.2).

Table 2: Antihypertensive Classes Prescribed with Most Prescribed Drugs and Blood Pressure Control

Prescription Pattern	Number	%

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Monotherapy	433	60.14
polytherapy	287	39.86
Polytherapy		
Two Drugs Combination	129	17.92
Three Drugs Combination	106	14.72
Four and more Drugs Combination	52	7.22
Antihypertensive Drug Classes		
Calcium Channel Blocker	418	34.09
Loop Diuretic	243	19.82
Angiotensin Receptor Blocker	186	15.17
β Blocker	161	13.13
α Blocker	79	6.44
Angiotensin Converting Enzyme Inhibitor	50	4.08
Thiazide Diuretic	36	2.94
Centrally Acting Agent	33	2.69
Vasodilator	20	1.63
Most Prescribed Antihypertensive Drugs		
Amlodipine	356	29.04
Furosemide	214	17.46
Telmisartan	152	12.40
Metoprolol	86	7.01
Prazosin	79	6.44
Cilnidipine	43	3.51
Hydrochlorothiazide	36	2.94
Carvedilol	36	2.94
Clonidine	33	2.69
Losartan	22	1.79
Systolic Blood Pressure		
Controlled (< 140 mmHg)	198	27.50
Stage I (140-159 mmHg)	306	42.50
Stage II (≥ 160 mmHg)	216	30.00
Diastolic Blood Pressure		
Controlled (< 90 mmHg)	378	52.50
Stage I (90-99 mmHg)	206	28.61
Stage II (≥ 100 mmHg)	136	18.89

DISCUSSION

A prospective study was conducted to systemically assess prescribing pattern of antihypertensive drugs among diabetes patients. Out of 720 patients, 61% male and 39% patients were females. Majority of patients were in the age group of 41-60 years and women above 41 years are found to be more prone to hypertension than their younger counterparts. This finding can be related to postmenopausal hypertension in female and indicates a potential physiological protection of estrogen-the female hormone. Blood pressure is typically lower in premenopausal women than in men. Mechanisms responsible for elevated BP in aging women can be included activation of the renin angiotensin system, obesity, sympathetic activation, physiological protective effect of estrogen, anxiety and depression.[14]During the period of study, most patients treated with monotherapy by result of less number of patients (only 27.5%) had controlled BP, indicates monotherapy based regimen is less effective for controlling high blood pressure. The ultimate goal of any blood pressure-lowering therapy is to reverse the risk associated with an elevated blood pressure and to prevent the cardiovascular complications associated with hypertension. Tight blood pressure control in patients with hypertension and type 2 diabetes achieves a clinically important reduction in the risk of deaths related to diabetes, complications related to diabetes, progression of diabetic retinopathy, and deterioration in visual acuity.[15]The importance of treating hypertension aggressively to ensure attainment of controlled BP goals is well established and treatment to target levels will often require therapy with two or more antihypertensive agents. [7, 10-11]

In present study, it was found that most of the hypertensive patients with diabetes mellitus require more than one class of antihypertensive medication for their BP goal achievement.. Clinical inertia (treated but uncontrolled hypertension) was common among diabetes mellitus. The majority of patients received atleast one of four recommended antihypertensive classes and few patient were prescribed with other classes of antihypertensive drug. Overall, calcium channel blockers remained the most commonly used antihypertensive drug class as monotherapy and polytherapy regimen. Epidemiologic studies show differences between women and men in stroke incidence, prevalence, and mortality. In addition, there are differences by age and age group over the life course. Stroke is a sexually dimorphic disease, with differences between males and females.[16]

Herein, we observed significant differences between age- and sex-specific of stroke occurrence.

LIMITATION

Study limitation should be noted for better interpretation. The study was done for a short term period of 12 months. Hence a longer term study with a larger group of patients can be carried out, as the treatment requires longer duration and more number of follow-ups.

CONCLUSION

The study showed prescribing patterns are consistent with the evidence-based JNC 8 guideline, but only one fourth of diabetic

patient had blood pressure within the target. This is most likely due to following monotherapy which is established inadequate regimen for blood pressure control among diabetes patients. We recommended more efforts for closing the gap between treatment and control to maximize the public health, clinical benefits among those high-risk populations and avoid clinical inertia.

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