

Pattern of Antihypertensive Drug Distribution in Hypertensive Diabetes Mellitus Patients: A Hospital Based Prospective Study.**Kaushal Kumar Mishra¹, Sanjay Kumar², Satyendra Kumar Pathak³**¹Assistant Professor, Department of Pharmacology, Sri Krishna Medical College, Muzaffarpur, Bihar, India.²Tutor, Department of Pharmacology, Sri Krishna Medical College, Muzaffarpur, Bihar, India.³Professor & Head, Department of Pharmacology, Sri Krishna Medical College, Muzaffarpur, Bihar, India.

Received: 15-01-2024 / Revised: 20-02-2024 / Accepted: 05-03-2024

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Conflict of interest: Nil

Abstract:**Objectives:** The present study was to evaluate the pattern of antihypertensive drugs prescription in hypertensive diabetes mellitus patients.**Methods:** A pre-tested interviewer-administered questionnaire was used. Patients with diabetes were identified by reviewing the physician's diagnosis on their chart/medical record. After a 15-min rest, (SBP and DBP) were measured twice at 3-min intervals in the sitting posture, and the mean was calculated. Hypertensive individuals had SBP and/or DBP of 140/90 mmHg or higher, respectively, or were on antihypertensive treatment. FBS levels were measured using blood samples (3 ml) obtained after overnight fasting of 8–12 h. The glucose GOD POD Methods was used to evaluate plasma glucose through a fully autoanalyzer.**Results:** A total of 600 hypertensive diabetes patients with age group 20 to >60 years were enrolled. Most of the patients 220(36.67%) were in age group of 51-60 years. Most of the patients 326(54.33%) were females. Calcium channel blocker (CCB) was prescribed to most of the 284(47.34%) hypertensive patients. Angiotensin receptor blockers (ARB) was prescribed to 218(36.33%) hypertensive patients. Metformin 488(81.33%) and Sulfonylureas 356(59.33%) were prescribed to most of the diabetic patients. Telmisartan 143(31.49%) and amlodipine 126(27.75%) were prescribed in most of the hypertensive patients as a monotherapy. Telmisartan with amlodipine were prescribed as a combination therapy in most of the hypertensive diabetic patients.**Conclusions:** Hypertension with diabetes is more preponderance in old age female population. Calcium channel blocker (CCB) and angiotensin receptor blockers (ARB) are the most common prescribing antihypertensive drugs. Metformin and sulfonyl ureas are the most common prescribing antidiabetic drugs. Telmisartan and amlodipine are the most common drugs used as monotherapy. Most common drugs used as a combination therapy are telmisartan with amlodipine in hypertensive diabetic patients.**Keywords:** Prescribing pattern, Hypertension, Diabetes, Age group.

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Introduction

Hypertension is one of the major chronic diseases resulting in high (1,2) mortality and morbidity in today's world [1,2]. Hypertension is the term used to denote elevated blood pressure. It is defined as the condition in which blood pressure remains consistent to systolic blood pressure more than 140 mmHg and diastolic blood pressure more than 90 mmHg. Patients with chronic HTN are at a greater risk for developing coronary artery disease, stroke, heart failure, peripheral vascular disease, vision loss and chronic kidney disease [3,4].

The prevalence of HTN is greater in low-middle income countries (31.5%) than in higher-income countries (28.5%) [5]. The occurrence of HTN in Pakistan is increasing continuously; there are more

than 33% of individuals over the age of 40 having HTN [6].

Macrovascular and microvascular complications associated with diabetes and hypertension can be more effectively reduced with control of blood pressure than blood glucose. Therefore, adequate management of hypertension among patients with diabetes mellitus is cost effective [7].

The Eighth Joint National Committee (JNC-VIII) has released evidence-based suggestions for treatment thresholds, objectives, and drugs to control diabetes-related HTN. Pharmacologic therapy should be started when the systolic BP (SBP) in people older is 150 mm Hg or higher or when diastolic pressure is 90 mm Hg or higher. Target systolic and diastolic pressures for patients

should be <150 mmHg and 90 mm Hg respectively [8]. Objectives of our study was to evaluate the pattern of antihypertensive drugs prescription in hypertensive diabetes mellitus patients.

Material & Methods

The present study was conducted in the Department of Pharmacology with the collaboration of the Department of Medicine in Sri Krishna Medical college and Hospital, Muzaffarpur, Bihar during a period from January 2023 to July 2023. Entire subjects signed an informed consent approved by the institutional ethical committee, SKMCH, Muzaffarpur was sought.

A total of 600 hypertensive patients associated with diabetes were included in this study. Patients who have had a recent myocardial infarction or stroke, immediately post-operative patients, type 2 diabetes patients who are critically ill and pregnant women were excluded from the present study.

Patients with SBP and diastolic BP (DBP) of 140/90 mmHg or greater or on antihypertensive therapy were considered hypertensive.

Staging of hypertension:

1. BP of 120/80–139/89 is pre- HTN
2. BP of 140/90–159/99 is Stage 1 HTN
3. 160/100–179/109 is Stage 2 HTN
4. BP \geq 180/110 is a hypertensive crisis.

Poor glyceic control:

1. A poor glyceic control was considered when a patient's HbA1c is >7%
2. A person was considered to have T2DM when he/she is an FBG of \geq 126 mg/dl and HbA1C \geq 6.5%.

Methods:

A pre-tested interviewer administered questionnaire was used. Patients with diabetes were identified by reviewing the physician's diagnosis on their chart/medical record. Participants were interviewed, and data on sociodemographic factors (age, gender, domicile, educational status, occupation, monthly income, and current cigarette smoking status) were obtained.

After a 15-min rest, (SBP and DBP) were measured twice at 3-min intervals in the sitting posture, and the mean was calculated. Hypertensive individuals had SBP and/or DBP of 140/90 mmHg or higher, respectively, or were on antihypertensive treatment. FBS levels were measured using blood samples (3 ml) obtained after overnight fasting of 8–12 h. The glucose GOD POD Methods was used to evaluate plasma glucose through a fully autoanalyzer.

Uncontrolled hyperglycaemia was characterized as HbA1c (Glycosylated) levels greater than 7%, (fasting plasma glucose) levels >129 mg/dL, or Post Prandial Glucose levels >180 mg/dL.

Statistical Analysis

Data was analysed by using simple statistical methods with the help of MS-Office software. All data was tabulated and percentages were calculated.

Results

A total of 600 hypertensive diabetes patients with age group 20 to >60 years were enrolled in the present study. Most of the patients 220(36.67%) were in age group of 51-60 years. 200(33.33%) patients were in age group of 41-50 years. Most of the patients 326(54.33%) were females.

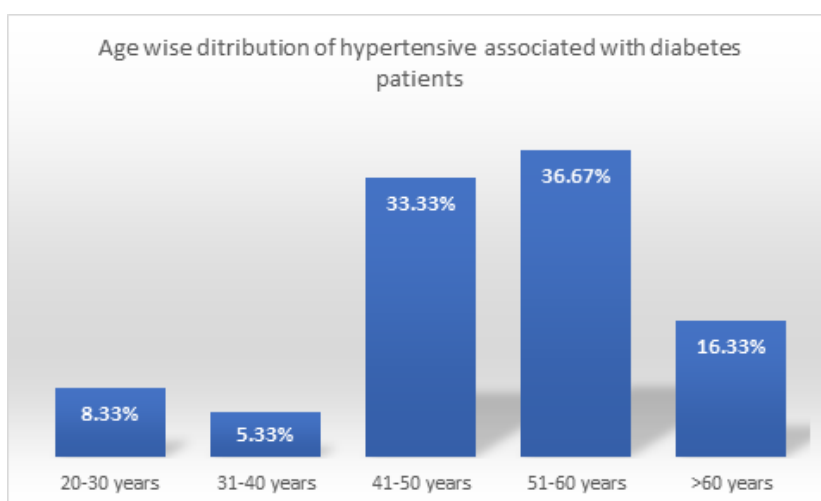


Figure 1: Age wise distribution of hypertensive patients.

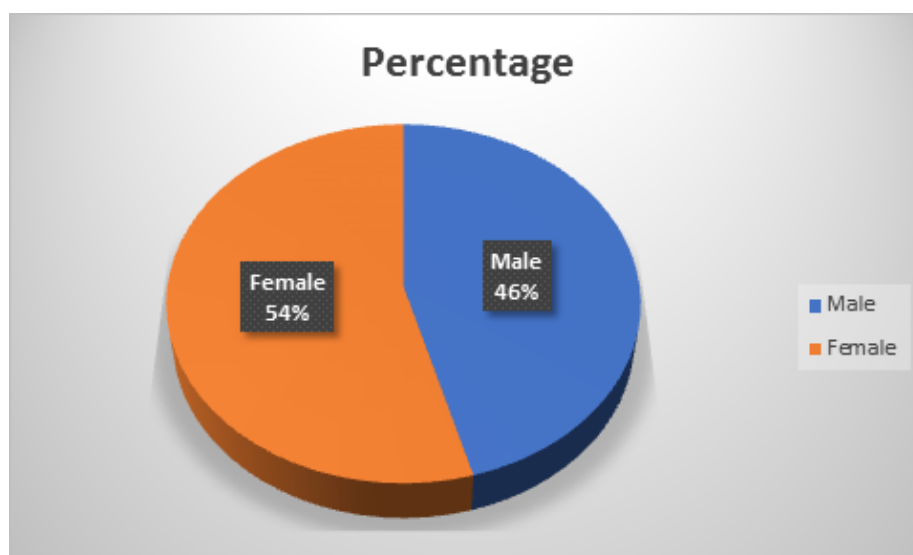


Figure 2: Gender wise distribution of hypertensive patients.

In the present study, most of the patients of hypertension 428(71.34%) and diabetes 386(64.33%) were suffered from the duration of 5-10 years.

Table 1: Duration of hypertension and diabetes

| Duration of hypertension | No. of patients (N=600) | Percentage |
|-----------------------------|-------------------------|------------|
| <5 years | 140 | 23.33% |
| 5-10 years | 428 | 71.34% |
| >10 years | 32 | 5.33% |
| Duration of diabetes | | |
| <5 years | 148 | 24.67% |
| 5-10 years | 386 | 64.33% |
| >10 years | 66 | 11% |

In the present study, Calcium channel blocker (CCB) was prescribed to most of the 284(47.34%) hypertensive patients. Angiotensin receptor blockers (ARB) was prescribed to 218(36.33%) hypertensive patients. β blockers was prescribed to 146(24.33%) hypertensive patients. Metformin was

prescribed to most of the 488(81.33%) diabetic patients. Sulfonylureas was prescribed to 356(59.33%) diabetic patients. DDP4 Inhibitors was prescribed to 316(52.67%) diabetic patients. Alpha glucosidase inhibitors were prescribed to 162(27%) diabetic patients.

Table 2: Prescribing pattern of antihypertensive and antidiabetic drugs.

| Pattern of antihypertensive drugs | No. of patients | Percentage |
|--------------------------------------|-----------------|------------|
| β blockers | 146 | 24.33% |
| Calcium channel blocker (CCB) | 284 | 47.34% |
| Angiotensin receptor blockers (ARB) | 218 | 36.33% |
| Pattern of antidiabetic drugs | | |
| Sulfonylureas | 356 | 59.33% |
| Metformin | 488 | 81.33% |
| Alpha glucosidase inhibitors | 162 | 27% |
| DDP4 Inhibitors | 316 | 52.67% |

In the present study, telmisartan was prescribed in most of the hypertensive patients as a monotherapy. Amlodipine was prescribed in 126(27.75%) hypertensive patients as a monotherapy. Bisoprolol was prescribed in 68(14.97%) patients.

In the form of combination therapy, telmisartan and amlodipine were prescribed in most of the 69(47.26%) hypertensive patients. Amlodipine and

Chlorthalidone were prescribed in 39(26.71%) patients as a combination therapy. Telmisartan and hydrochlorothiazide were prescribed in 38(26.02) hypertensive patients as a combination therapy.

Out of 600 patients, antihypertensive drugs were prescribed as a monotherapy in most of the patients 454(75.66%) and as a combination therapy in 146(24.33%) patients.

Table 3: Prescribing pattern of antihypertensive drugs as a monotherapy and combination therapy.

| | No. of patients | Percentage |
|---------------------------------|-----------------|------------|
| Monotherapy | N= 454 | |
| Amlodipine | 126 | 27.75% |
| Telmisartan | 143 | 31.49% |
| Metoprolol | 63 | 13.87% |
| Cilnidipine | 54 | 11.89% |
| Bisoprolol | 68 | 14.97% |
| Combination therapy | N= 146 | |
| Amlodipine+Chlorthalidone | 39 | 26.71% |
| Telmisartan+Amlodipine | 69 | 47.26% |
| Telmisartan+Hydrochlorothiazide | 38 | 26.02% |

Discussions

Hypertension is becoming a global threat to the world population. Hypertension is one of the most common disorders and one of the most critical health problems causing multiple organ damage and death as single contributor in developed and developing countries [9].

In the present study, 600 hypertensive diabetes patients were enrolled. Most of the patients 220(36.67%) were in age group of 51-60 years. 200(33.33%) patients were in age group of 41-50 years.

The age distribution of the study participants revealed that 518(86.33%) of the patients were over 40 years old, and this observation suggests that these people are more prone to developing cardiometabolic disorders such as HTN and T2D. Females 326(54.33%) were more common. Dhanaraj et al. compare current guidelines to antihypertensive drug prescribing patterns in T2DM (type 2 diabetes) patients. In terms of demographic information, they indicated that 620 (52%) male and 566 (48%) female patients made up the mean age (SD) of patients with diabetic HTN, which was 55.6 (10.1) years [10].

In the present study, most of the patients of hypertension 428(71.34%) and diabetes 386(64.33%) were suffered from 5-10 years.

Type 2 DM is a rapidly growing epidemic in India, currently affecting 7.4 million people with a prevalence of 8.3%. The prevalence of HTN in T2DM is significant and can be observed in more than 80% of patients. Not only has HTN been recognized as a significant risk factor for the development of diabetes but also for the development of micro- and macrovascular problems, such as nephropathy, retinopathy, CAD, stroke, and PVD in diabetics. Reducing either isolated systolic or systolic diastolic HTN significantly reduces the risk of micro- and macrovascular complications and cardiovascular or diabetic deaths [11].

In the present study, Calcium channel blocker (CCB) was prescribed to most of the 284(47.34%) hypertensive patients. Angiotensin receptor blockers (ARB) was prescribed to 218(36.33%) hypertensive patients. β blockers was prescribed to 146(24.33%) hypertensive patients. Metformin was prescribed to most of the 488(81.33%) diabetic patients. Sulfonylureas was prescribed to 356(59.33%) diabetic patients. DPP4 Inhibitors was prescribed to 316(52.67%) diabetic patients. Alpha glucosidase inhibitors were prescribed to 162(27%) diabetic patients.

In the present study, telmisartan was prescribed in most of the hypertensive patients 143(31.49%) as a monotherapy. Amlodipine was prescribed in 126(27.75%) hypertensive patients as a monotherapy. Bisoprolol was prescribed in 68(14.97%) patients.

In a study conducted in Pakistan stated that two drugs combination was the most frequently prescribed therapy (31.2%) followed by single therapy (23.2%) [6], another study also revealed dual therapy (66%) is the highest among other therapy prescribing trend followed by single drug therapy (10%) [12].

In the present study, telmisartan and amlodipine were prescribed in most of the 69(47.26%) hypertensive patients as a combination therapy. Amlodipine and Chlorthalidone were prescribed in 39(26.71%) patients as a combination therapy. Telmisartan and hydrochlorothiazide were prescribed in 38(26.02) hypertensive patients as a combination therapy.

These results supported the work of Hansson et al that showed blood pressure could be adequately controlled with the help of combination therapy [13]. Furthermore, combination therapy seems to be a rational (9) approach to reduce the cardiovascular mortality [14].

Bhore et al. determined in their study the current prescribing pattern of antihypertensive drugs in patients with type 2 diabetes and evaluated the rationality of the recommendations of the JNC-8

guidelines. In terms of the demographics of the study participants, they disclosed that a total of 76 patients were included in the prescription data recorded in CRF for 1 month. The mean age of the patients was 54.99.3 years, and most of them were in the age group of 51–60 years. The proportion of women was 51.3% [15].

According to the Angiotensin Converting Enzyme Inhibitors (ACEIs), Angiotensin Receptor Blockers (ARBs), Thiazide diuretics, and Calcium Channel Blockers (CCBs) should be used alone or in combination for the management of hypertension. If the target blood pressure is reached after initial therapy, then drug dose should be increased or combination therapy is prescribed. The existence of comorbidities such as Diabetes Mellitus should be properly considered while choosing an antihypertensive medication. Similarly, the prescriptions of oral hypoglycemic agent's appropriate consideration are essential. Oral hypoglycemic medications are divided into several categories. Physicians face a challenge in rationally selecting a regimen from a variety of classes, and the situation becomes more complicated when the patients have additional non-communicable illnesses, such as HTN. The combination therapy of ailments not only effects the patient's economic status but also effects the quality of life [7,16].

Several large clinical trials and guidelines recommend the use of multiple antihypertensive drugs in order to achieve adequate and sustained blood pressure control [17,18,19]. The majority of our treated patients (51.4 %) were on multi-drug regimens. But, only one-third of our diabetic patients have reached goal blood pressure below 140/90 mm Hg. Although, the results of this study were similar to the findings of published studies in other countries [20], the blood pressure control is better than a similar study conducted in a non-academic hospital in Ethiopia [16]. Despite the presence of clear recommendations about blood pressure goals, the majority of our diabetic patients did not attain adequate control [21,22]. This might be due to poor compliance and inadequate dosing titration. Health professionals also fail to educate them about the nature of their illness and the need for adequate blood pressure control.

Conclusions

The present study concluded that the hypertension with diabetes is more preponderance in old age female population. Calcium channel blocker (CCB) and angiotensin receptor blockers (ARB) are the most common prescribing antihypertensive drugs. Metformin and sulfonyl ureas are the most common prescribing antidiabetic drugs. Telmisartan and amlodipine are the most common drugs used as monotherapy. Most common drugs used as a

combination therapy are telmisartan with amlodipine.

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