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Assessment of Antihypertensives Drug Class in Type 2 Diabetes and It's Complications.

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ABSTRACT

Background: Hypertension and Diabetes are now serious public and worldwide health challenge as by 2025 it has been estimated that 1.56 billion world population will suffer from hypertension and diabetes is the 8th leading cause of death.

Objectives:Primary objective is assessment of antihypertensive drug classes used in type 2 diabetes & it's complications and Secondary objectives are , is to assess the prescribing pattern of diabetic drugs, and to assess the incidence of complications in diabetes mellitus.

Methods & Materials: This was a prospective observational study carried out at Dr. B.R. Ambedkar Medical College and Hospital. Data collection form was prepared and study was carried out in Patients with inclusion criterias after they were briefed about the study and oral consent was obtained from them.

Results: 150 patients were included in the study, with females 66.67%. The average age of patients included in the study was 57.97±9.90, belonging to the age group 55-64 years. Out of 150 patients 105 had diabetic complications. Patients with Diabetic Nephropathy CCB 38.71% and the combination of ARB with diuretic 22.58% were prescribed, In patients with cardiovascular diseases they were mostly prescribed with CCB 34.29% followed by Beta-Blockers 20.00%, in patients with cerebrovascular diseases combinations of ARB with Diuretic 30.77% were most prescribed and in diabetic foot CCB 45.83% were prescribed. Managing diabetes, Metformin was the most prescribed as mono-therapy in 24.49% patients and as the combination with Glimepiride was used in 56.46% patients.

Conclusion: This study revealed that CCB as monotherapy and ARB with diuretics as dual therapy were the most commonly used agents with diabetic complications like diabetic neuropathy, cardiovascular diseases and diabetic foot. A larger sample size may be necessary to reach a conclusion on the benefits of particular classes of drug in different diabetes complication so as to slower their progression.

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Introduction

Hypertension and diabetes are now serious public and worldwide health challenge, by 2025 it has been estimated that 1.56 billion world population will suffer from hypertension. Hypertensive patients with diabetes have lower rates of blood pressure control, approximately two-thirds of people with diabetes do not reach recommended target BP value of 140/90 mmHg as the result macro and micro vascular complications of type 2 diabetes occurs. In 2012 diabetes was the 8th leading cause of death[1]. Despite that antihypertensive are important in controlling blood pressure but also have problems which are postural Hypotension in geriatric patients, increase fasting glucose levels and cholesterol level, Acute kidney failure and Miscarriage in pregnant women. Monitoring of these problems is essential[2].

Patients with diabetes are more likely to have hypertension and Hypertension can increase the risk of diabetes complications which are microvascular and macrovascular (diabetic retinopathy, diabetic nephropathy, IHD and diabetic foot). Therefore, managing hypertension is a part of diabetes care plan for preventing diabetic complications. Diabetes adversely affects the arteries leading to atherosclerosis which cause hypertension. If hypertension is not treated, further damage to the blood vessels occurs resulting in risk of stroke, heart failure, heart attack kidney failure and peripheral vascular disease (narrowing of arteries on legs or feet). The blood pressure of diabetic patient should be maintained below 130/80mmHg.[3] Hypertension and diabetes are connected together as both are caused by lifestyle, diet, and obesity, they are also linked metabolically because of resistance in the way in which the body reacts to insulin. High level of insulin in blood widens blood vessels which affects sympathetic nervous system and either directly or indirectly causes kidney retain salt and water causing hypertension.[4] ACEi and angiotensin receptor blockers, are mostly used in patient with diabetic and hypertension because they are thought to help protect the kidneys however, other blood pressure medicines can also be used,[5] but despite that antihypertensive are important in controlling blood pressure but also have problems which are postural Hypotension in geriatric patients, increase fasting glucose levels and cholesterol level, Acute kidney failure and Miscarriage in pregnant women therefore monitoring of these problems is essential. Lowering blood pressure in people with diabetes and high blood pressure is the single most important way to reduce death and disability related to type 2 diabetes.[6] It usually takes years for blood vessels to completely close off and damage to blood vessels can be slowed down or reversed with treatment.[7] There are two tests recommend to be done at least yearly to recognize the presence of the kidney disease as early as possible. It is very important to measure both tests, as abnormal results in either test may indicate kidney disease. The first is a urine test that reveals an increase of a protein called albumin(microalbuminuria) is often the first sign of damage to the kidney. Second is a blood test to measure the level of a chemical called creatinine that is a reflection of kidney filtering. The serum creatinine level is used in a formula to estimate your GFR (glomerular filtration rate).[8]

Material & Methods

This is a prospective observational study, carried out for six months in In- patient and Out-patient clinics of the Department of General Medicine at Dr. B.R. Ambedkar Medical College and Hospital. The study was conducted in correspondence to Dr. B.R. Ambedkar Medical College Ethical Committee. The inclusion criteria were patients above 18 years of age, patients with hypertension and diabetes, patients attending OPD & IPD of general medicine and patients with type 2 diabetes with or without complications and other co-morbid factors. The exclusion criteria were patients below 18 years of age, patients attending departments other than general medicine,

patients without hypertension and diabetes, patients with other illness or infections were ruled out.

Patients satisfying the inclusion criteria were identified in OPD & IPD of department of General medicine. The patients were briefed about the study and oral consent was obtained. Patients Demographic and clinical data was collected from the patient Case report form, Prescription of patients, Patient case sheet/medication chart, Lab reports, by interviewing the patient as well as communication with the physicians. The data collected included patient demographics, duration of hypertension, duration of diabetes, Microvascular Complications and their evaluating parameters, Macrovascular Complications and their evaluating parameters, hypertension and it's evaluating parameters, diabetes and it's evaluating parameters, medication history of hypertension and diabetes as shown on the data collection form.

Statistical Analysis:

The collected data was analysed for mean, Standard Deviation and Percentage calculations wherever applicable

Results:

This study included 150 and majority were females (66.67%). The average age of patients included in the study was 57.97±9.90. Majority of the patients included in the study belonged to the age group 55-64 years 38.67% followed by age group 45-54 years. Majority of the patients included in the study were Obese 51.33% followed by Overweight 15.33%. There were more overweight males compared to females 42.00% as compared to 29.00%. The average duration of Diabetes Mellitus among the study patients was 6.59±5.30 years. Majority of the patients had diabetes for 5-10 years (49, 32.67%) followed by 1-3 years (35, 23.33%). About 8.00% of the patients had diabetes for less than a year. The average duration of Hypertension among the study patients was 5.90±4.88 years. Majority of the patients had hypertension for the duration 1-3 years (55, 36.67%). While more males 46.00% had hypertension for 1-3 years, more females 33.00% had hypertension for 5-10 years. About 6.00% patients in both genders had hypertension for less than a year. 72.00% had atleast one complication associated with Diabetes Mellitus. The most common complication was Peripheral Neuropathy 25.33% followed by Retinopathy 20.67% and Cardiovascular disease 19.33%. Other complications, including Candidiasis and Hyperlipidemia, were seen in a significant proportion of patients 32.00%. Diabetic foot was seen only in 14.67% patients. There were equal proportions of patients with controlled and uncontrolled Diabetes Mellitus. However, diabetes control was found to be generally poor among females as compared to males (53.00% females with uncontrolled diabetes as compared to only 44.00% males. 48.00% in the study received two antihypertensives for hypertension control, while about 2.67% patients received four antihypertensives. Angiotensin-II receptor blockers (ARB) were the most common class 56.00% of antihypertensives used in the study population, followed by Calcium Channel Blockers (CCB) 51.33%. Angiotensin Converting Enzyme Inhibitors (ACEI) were the least prescribed class of antihypertensives. 105 patients had diabetic complication and Calcium Channel blockers were the most commonly prescribed 38.71% antihypertensive agent in patients with Diabetic Nephropathy, followed by the combination of Angiotensin-II Receptor Blocker with diuretic 22.58%. In patients with cardiovascular diseases CCB 34.29% were mostly prescribed followed by Beta-Blockers 20.00%. The combination of Angiotensin-II Receptor Blocker with Diuretic 30.77% were most prescribed in patients with cerebrovascular diseases and in patients with diabetic foot Calcium Channel Blockers 45.83%. In management of diabetes, 58.52% of patients received two OHAs while 13.33%

patients received more than two OHAs. Metformin was the most prescribed oral hypoglycemic agent (OHA). While Metformin was used as mono-therapy in 36 (24.49%) patients, the combination of Metformin with Glimepiride was used in 83 (56.46%) patients.

Discussion

The finding of our study which was a prospective observational study included 150 patients with females 66.67% and males 33.33%. The average age of patients included in the study was 57.97±9.90 and they belonged to the age group 55-64 years. Out of 150 patients 105 had diabetic complications, in patients with Diabetic Nephropathy CCB 38.71% and the combination of ARB with diuretic 22.58% were prescribed, In patients with cardiovascular diseases they were mostly prescribed with CCB 34.29% followed by Beta-Blockers 20.00%, in patients with cerebrovascular diseases combinations of ARB with Diuretic 30.77% were most prescribed and in diabetic foot CCB 45.83% were prescribed. Managing diabetes, Metformin was the most prescribed drug and was used as mono-therapy in 24.49% patients and the combination of Metformin with Glimepiride was used in 56.46% patients aa a dual-therapy.

In our study, majority of the patients were females 66.67%, this distribution was similar to a study conducted by Elke J et al on “evaluation of prescribing patterns in a German network of CAM physicians for the treatment of patients with hypertension: a prospective observational study“ [9] whereby they were 63.5% women and 36.5% men. The average age of patients included in the study was 57.97±9.90 and mostly were females, this is similar to the study conducted by Shah J et al which conducted a Study on “utilization pattern of anti-hypertensive drugs in hypertensive diabetic patients with or without reduced renal function at tertiary care teaching hospital” where they found age group to be 56.04±10.46[10]. Sepúlveda E et al also conducted a study on ”relationship between chronic complications, hypertension and health related quality of life in patients with type 2 diabetes” and found similar finding of age group of 62.7 ± 8.7 years[11]. Majority of the patients belonged to the age group 55-64 years 38.67% followed by 45-54 years 26.67%, this was similar to the study conducted by Janagan T et al which did a study on “Prescription Pattern of Anti-Hypertensive Drugs used in Hypertensive Patients with Associated Type2 Diabetes Mellitus in A Tertiary Care Hospital” where they found 41-50years were 19.2% and 51-60 were 36.4%[12]. In our study 48.00% patient took two and 36% took one antihypertensive(s), the finding were different with the study conducted by Elke J et al on which conducted a study on “Evaluation of prescribing patterns in a German network of CAM physicians for the treatment of patients with hypertension: a prospective observational study” where they found out dual therapy was by 31.2% and monotherapy was by 63.5%[9]. In our study Angiotensin-II receptor blockers (ARB) were the most common class of antihypertensives used in the study population, closely followed by Calcium Channel Blockers (CCB) (51.33%) and Angiotensin Converting Enzyme Inhibitors (ACEI) were the least prescribed class of antihypertensive (3.44%), Shah J et al conducted a study on “utilization pattern of anti-hypertensive drugs in hypertensive diabetic patients with or without reduced renal function at tertiary care teaching hospital and found similar finding which was , the most common prescribed class was ARB (60%) followed by CCB (24%)[10]. In management of diabetes, In this study more patients were under polytherapy, a study conducted by Dhanaraj E et al on “prescribing pattern of antihypertensive agents in T2DM patients visiting tertiary care centre in North India” had similar findings, where they found 55% of T2DM patients were on polytherapy and 41% on monotherapy[13]. Prescribing pattern of OHAs, majority of the patients receiving OHAs, received two OHAs 58.52% while 13.33% patients received more than two OHAs.

Metformin was the most prescribed oral hypoglycemic agent (OHA). While Metformin was used as mono-therapy in 24.49% patients, the combination of Metformin with Glimepiride was used in 56.46% patients, similar finding were obtained in a study conducted by Boccuzzi et al which conducted a study on utilization of oral hypoglycemic agents in a drug-insured U.S. population.[14]

Limitations of the study were; Duration of the study and sample size was not enough, It was a single center study, validity of the findings would be more if it was a multi-center study, the study was carried out only in general medicine of IPD & OPD, was not involving other departmental patients with hypertension and type 2 diabetes mellitus, The prescriptions were collected from a single hospital and it may not be a representative of prescribing pattern across the city also Only adults were included in the study hence prescription pattern of pediatric population was not analysed. Strengths of the study were; it identified the most prescribed antihypertensive medication with the common diabetic complication and It showed a starting point of doing a research on specific antihypertensive drugs in diabetic complications this will help decide type of antihypertensive to be used to slower the progression of the diabetic complications.

Conclusion

This study revealed that most of the hypertensive patients with associated Type 2 Diabetes mellitus were given one or two drugs and among them calcium channel blockers as monotherapy and Angiotensin receptor blockers with diuretics as dual therapy were the most commonly used agents. The prescribing pattern was mostly consistent with the evidence-based guidelines, as majority of the patients were in control of both diabetes and hypertension. Further studies need to be performed, encompassing medication adherence in a larger sample size. Calcium channel blockers was prescribed mostly in patients with diabetic complications like diabetic neuropathy, Cardiovascular diseases and diabetic foot. A larger sample size may be necessary to reach a conclusion on the benefits of particular classes of drug in different diabetes complications so as to slower their progression.

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