

# Prescribing pattern of diabetic patients with and without chronic kidney disease: A cross sectional study in a tertiary care hospital in Mandya

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## Abstract-

**BACKGROUND:** Diabetes Mellitus (DM) is a metabolic syndrome which is characterized by elevated level of glucose in the blood due to body's inability to produce or respond to insulin. Chronic kidney disease (CKD) describe as the gradual decrease in kidney function. The kidney filters waste and excess fluids from the blood that excreted in the form of urine. Diabetic is a common cause for CKD. People who are suffering from diabetes cause kidney damage by various factors, including changes in kidney due to diabetes. The main aim of our study is to upgrade patient knowledge about DM and CKD and also to describe the prescribing pattern involved in it. **OBJECTIVE:** To describe prescribing pattern of drugs for diabetes patients with CKD and also for DM patients without CKD. **METHODOLOGY:** A cross-sectional study on 230 diabetes patients with and without CKD was enrolled from the Department of general medicine, MIMS Mandya. **RESULTS:** Out 230 patients, 111 suffered from diabetes with CKD and 119 suffered from diabetes without CKD. The study shows that the majority of the patients were prescribed with OHA (57%) rather than insulin (43%) in diabetes patients without CKD and insulin (53%) rather than OHA (47%) in diabetes patients with CKD. In our study, among OHA Metformin (36.54%) was most commonly prescribed drug in diabetes patients without CKD and Metformin + Glimipiride ( 34.83%) was most commonly prescribed drug in diabetes patients with CKD. Among insulin, short acting insulin (HUMAN ACTRAPID) was most commonly prescribed for diabetic patients without CKD (69%) and diabetic patients with CKD (64%). **CONCLUSION:** The study shows that in diabetes patients, developing a CKD is more common than in non-diabetic patients. So we can make better patient quality of life by monitoring and controlling the blood sugar level in diabetes patients, which can reduce the risk of CKD.

**Key Words:** DM, CKD, Oral Hypoglycaemic Agent (OHA), Insulin.

## I. INTRODUCTION

Diabetes mellitus (DM) is a metabolic syndrome which is characterized by elevated level of glucose in the blood due to body's inability to produce or respond to insulin. There are two clinically important types of diabetes. They are: Type 1 DM, or insulin-dependent DM; and Type 2 DM, or non-insulin-dependent DM.<sup>1</sup> Chronic kidney disease (CKD) describe as the gradual decrease in kidney function. The kidney filters waste and excess fluids from the blood that excreted in the form of urine. At end stage of renal disease, dangerous levels of fluid, electrolytes, and waste can accumulate in the body.<sup>2</sup> People with diabetes cause kidney disease by various factors, including changes in the kidney due to diabetes. Diabetic people have a high level of blood glucose in their blood that can damage the kidneys and lead to kidney failure.<sup>3</sup>

Various anti-diabetic medications, such as insulin and oral hypoglycemic agents (OHA), are used in the management of DM, and intend to decrease blood sugar levels and keep up normal glucose level in the blood.<sup>4</sup> Clearance of some anti-diabetic drugs is decreased in renal patients. It increases the chances of hypoglycemia, especially for insulin and sulfonylureas. The metformin use can lead to lactic acidosis in advanced renal failure patients. Many new medications have been introduced into the market, such as glucagon-like peptide-1 receptor agonists (GLP-1) and dipeptidyl peptidase-4 inhibitors (DPP-4).<sup>5</sup>

Globally, diabetes considered as the ninth- prime cause of death. Around 2 million deaths occur every year due to DM alone and kidney failure due to DM.<sup>6</sup> The diabetes prevalence in India elevated from 7.1% in 2009 to 8.9% in 2019. India comes after China in the global epidemic of diabetes, with 77 million people.<sup>7</sup> The prevalence of ESRD patients with DM rose from 19% to 29.7% in 2015. Sudden rate changes happened in the Western Pacific and Eastern Mediterranean Regions, and the slowest increases were found in Europe (40.5%).<sup>8</sup> In India, the CKD prevalence in DM patients was about 48.4%.<sup>9</sup>

## I.METHODS

The current study was carried out in MIMS Teaching hospital. A cross sectional study conducted in General medicine department MIMS Mandya for 6 months. According to inclusion and exclusion criteria 230 cases were collected. Ethical approval was attained from the "Ethics committee" of MIMS Teaching hospital, Mandya. Data will be collected from patients who will be admitted in General medicine department, which includes social demographic details like Name, Age, and Sex. It also contains details on diagnosis, treatment and management of disease.

### Inclusion criteria:

- All adult diabetic patients with and without CKD admitted to department of General Medicine.

- Patient giving informed consent.

#### Exclusion Criteria:

- Pregnant and lactating patients.

**Statistical analysis:** Descriptive Statistics like Mean with suitable known parametric statistics has been applied to the current study. Easy percentage calculation will be done to reach the conclusion of our study. Data will be entered to generate graphs, tables etc. by using Microsoft Excel and Word.

## II.RESULT

### *Patient distribution according to gender*

A total of 230 patient's data was collected from the in-patient department of general medicine at MIMS hospital within the duration of six months. Among 230, 110(48%) are males and 120(52%) are females. In our study, the more susceptible gender of patients prone to DM was female which is similar to study conducted by Lalith Kumar et al.,<sup>10</sup> and patients prone to DM with CKD was male which is similar to study conducted by Jo-Anne-Manski-Nankervis et al.,<sup>11</sup>.

Out of 230 patients, 119 have DM without CKD along with other disease, and 111 have DM with CKD along with other disease. Out of 119 patients, 52 are males and 67 are females, and out of 111 patients, 57 are males and 54 are females.

### *Patient distribution based on age*

The 230 patient's data was evaluated in the present study. Among these patients, 28 (12.17%) were in the age group of 31-40, 45 (19.56%) were in the age group of 41-50, 65 (28.26%) were in the age group of 51-60, 55 (23.91%) were in the age group of 61-70, 29 (12.6%) were in the age group of 71-80 and 8 (3.47%) were in the age group of 81-90. The age group of 51-60 years followed by 61-70 years shows greater prevalence of DM in the current study, which is related to the study carried out by Ashok et al.,<sup>12</sup>. The minimum age was between 81 and 90 year.

### *Prescription pattern of anti-diabetic drugs in diabetic patients with and without Chronic kidney disease*

Out of 230, 119 patients have DM without CKD, and 119 prescriptions were analyzed. Anti-diabetic agents, including insulin and oral hypoglycemic agents were prescribed for the patients, and 43% were insulin and 57% were OHA.

Among insulin, short acting insulin was commonly prescribed followed by intermediate + short acting insulin. Among OHA, Metformin was commonly prescribed drug which is followed by combination of metformin + glimipiride.

Out of 230, 111 patients have DM with CKD, and 111 prescriptions were analyzed. Anti-diabetic agents, including insulin and oral hypoglycemic agents were prescribed, and 47% were OHA were 53% were insulin.

Among insulin, short acting insulin was commonly prescribed followed by intermediate + short acting insulin. Among OHA, combination of Metformin + Glimipiride was commonly prescribed followed by Metformin.

**Table 1: Prescription pattern of anti-diabetic drugs in diabetic patients**

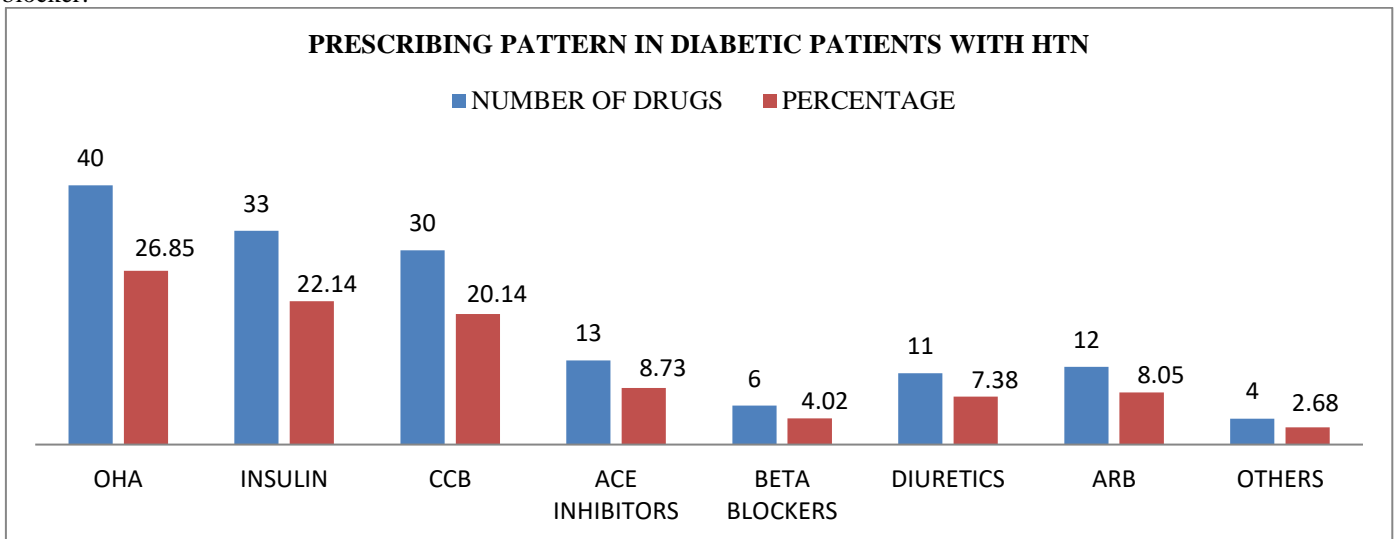
Anti-diabetic agents used in DM patients without CKD			Anti-diabetic agents used in DM patients with CKD		
Anti-diabetic drugs	Number of drugs	Percentage	Anti-diabetic drugs	Number of drugs	percentage
Short acting insulin	54	29.67%	Short acting insulin	64	33.86%
Intermediate+ short acting insulin	20	10.98%	Intermediate+ Short acting insulin	33	17.46%
Long acting insulin	4	2.19%	Long acting insulin	3	1.58%
Metformin	38	20.88%	Metformin	24	12.69%
Vildagliptin	8	4.39%	Teneligliptin	8	4.23%
Glimipiride	5	2.76%	Dapagliflozin	6	3.18%
Dapagliflozin	4	2.19%	Glimipiride	9	4.76%
Metformin+ Glimipiride	31	17.05%	Metformin+ Glimipiride	31	16.42%
Vildagliptin+ Dapagliflozin	5	2.75%	Metformin+ Vildagliptin	4	2.12%
Metformin+ Glimipiride+ Pioglitazone	7	3.85%	Metformin+ Glimipiride+ Pioglitazone	4	2.12%
Metformin+ Glimipiride+ Voglibose	6	3.29%	Metformin+ Dapagliflozin	3	1.58%

### *Drug prescription pattern in diabetes patient without chronic kidney disease*

The prescriptions of 230 patients were interpreted in the study, among 119 patients had DM without CKD along with other co morbidities. Almost all patients enrolled in the study had at least more than 1 co-morbid condition. Out of 119 patients, 51 had DM +Hypertension, 21 had DM +Cerebrovascular accident, 32 had DM + Ischemic heart disease +Hypertension and 15 had DM + Others.

**Prescription pattern of drugs in diabetic patients with Hypertension**

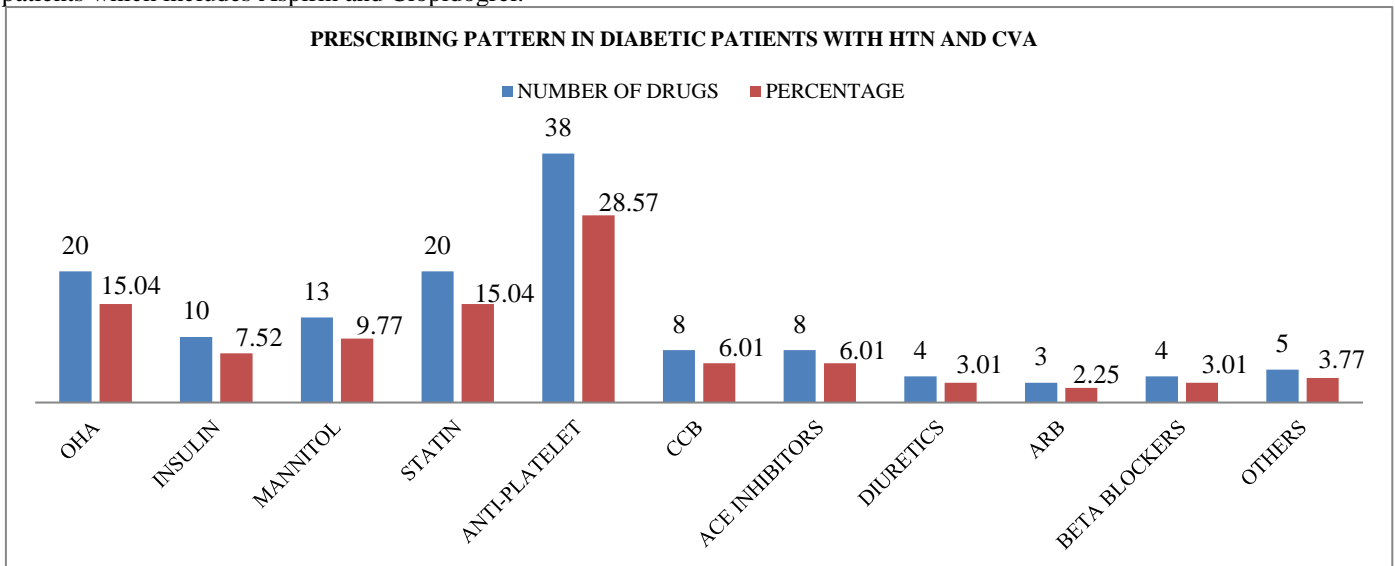
Out of 119 patients, 51 patients had hypertension (HTN) along with DM. It was found that OHA was more commonly used in diabetic patients than insulin. Most commonly prescribed OHAs were metformin and antihypertensive were Calcium channel blocker.



**FIGURE 1: Prescription pattern of drug in diabetic patients with Hypertension**

**Prescription pattern of drugs in diabetic patients with Hypertension & Cerebrovascular accident**

Out of 119 patients, 21 patients had hypertension and CVA along with DM. OHA was more commonly used in diabetic patients than insulin. Most commonly prescribed anti-diabetic agent was Metformin and anti-platelet was commonly prescribed for CVA patients which includes Aspirin and Clopidogrel.



**FIGURE 2: Prescription pattern of drugs in diabetic patients with Hypertension & Cerebrovascular accident.**

**Prescription pattern of drugs in diabetic patients with Hypertension & Ischemic heart disease**

Out of 119 patients, 32 had HTN and IHD along with DM. OHA was more commonly used in diabetic patients than insulin. Most commonly prescribed anti-diabetic agents were combination of metformin and glimipiride, Anti-hypertensive drugs were Metoprolol and cardiac drugs were nitroglycerin. Anti-coagulants such as low molecular weight heparin were prescribed for the patients.

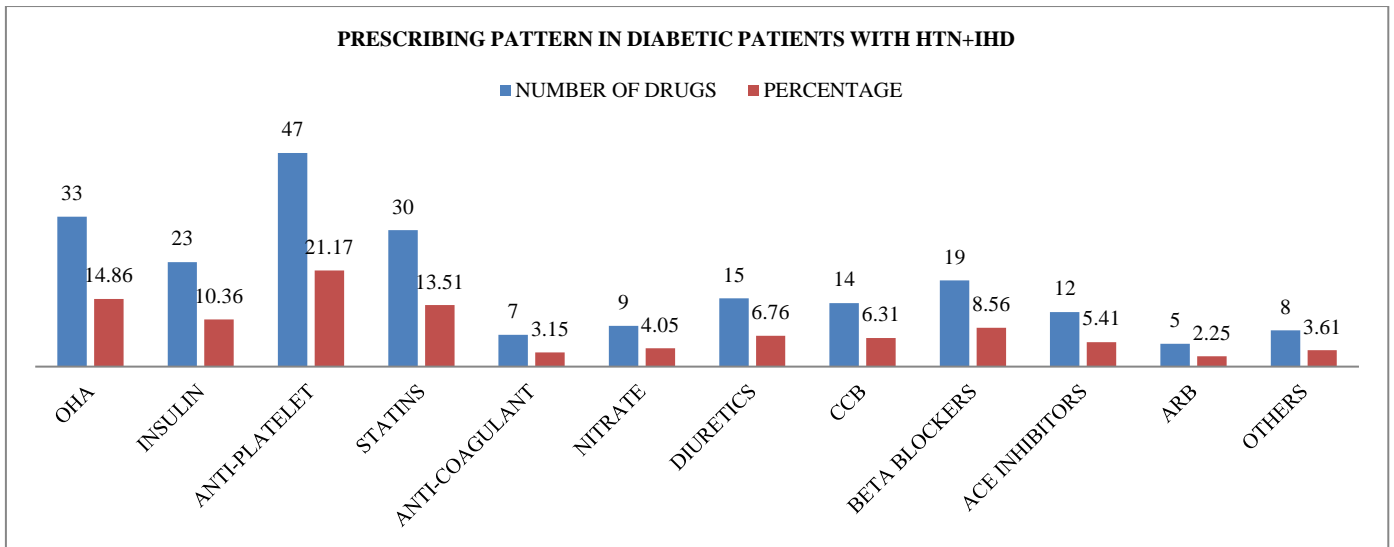


FIGURE 3: Prescription pattern of drugs in diabetic patients with Hypertension & Ischemic heart disease.

**Drug prescription in diabetic patterns with chronic kidney disease**

The prescriptions of 230 patients were interpreted in the study, among 111(48.26%) patients had DM with CKD along with other co morbidities. Out of 111 patients, 46 had DM+ CKD+ Hypertension, 31 had DM+CKD+ Hypertension + Ischemic heart disease, 18 had DM+CKD+ Hypertension +Anemia, 13 had DM+CKD+ Cerebrovascular accident and 3 had DM+CKD+others.

**Prescription pattern of drugs in diabetic patients with Chronic kidney disease & Hypertension**

Out of 111 patients, 46 were found to be having HTN along with DM and CKD. Among 46 patients, 14 were on Hemodialysis. Insulin was commonly used in diabetic patients than OHA. Most commonly prescribed OHA was combination of Metformin and Glimpiride and anti-hypertensive were Amlodipine.

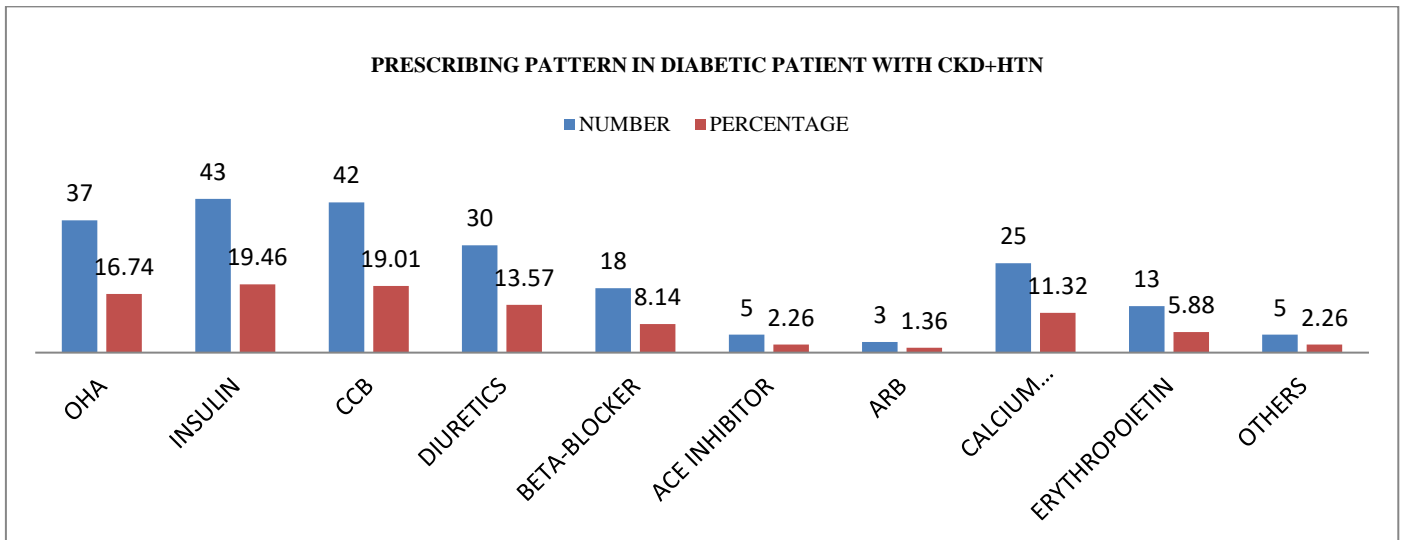
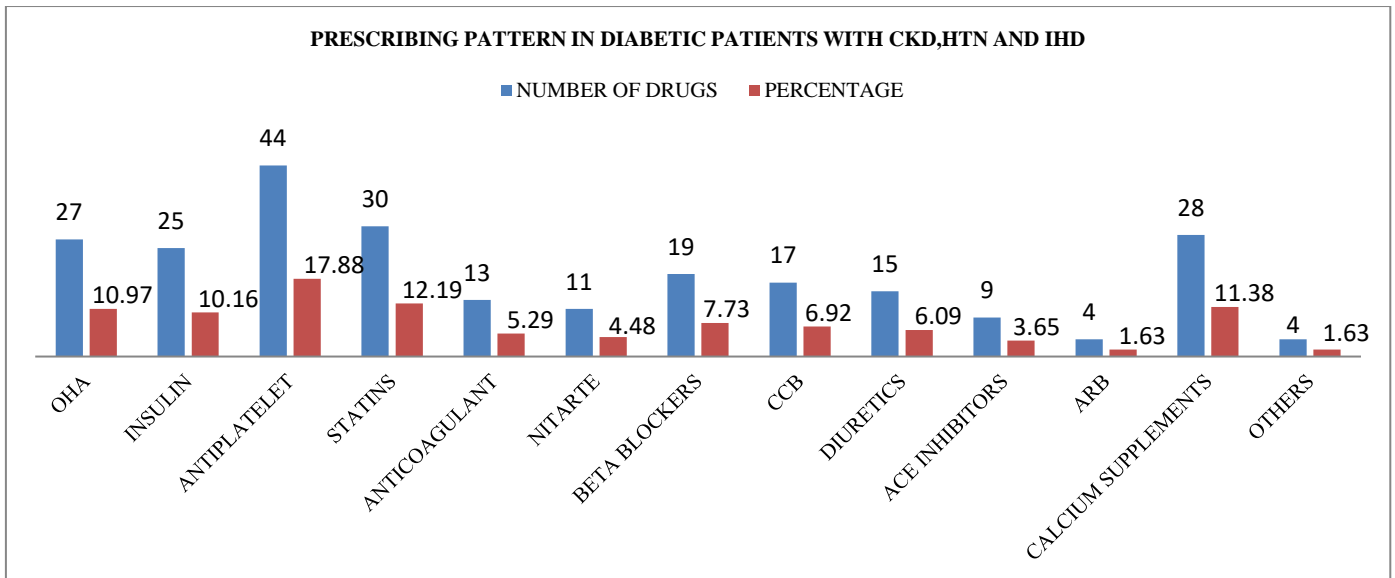


FIGURE 4: Prescription pattern of drug in diabetic patient with Chronic kidney disease & Hypertension

**Prescription pattern of drugs in diabetic patients with chronic kidney disease, Hypertension & Ischemic heart disease**

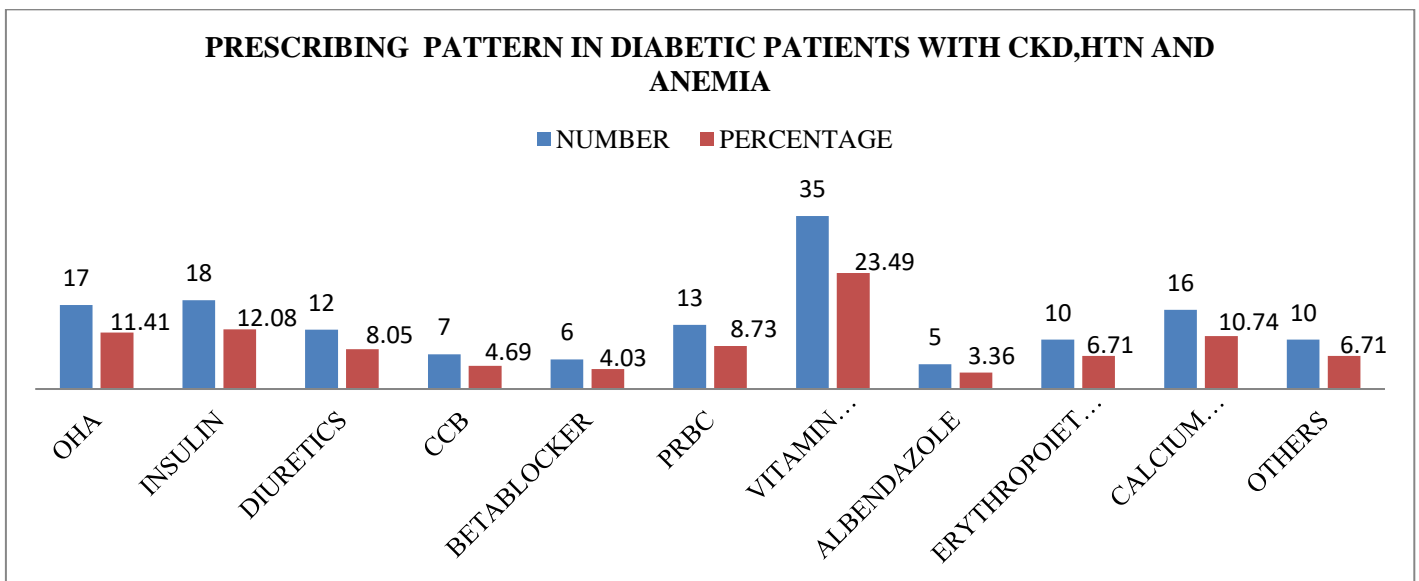
Out of 111 patients, 31 were found to be having HTN and IHD along with DM and CKD. Among 23 patients 4 were on Hemodialysis. OHA was commonly prescribed for patients than insulin. Most commonly prescribed OHA were metformin and antihypertensive drug were Carvedilol. Anti-platelets such as Aspirin and Clopidogrel, anti-coagulants such as Unfractionated heparin and nitrates such as Isosorbide dinitrate were prescribed for patients.



**FIGURE 5:** Prescription pattern of drug in diabetic patients with Chronic kidney disease, Hypertension & Ischemic heart disease.

**Prescription pattern of drugs in diabetic patients with Chronic kidney disease, Hypertension & Anemia**

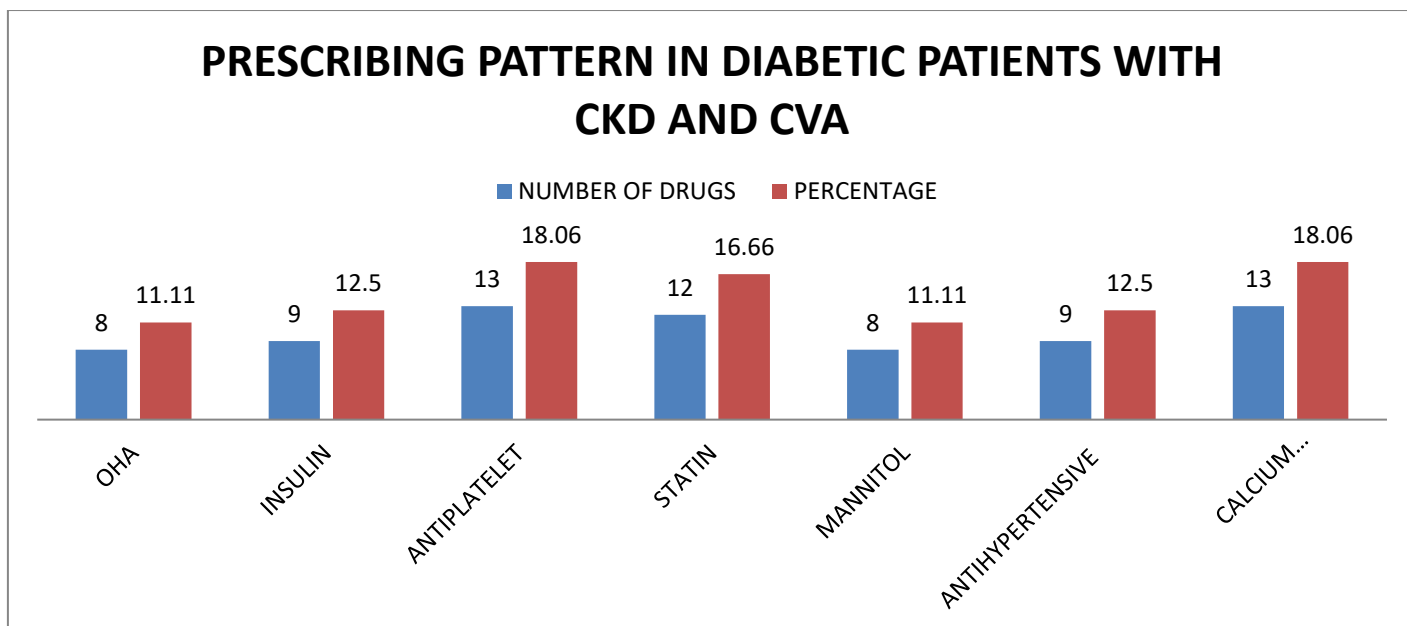
Out of 111 patients, 18 were found to be having HTN and ANEMIA along with DM and CKD. Among 18, 7 were on Hemodialysis. Insulin was commonly prescribed for the patients than OHA. Most commonly prescribed OHA were Metformin + Glimipiride and antihypertensive were Furosemide. Packed red blood cells transfusion and vitamin supplements were used to treat anemic condition.



**FIGURE 6:** Prescription pattern of drugs in diabetic patients with Chronic kidney disease, Hypertension & Anemia.

**Prescription pattern of drugs in diabetic patient with Chronic kidney disease and Cerebrovascular disease**

Out of 111 patients, 13 were found to have Cerebrovascular accident along with DM and CKD. Among 13, 5 were on Hemodialysis. Most commonly prescribed drugs were anti-platelet including Aspirin and Clopidogrel followed by insulin. Insulin was commonly prescribed than OHA. Most commonly prescribed OHA were Metformin + Glimipiride.



**FIGURE 7: Prescription pattern in diabetic patients with Chronic kidney disease and Cerebrovascular accident**

#### RELATIVE RISK (RR) AND ODDS RATIO (OR)

**TABLE 2: Relative risk (RR) and Odds Ratio (OR) based on Diabetes mellitus as risk factor**

EXPOSURE	OUTCOME(CKD)		P VALUE, 95% CI
	YES	NO	
Present (DM)	a=111	b=119	RR- P< 0.0001, 1.354-2.221
Absent (DM)	c=64	d=166	OR- P< 0.0001, 1.642-3.564

$$RR = a / (a+b) / c / (c+d) = (111/230) / (64/230) = 1.73$$

$$OR = a \times d / b \times c = (111 \times 166) / (119 \times 64) = 2.41$$

The present study demonstrates that the RR and OR values are greater than 1 in DM patients which show a higher risk for CKD.

### III. CONCLUSION

Treatment patterns in diabetic patients with CKD and without CKD were identified, allowing us to describe the use of anti-diabetics with nephroprotective properties. A cross sectional study was conducted by assesses the prescribing pattern for patients having DM with CKD and without CKD in a tertiary care hospital Mandya. In our study we observed that the DM was more common in females when compared to males. Majority of the patients were from the age group of 51-60 years. The demographic data shows that the prevalence of DM with CKD was more in males than in females and prevalence of DM without CKD was more in females than in males. The study shows that in the diabetes patients developing a CKD is more than the non-diabetic patients.

The required details were collected from the patient's case sheets were recorded in a suitably designed patient profile form. Out 230 patients 111 patients were suffered from diabetes with CKD and 119 patients were suffered from diabetes without CKD. The study shows that the majority of the patients were prescribed with OHA (57%) than insulin (43%) in diabetes patients without CKD and prescribed with insulin (53%) than OHA (47%) in diabetes patients with CKD. Among OHA Metformin (36.54%) was most commonly prescribed drug in diabetes patients without CKD and Metformin + Glimipiride ( 34.83%) was most commonly prescribed drug in diabetes patients with CKD. Among insulin, short acting insulin (HUMAN ACTRAPID) was most commonly prescribed for diabetic patients without CKD (69%) and diabetic patients with CKD (64%). The other drugs prescribed in our study were CCB, diuretics, beta blockers, ACE Inhibitors, ARBs, Calcium supplements, erythropoietin, lipid lowering agents, cardiac drugs and others.

In our study, out of 111 diabetic patients with CKD, 49 were undergone for hemodialysis. Calcium supplements and erythropoiesis- stimulating agents were prescribed to most of the patients with kidney disease.

The study showed that the relative risk and odds ratio value among the patients with diabetes mellitus is greater than 1.00 indicates increased risk for CKD.

The study shows that in the diabetes patients developing a CKD is more than the non-diabetic patients. So we can improve the patient quality of life by monitoring and controlling the blood sugar level in diabetes patients that can reduce the risk of chronic kidney disease.

#### REFERENCES:

- Sandip Kumar Kundu, Sibaprakash Mukherjee and Shubhrangsu Samanta, "A cross-sectional study to find out the significant prevalence of chronic kidney disease in type 2 diabetics in eastern India," Asian Journal of Pharmaceutical And Clinical Research, vol. 15, pp. 144-152, March 2022.
- Chronic Kidney Disease " <https://www.paho.org>"

3. Meda E.Pavkov, The link between Diabetes and Kidney Disease "[www.niddk.nih.gov](http://www.niddk.nih.gov)" 2020 March
4. Kalpana Tiwari, Manisha Bisht, Ravi Kant and Shailendra S. Handu,. "Prescribing pattern of anti-diabetic drugs and adherence to the American Diabetes Association's 2021 treatment guidelines among patients of type 2 diabetes mellitus: a cross sectional study", *Journal of Family Medicine and Primary Care*, vol. 11, pp 6159-6164, October 2022.
5. Jinnie J. Rhee, Jialin Han, Maria E. Montez-Rath , Sun H. Kim , Mark R. Cullen, Randoll S. Stafford, Wolfgang C. Winkelmayr, Glenn M. Chertow, "Anti-diabetic medication use in patients with type 2 diabetes and chronic kidney disease," *Journal of Diabetes and its complications*, vol. 33, pp.107423-107434, November 2019.
6. Epideomology of diabetes "[en.m.wikipedia.org](http://en.m.wikipedia.org)"
7. Rajendra Pradeepa and Viswanathan Mohan,"Epidemiology of T2DM in India," *Indian Journal of Ophthalmology*, vol. 69, pp. 2932-2938, November 2021.
8. Hui-Teng Cheng, Xiaoqi Xu, Paik Seong Lim, Kuan-Yu Hung, "Worldwide epidemiology of diabetes related end stage renal disease 2000-2015," *Diabetes care*, vol. 44, pp. 89-97, 2021.
9. Rajesh Rajput, K M Prasanna Kumar, Krishna Seshadri, Pankaj Agarwal, Pradeep Talwalkar, Bhavesh Kotak, Ammar Raza, Hardik Vasnawala, Amit Kumar " Prevalence of chronic kidney disease in type 2 diabetes mellitus patients: START-India Study," *Journal of diabetes and metabolism*, vol.8, pp.1-5, January 2017.
10. Lalit Kumar,Dr.SK Gupta and Dr.Anupam Prakash, "Assesment of the prescription pattern of antidiabetic drugs in type2 diabetes mellitus patients,"*The Pharma Innovation Journal* , vol. 7, pp. 392-394, 2018.
11. Jo-Anne Manski-Nankervis, Sharmala Thuraisingam, Janet K. Sluggett, Gary Kilov, John Furler, David o'Neal, Alicia Jenkis, , " Prescribing of diabetes medications to people with type 2 diabetes and chronic kidney disease: a national cross-sectional study," *BMC family practise*, vol. 20, pp. 1-11, February 2019.
12. Dr.Purnima Ashok, Vijesh Thollur Subrahmanian ,Rinju Raj, Rahul Rajendra Babu, Ramshad T.P, Kevin L, " Prescription pattern analysis of type2 diabetes mellitus in patients and associated co-morbidities.," *Journal of Drug Delivery and Therapeutics*, vol. 10, pp. 42-4, 2020.