

PRESCRIBING PATTERN OF ANTI-DIABETIC DRUGS AMONG DIABETIC OUTPATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Diabetes has gradually emerged as one of the most serious public health problems in our country. This underlines the need for timely disease detection and decisive therapeutic intervention. Poor glycaemic control in diabetes mellitus can be prevented by using rational use of oral hypoglycaemic agents (OHA). Rational use of the drugs in populations can be effectively evaluated using drug utilization studies. **Objective:** To determine the drug utilization pattern of antidiabetic agents in a tertiary care teaching hospital. **Materials and Methods:** This study was a hospital based cross sectional study conducted in the diabetes clinic of tertiary care hospital. All the relevant data were collected and drug utilization pattern of antidiabetic agents was determined among 285 Type II diabetic patients. **Results:** Average number of drugs per prescription was found to be 2.43. 86 (18.14%) of the drugs were prescribed by generic name. Majority (64.56%) of the patients were on combination therapy and 35.43% of patients were on antidiabetic monotherapy. Biguanides accounted for (51.47%) of all the prescribed drugs followed by sulfonylureas (20.25%), DPP4 inhibitors (8.22%) and oral antidiabetic combination therapy. Encounter with parenteral preparation (injection) was 15.82% Encounter with an antibiotic was 19 (8.63%) Drugs prescribed from national essential drug list were 64.34%. **Conclusion:** Metformin was the most frequently prescribed drug in diabetes. Prescription by Brand name is a matter of concern.

INTRODUCTION

The World Health Organization predicted a 50% increase in deaths from diabetes over next 10 years, and by 2030, diabetes is projected to be the seventh leading cause of death. These estimated extrapolations and predictions are worrisome statistics in relation to the potential burden that diabetes may impose upon the country.^[1] Diabetes mellitus (DM) is the chronic disorder emerging as major health problem which increases the rate of morbidity and mortality.^[2] Poor management of these two disorders leads to several complications.^[3] Management of DM requires both pharmacological and nonpharmacological interventions. In this regard drug utilization study was conducted to determine the drug utilization pattern of antidiabetic medicines. Rational use of the drugs is defined as follows: "That patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time and at the lowest cost to them and their community".^[4] Rational use of the drugs in populations can be effectively evaluated with drug utilization studies. The World Health Organization (WHO) defines "drug utilization" as the marketing, distribution, prescription and use of the drugs in a society considering its medical, social, and economic consequences.^[5] The study will help to identify any change if any in the prescription trends of antidiabetic drugs as monotherapy as well as

combination therapy in light of the new drugs being introduced and widely being used clinically.

MATERIALS AND METHODS

The present study was a hospital based cross sectional study conducted in the diabetes clinic of tertiary care hospital focusing on drug utilization pattern among Type II diabetic patients. The study was performed using prescriptions of around 285 patients suffering from diabetes. All the data, which was collected from the outpatient department, were shown in the form of tables. Prescriptions of newly registered patients was studied. Patients of either sex and age group of 18 years and above with diabetes have been selected for the study. Patients with gestational diabetes were excluded from the study.

Patient's data such as the age, name, gender and data on prescribed drugs that include name of drug, dosage form, route of administration, most prescribed drug and so on were recorded on a customized data collection sheet in an approved manner. Each drug was counted only once without considering any change in the regimen.

RESULT

WHO core prescribing indices Total numbers of antidiabetic drugs prescribed were 474 average number of

drugs encountered per prescription was found to be 1.66. 86 (18.14%) of the drugs were prescribed by generic name. Encounter with parenteral preparation (injection) was 15.82% Encounter with an antibiotic was (8.63%). Drugs prescribed from national essential drug list were 64.34%.

During the study period, 285 patients with DM were considered. Out of the 694 drugs were prescribed with an average of 2.43 per encounter. Of the 694 drugs, 474 (68.29%) were antidiabetic drugs and 220 (31.70%) were for co-morbid conditions, 67.6% were for men and 32.4% were for women indicating that men predominated over women (Fig.1). Maximum patients with Diabetic Mellitus were of the age group of 51- 60 years 156 (54.73%) followed by the age group of 41 to 50 years 75 (26.31%). Greater prevalence in this age

group may be due to change in life style, lack of exercise and stress.

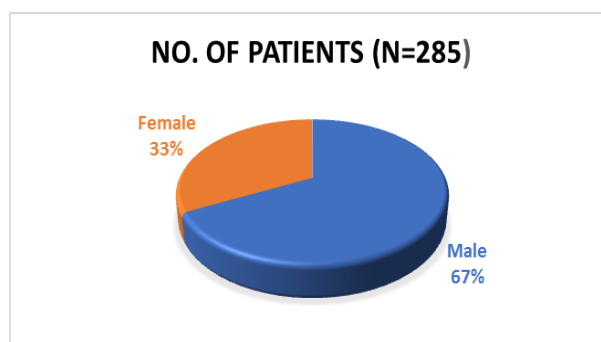


Figure 1.

Table 1. Demographic Characteristics of the Study Population.

Age group (years)	Male (%)	Female (%)	Total
< 30	5 (2.63%)	2 (2.10%)	7(2.45%)
31- 40	12(6.31%)	6 (6.31%)	18 (6.31%)
41 – 50	51(26.84%)	24 (25.26%)	75 (26.31%)
51 – 60	105 (55.26%)	51 (53.68%)	156 (54.73%)
> 60	17 (8.9%)	12 (12.63%)	29 (10.17%)
Total	190 (67%)	95 (33%)	285 (100.0)

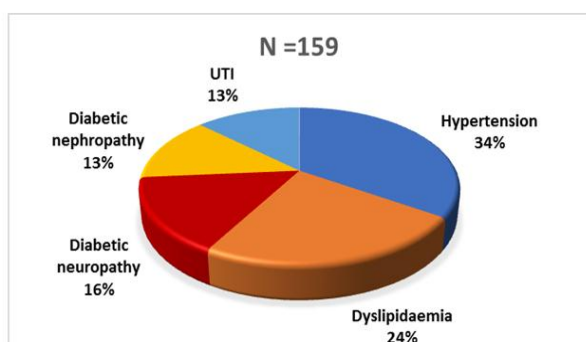


Figure 2. Comorbid conditions were found in 159 patients of which hypertension was most common. Other co-morbid conditions include Dyslipidaemias, diabetic neuropathy, diabetic nephropathy, acute urinary tract infections.

Antihypertensive drugs were prescribed very commonly as hypertension was the most frequent associated comorbidity in the study samples. Among them angiotensin converting enzyme inhibitors were given in 27 patients (52.94%) (Figure 2). Calcium channel blockers were given in 10 (19.60%) cases. Diuretics were prescribed in 9 cases (17.64%). Beta blockers were less frequently used, being only in 5(9.8%) cases.

Antiplatelets were prescribed to 43 patients. Among them aspirin 75 mg was given most commonly (41 cases) and clopidogrel 75 mg was given only in 2 cases.

HMG-Co A reductase inhibitors were given in 35 patients (52.48%). Atorvastatin was given to 25 patients

and rosuvastatin in 10 patients. For diabetic neuropathy, patients were prescribed cyclic GABA analogues. They were given to 23 patients (10.45%). Nitrates were given in 11 cases. Proton pump inhibitors were prescribed in 38 cases. Among them pantoprazole was commonest.

21(13%) patients presented with UTI of which 19 (8.63%) received antimicrobials. Levofloxacin was used most commonly among antibiotics (Figure 2).

Table 2: Percentage of Anti-Diabetic Drugs Prescribing Pattern.

Anti-diabetic drugs	n (%)
Metformin	86 (18.14%)
Glimepiride	10 (3.50%)
Voglibose	2 (0.70%)
Pioglitazone	3 (1.05%)
Metformin+ sitagliptin	20 (7.01 %)
Metformin+ Teneligptin	19 (6.66%)
Metformin+ glimepiride	73 (25.61%)
Metformin+ glipizide	9 (3.15%)
Metformin+ glimepiride+ pioglitazone	4(1.4%)
Metformin + Canagliflozin	6 (2.10%)
Metformin +Repaglinide	5 (1.75%)
Insulin degludec +insulin aspart	8 (3.15%)
Insulin regular+ insulin isophane	18 (5.96%)
Metformin+ insulin glargine	9 (3.15%)
Metformin+ insulin aspart	9 (3.15%)
Metformin+ insulin lispro	4(1.4%)

101 (35.43%) patients were prescribed anti-diabetic drugs as monotherapy and 184 (64.56%) were given combination therapy. 162 (56.84%) were prescribed FDCs and 22 (7.71%) were prescribed non-FDC combination therapy. Most common drug used as monotherapy was metformin (n=86) and most prescribed drugs in combination therapy were glimepiride and metformin (n=73) Table:2,3. Metformin was the only drug prescribed by generic name (18.14%).

Table 3: Frequency of Prescribing of Anti-Diabetics Drugs.

Anti-diabetic drugs	N (%)
Biguanides	244 (51.47%)
Metformin	244 (51.47%)
Sulfonylureas	96 (20.25%)
Glimepiride	87 (18.35%)
Glipizide	9 (1.8%)
Dipeptidyl peptidase-4 Inhibitors	39 (8.22%)
Sitagliptin	20 (4.21%)
Teneligliptin	19 (4.0%)
α-glucosidase Inhibitors	2 (0.421%)
Voglibose	2 (0.421%)
Thiazolidinedione's	7 (1.47%)
Pioglitazone	7 (1.47%)
Meglitinides	5 (1.05%)
Repaglinide	5 (1.05%)
SGLT-2 inhibitors	6 (1.26%)
Canagliflozin	6 (1.26%)
Rapid Acting Insulin's	22 (4.64%)
Insulin Lispro	4 (0.84%)
Insulin Aspart	17 (3.58%)
Short Acting Insulin	18 (3.79%)
Regular insulin	18 (3.79%)
Intermediate Acting Insulin's	18 (3.79%)
Isophane insulin	18 (3.79%)
Long Acting Insulin's	17 (3.58%)
Insulin Glargine	9 (1.89%)
Insulin Degludec	8(1.68%)

Table 5: WHO Drug Prescribing Indicators.

WHO drug use indicators	N (%)
Average Number of Drugs Per Prescription	2.43
Average Number of Anti-Diabetic Drugs Per Prescription	1.66
Number of Fixed Dose Combinations (Fdc) Prescribed	162 (56.84%)
Drugs Prescribed by Generic Name	86 (18.14%)
Drugs Prescribed by Proprietary Name(s)	388 (81.85%)
Encounters with an Antibiotic Prescription	19 (8.63%)
Drugs prescribed From National Essential Medicine List (NLEM)	305 (64.34%)

Table 5. displays WHO drug prescribing indicators. The average number of drugs per prescription was found to be 2.43. 86 (18.14%) of the drugs were prescribed by generic name. Encounter with an antibiotic was 19 (8.63%) Drugs prescribed from national essential drug list were 64.34%.

Table: 4 Fixed Dose Combination Therapy.

Fixed dose Combinations	%
Metformin+ sitagliptin	20 (7.01 %)
Metformin+ Teneligliptin	19 (6.66%)
Metformin+ glimepiride	73 (25.61%)
Metformin+ glipizide	9 (3.15%)
Metformin+ glimepiride+ pioglitazone	4(1.4%)
Metformin + Canagliflozin	6 (2.10%)
Metformin +Repaglinide	5 (1.75%)
Insulin regular+ insulin isophane	18 (5.96%)
Insulin degludec +insulin aspart	8 (3.15%)

Table 4 depicts Fixed drug combination prescribed were 162 (56.84%) among total prescriptions. There were two type of fixed dose combinations prescribed: two drug combinations 158 (55.43%) and triple drug combination 4(1.4%). Amongst two drug combination: commonest prescribed was Metformin + Glimepiride 73(25.61%), Metformin+ sitagliptin was encountered in 20 (7.01%), Metformin + Teneligliptin 19 (6.66%) and Metformin + Canagliflozin 6 (2.10%) and the least commonly prescribed was Metformin +Repaglinide 5(1.75%) cases. 4(1.4%) type II diabetics were prescribed three drug combination Metformin+ glimepiride+ pioglitazone. Amongst insulin therapy Insulin regular+ insulin isophane (5.96%) was most commonly prescribed.

DISCUSSION

Diabetes mellitus is a metabolic disorder as stated by WHO which requires the chronic treatment^[6] Besides the life-style modifications and dietary changes, the pharmacological treatment an integral component in the management of diabetes.^[7]

This study focused on the prescription pattern among diabetic patients attending the outpatient departments in the hospital the principal aim of drug utilization research is to facilitate the rational use of drugs in populations. For the individual patient, the rational use of a drug implies the prescription of a well-documented drug at an optimal dose, together with the correct information, at an affordable price. Knowledge of how drugs are being prescribed and used, will help to identify issues if any addressing rational drug use or suggest measures to improve prescribing habits.^[8] With this point of view the study was designed. A drug utilization study is considered to be one the most effective methods to assess and evaluate the prescribing attitude of physician and help to promote rational use of drugs.

Out of the 285 patients evaluated in our study, 67.6% were males and 32.4% were females. Males predominated in the study population which is in agreement with the results of various other studies in India and United States.^[9] These results also corroborate with the findings of a cohort study conducted in the U.S. which also reported a male preponderance for DM.^[10] In present study, WHO drug use indicators were analysed from prescriptions of all 285 patients. Result demonstrated that the average number of drugs encountered per prescription was found to be 2.43. In this study, average number of drugs prescribed is less as compared to result of Upadhyay DK et al.^[11] and V. Karthikeyan et al.^[12] (4.83 per prescription). However, the average number of drugs prescribed is more compared to that reported by Das Priya et al.^[13] (1.83 per prescription), and Kannan et al. (1.4 per prescription).^[14] The average number of antidiabetic drugs prescribed was 1.66 per encounter, as in the study by Alex et al. (1.81),^[15] and slightly more than the study by Kannan et al (1.4),^[14] and lesser than the study by Dutta et al (2.13).^[16]

Metformin was the most common drug prescribed as monotherapy, and even as a part of combination therapy. These findings were similar to several other studies and also in the study by Dutta S et al.^[16,17]

Newer drug sitagliptin is increasingly being prescribed in comparison to earlier studies, although as a part of combination therapy.^[17] Sitagliptin is associated with very low risk of hypoglycaemia and other side effects in comparison to sulphonylureas as monotherapy and as combination therapy with metformin.^[18] Pioglitazone was less prescribed, probably because of more adverse effects of weight gain and higher risk of heart failure.^[18]

Insulins, especially newer insulin analogues were prescribed more in our study and in the study by Singh A et al,^[19] in comparison to the study by Okonta JM et al (10.7%) in Nigeria and by Sutharson L et al.^[20,21]

As diabetes progresses, functional decrease in beta cell function is evident, which presses the need for

combination therapy. Therefore, combination modalities have become an integral part of diabetes management. The main aim for combination therapy is to provide additional effects with different mechanisms of action and to allow lower doses for disease management. Consistent with the same, in the present study, majority 184 (64.56%) of the patients were receiving combination therapy among which maximum were on dual therapy 158 (55.43%) followed by triple drug therapy 4(1.4%).^[22] Majority (64.56%) of the patients were on combination therapy which was found similar to many studies.^[21,16]

The most common combination prescribed was of Metformin and glimepiride 73 (25.61%), also the most favoured combination seen in a number of other studies.^[23] In the treatment of diabetes mellitus, the aim of the commonly employed FDC products is to provide rationale drug regulatory mechanism and enhance drug therapeutic effectiveness. The FDCs are justified when they demonstrate clear benefits which are supported by scientific evidence.^[22]

86 (18.14%) of the anti-diabetic drug formulations were prescribed by generic name, much lower than the WHO standards of generic prescribing (100%).^[24] 305 (64.34%) of anti-diabetic formulations prescribed were from NLEM, 2015 which were similar in number as seen in other studies.^[16,17,21,23]

CONCLUSION

Metformin was the most frequently prescribed drug in diabetes followed by sulphonylureas (Glimepiride). Among antidiabetic drugs used as monotherapy, most commonly utilized drug class was biguanides followed by sulphonylureas. Metformin with glimepiride was the most frequently prescribed combination therapy.

Among Fixed drug combination, prescription of Metformin + glimepiride and Metformin + Sitagliptin was the most common. Majority of drugs were prescribed from national essential drug list. Average number of drugs per prescription was found to be 2.43. 86 (18.14%) of the drugs were prescribed by generic name. In conclusion, the antidiabetic prescribing trend has moved away from monotherapy towards combination therapies to achieve better glycaemic control.

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