The Journal of International Medical Sciences Academy
2021; (July-September); Vol 34; No. 3

ORIGINAL ARTICLE

Study of Prescription Pattern of Antidiabetic Drugs used in a Tertiary Care Teaching Hospital

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Abstract

Background: Diabetes mellitus is a pandemic disease with more than 50% of diabetic population having poor glycemic control with uncontrolled hypertension, dyslipidemia and having large percentage of diabetic vascular complications. However, different classes of antidiabetic drugs such as oral hypoglycaemic agents and insulin are currently used for treatment of T1DM and T2DM with or without complications but prescription of drugs vary among physicians. So, this study was conducted to understand the trend of prescription given among the patients of Diabetes mellitus in a tertiary care hospital.

Methodology: Data were collected using preformed data collection form and medical case records containing information of demographic profile of patients and their prescription of medications. The case record sheets were reviewed for average number antidiabetic drugs prescribed, percentage of different classes antidiabetic drugs prescribed, commonest class and type of antidiabetic drugs prescribed, percentage of antidiabetic drugs prescribed from essential drug list, number of patients receiving oral antidiabetic drugs, number of patients receiving parenteral antidiabetic drugs, number of patients receiving combination of oral antidiabetic drugs and number of patients receiving combination of oral with parenteral antidiabetic drugs. Categorical variable was expressed in terms of frequency and percentage and graphs were prepared using Microsoft excel sheet.

Results: Oral antidiabetic drugs were still preferred to maintain optimal glycemic control. Metformin was most preferred drug used in T2DM followed by glimepiride. Insulin as monotherapy was commonly prescribed in T1DM.

Conclusion: Prescribing pattern of antidiabetic drugs seemed to be specific to the age, duration of the diabetes and associated co-morbidity.

Keywords: Prescription pattern, antidiabetic drugs, case records, cross-sectional observational study.

Introduction

According to World Health Organization (WHO) diabetes mellitus is described as "Metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both" [1].

Diabetes mellitus is a pandemic disease that has spreading each and every corner of the world. According to the Indian Council of Medical Research Indian Diabetes study (ICMR), a national diabetes study, currently 62.4 million people are suffering with diabetes and might to increase to over 100 million by 2030 [2]. Another study estimates Diabetes mellitus epidemic levels in India will rise to 123.5 million by 2040 [3]. The prevalence of diabetes among adults in urban population has increased nearly 20% and nearly 10% in rural populations in India [2].

Different classes of antidiabetic drugs including oral hypoglycemic agents (OHA) and insulin are currently used in the treatment of diabetes, which reduce the blood glucose levels to maintain optimal glycemic control by different mechanisms [2].

Currently used antidiabetic drugs are very effective,

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Received: January 2021
Accepted: March 2021

however insulin resistance, lacking of patient compliance, exercise and diet control leading to unsatisfactory control of hyperglycemia [3].

In India, very less number of studies has focused on diabetes care and provides an insight of their management in relation with profile of patients. More than 50% of diabetic population have poor glycemic control with uncontrolled hypertension and dyslipidemia, and having large percentage of diabetic vascular complications [2].

Various drugs are available for the treatment of T1DM and T2DM with or without complications but pattern of prescription of drugs varies among physician, which depends on glycemic status and complications due to diabetes. It is important to understand the trend of prescription given to the patients in tertiary health care hospital. Guidelines and prescribing indicators help in rational use of drugs [4].

Therefore, this study was conducted to find the current prescription pattern of antidiabetic drugs and efficacy of these drugs in maintaining optimal glycemic control in diabetic patients attending a tertiary care hospital.

Methodology

The Cross sectional observational study was conducted after obtaining approval from Institutional Ethics Committee as a survey among the 250 patients who were known cases of Diabetes mellitus visiting OPD of Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune from January 2019 to December 2020. Patients were selected as per the inclusion and exclusion criteria which mentioned below.

Inclusion Criteria

- Patients diagnosed as suffering from T2DM or T1DM.
- Either sex.
- Age 18-70 years.
- With or without co-morbid conditions.

Exclusion Criteria

- Below 18 years of age.
- Patients >70 years of age.

Data Analysis

Data were collected using preformed data collection form and case record form. Data were entered in Microsoft Excel 2016 and analysis was done using WinPepi software (Version 11.65) [5]. Categorical variable was expressed in terms of frequency and percentage and graphs were prepared using Microsoft excel sheet.

Observations and Results

Out of total 250 cases, 16 (06.4%) were of T1DM and 234 (93.60%) were of T2DM. Out of total 250 cases, 141 (56.4%) were male and 109 (43.6%) were female. The male to female ratio was 1.29:1. Out of total 250 cases, a maximum of 89 i.e.35.6% of the total cases were in the age group of 51 – 60 years and the least number of cases were observed in the age group of 18 – 20 years and 21 – 30 years i.e. only one in each group accounting to a total of 4.4% and 3.2%. Total of 340 drugs were prescribed for 250 patients', most common prescribed drugs were biguanides (n=151, 44.4%), followed by sulfonylureas (n=100, 29.4%) and others including thiazolidinediones (n=33, 09.7%), α – glucosidase inhibitors (n=20, 5.8%), DPP4-inhibitors (n=12, 03.5%), and insulin preparations (n=24, 07.0%).

Out of 143 males included in the study, 104 were on single drug treatment for DM, amounting to (72.72%) of the total male population of the study. 24 i.e. (16.78%) males were prescribed two drugs. Three drugs were prescribed in 15 i.e. (10.48%) of the males. Similar finding was observed in female population of the study with the total of 107. Single drug therapy for hypertension was prescribed in 81 i.e. (75.70%) females. 15 i.e. (14.01%) received two drugs, while three drugs were prescribed in 11 i.e. (10.40%) females.

Most common drug used was metformin in 47.4% of total 179 patients on monotherapy, followed by glimepride 35(19.5%). During double or triple drug therapy, metformin was usually combined with other drugs. Only 24 out of 250 patients' were treated with insulin. Most common insulin used was human mixtard in 14 i.e. 58.3% among all insulin preparations. It was followed by human insulatard in 6 cases i.e. 25% among all preparations of insulin. And least insulin preparation used was human actrapid in 4 cases i.e. 16.6% among all.

Out of 250 patients' 47 received various combinations of oral antidiabetic drugs. Most commonly combined two drugs were metformin + glimepride used in 15(36.1%) cases of total 45 cases on combination therapy. Only three drug combination used was metformin + glimepride + pioglitazone was used in 8(17%) of total cases. Most common oral antidiabetic drugs combined with insulin were - metformin from the group of biguanides, and drugs from sulphonylurease group and pioglitazone from thiazolidinediones.

Among total 240 cases, most prescribed drug from biguanides was metformin in 151 cases (44.4%), sulphonylurease was glimepiride in 65 cases (19.1%). Among Insulin, 14 cases (4.1%) were on human mixtard, 6 cases (1.7%) were on human insulatard, 4 cases (1.1%) were on human actrapid. Among total 166 cases, most

Table 1: Demographic details of participants (n=250)

Variables	N (%)
Diabetes	
Type 1	16(6.4)
Type 2	234(93.6)
Gender	
Male	143(57.2)
Female	107(42.8)
Age	
18–20	8(3.2)
21–30	11(4.4)
31–40	26(10.4)
41–50	81(32.4)
51–60	89(35.6)
61 – 70	35(14)
Class of Drugs prescribed	
Biguanides	151 (44.4)
Sulfonylureas	100(29.4)
Thiazolidinediones	33(9.7)
α – glucosidase inhibitors	20(5.8)
DPP4-inhibitors	12(3.5)
Insulin preparations	24(7)

Table 2: Distribution of prescribed drugs according to the gender of cases

Sex	Monotherapy	Two Drug therapy	Three Drug therapy
	N (%)	N (%)	N (%)
Male	104 (72.72)	24 (16.78)	15 (10.48)
Female	81 (75.70)	15 (14.01)	11 (10.28)
Total	185 (74.00)	39 (15.60)	26 (10.40)

Table 3: Distribution of cases according to the antidiabetic drugs

Class of Drugs	Oral Antidiabetic Drugs	N (%)
Oral Antidiabetic Drugs		
Biguanides	Metformin	85(47.48)
Sulfonylureas	Glimepiride	35(19.5)
	Glipizide	13(7.26)
	Glibenclamide	06(3.35)
	Gliclazide	05(2.79)
Thiazolidinediones	Pioglitazone	14(7.82)
α – glucosidase inhibitors	Voglibose	09(5.02)
	Acarbose	07(3.91)
DPP4-inhibitor	Vildagliptin	04
Total		**179**
Insulin		
	Human Mixtard	14 (58.3)
	Human Insulatard	06 (25)
	Human Actrapid	04(16.6)
Total		**24**

Table 4: Distribution of cases according to the various antidiabetic drug combinations

Oral Drug Combinations	N (%)
Metformin + Glimepiride	17(36.17)
Metformin + Gliclazide	06(12.76)
Metformin + Glipizide	03(6.38)
Metformin + Sitagliptin	04(8.51)
Metformin + Vildagliptin	05(10.63)
Metformin + Voglibose	04(8.51)
Metformin + Glimepiride + Pioglitazone	08(17.02)
Oral hypoglycaemic with Insulin	
Metformin + Pioglitazone + Human Mixtard	7(38.88)
Metformin + Glimepiride + Human Mixtard	7(38.88)
Metformin + Pioglitazone + Human Actrapid	03(16.6)
Metformin + Glipizide + Human Actrapid	01(5.55)

Table 5: Number of antidiabetic drugs prescribed as per National list of Essential Medicines [NLEM] and WHO model list of Essential Medicines

Essential Drugs	N (%)
National list of Essential Medicines [NLEM]	
Metformin	151 (44.4)
Glimepiride	65 (19.1)
Human Mixtard	14 (4.1)
Human Insulatard	06 (1.7)
Human Actrapid	04 (1.1)
Total	**240 (70.5)**
WHO Model	
Metformin	151 (44.4)
Gliclazide	05 (1.4)
Human Insulatard	06 (1.7)
Human Actrapid	04 (1.1)
Total	**166 (48.8)**

prescribed drug from biguanides was metformin in 151 cases (44.4%), sulphonylurease was gliclazide in 5 cases (19.1%). Among Insulin, 10 cases, 6 cases (1.7%) were on human insulatard, 4 cases (1.1%) were on human actrapid.

Discussion

Diabetes Mellitus (DM) is one of the first described diseases in history. Since then it is one of the leading causes of morbidity and mortality throughout the world. It is a chronic disease, affecting nearly 6% of global population [6]. Diabetes mellitus (DM) has huge burden on healthcare; not just in developed countries but also in developing countries including India [7].

The choice of antidiabetic drug depends upon multiple factors like age of patient, concurrent illness such as hypertension, social-economic status, etc. Usually, multiple drugs are required and this leads to use of combination therapy containing two or more drugs [8]. Since, the therapy of diabetes is usually for lifelong, fixed dose combinations using drugs with longer half-lives are considered to maintain the patients' compliance.

This study was conducted in 250 patients receiving antidiabetic drugs. Their prescriptions were studied to have useful insight to understand the pattern of prescription of these drugs to control diabetes.

In our study, out of 250 cases, 234 (93.5%) were diagnosed with T2DM and 16 (6.4%) were diagnosed with T1DM. Similar findings were observed in some other studies. Machanchery S et al. (2011) performed cross-sectional survey of 200 prescriptions given to out-patients from alappuram district. Out of these 95% were for T2DM and

5% were for T1DM patients [9]. In our study, 14 (56.4%) were males and 109 (43.6%) were females. The male to female ratio was 1.29:1. Similar ratio was observed in the studies by Ashutosh K et al (2019) [10], 57.3% were males and 42.7% were females.

In present study, maximum numbers of diabetic cases i.e. 35.6% were in age group of 51 – 60 years, followed by 32.4% in age group of 41 – 50 years. This finding of our study is in accordance with the studies by Chaudhary PK et al (2019) [11], majority (31.2%) of the patients were in age group of 51 – 60 years and 25.17%were in age group of 41 – 50 years.

In the study place, among the different classes of antidiabetic drugs almost half of the prescribed drugs contained biguanide 44.4% which was given either as single drug or in combination. This was followed by sulfonylureas 29.4%, thiazolidinedione 9.7%, á – glucosidase inhibitors 5.8%, DPP4-inhibitors 3.5%, and insulin 7.0%. Combination of two drugs was prescribed in 15.6% i.e. in 39 cases and three drugs were prescribed in 10.4% i.e. in 26 cases, whereas single antidiabetic drug was prescribed in 74% i.e.in 185 cases. Bela P et al (2013) observed most common class of drug prescribed were biguanide 87.7%, followed by sulphonylureas 68.4%. In their study 45.4% drugs were prescribed from National list of Essential Medicines of India 2011, among the list drugs, we observed in our study that it was prescribed in 70.5% which is relatively higher than their study [8]. This difference might be due to greater awareness among the physicians regarding essential medicines. It may also be due to the fact that majority of drugs available in our hospital pharmacy are from essential list of medicines.

In our study, among the biguanide group, metformin as monotherapy 47.48% and metformin in combination therapy 26% was the only prescribed antidiabetic drug. Bela P et al (2013) observed that most commonly utilised antidiabetic drug was metformin as monotherapy in 20% and as combination with others in 24.5% patients [8].

Sulphonylureas are preferred as first add on drug to biguanide and as monotherapy also. Amongst these, glimepiride (20.11%) was most commonly prescribed as monotherapy, followed by glipizide (7.26%), glibenclamide (3.25%) and gliclazide (2.79%). In Chaudhary PK et al (2019), glimepiride (24.11%) was the most commonly prescribed agent, followed by glibenclamide (21.27%), glipizide (5.67%) and gliclazide (2.83%) [11].

In our study third commonly prescribed antidiabetic drugs were α – glucosidase inhibitors as monotherapy in 8.93% and combination therapy in 6.1%. Similar findings were reported by Akshay A et al (2014),[2] in which α– glucosidase inhibitorswere prescribed least as monotherapy in 3.8% and as well as in 1.26% as combination therapy.

Fourth commonly prescribed antidiabetic drug was pioglitazone, which is the only available agent from thiazolidinedione. It was prescribed as monotherapy in 7.82% and as combination therapy in 27.69%. In Mohammad YA et al (2014) [12] they studied pioglitazone was used in 22 patients, alone in 13 patients (9.77%) and combined with glimepiride or metformin in 9 patients (6.76%) which was similar to our results.

DPP4-inhibitors were the least prescribed antidiabetic drugs and were used as monotherapy in 2.23% as well as combination therapy with metformin in 13.84%. Similarly Mohammad YA et al [12] (2014), wherein DPP-4 inhibitors were used as monotherapy in (1.63%) and as combination therapy in (1.92%). This might be due to the fact that they are relatively new drugs and recently added in our hospital pharmacy.

Insulin was used in all patients of T1DM, which is as expected and it was combined with oral antidiabetic drugs in case of inadequate control in T2DM patients. Among these human mixtard was prescribed for all patients of T1DM, while human insulatard, human actrapid and human mixtard were prescribed for T2DM.Similar use of human mixtard for T1DM patients has been reported by Machanchery S et al (2011) [9]. Ashutosh K et al (2017) studied the prescription pattern of antidiabetic drugs in T2DM patients 3 insulin preparations viz. lispro, glargine, insulartard were used to achieve better diabetic control [10].

Conclusion

From our study, it can be concluded that metformin from the biguanide group is the most commonly prescribed antidiabetic drug, which complies with its endorsement and preference by many international organisations. Our study highlights the dominance of OHAs in the management of T2DM patients. This is in accordance to the guidelines issued by various international organizations. After metformin, sulphonylureas namely glimepiride and gliclazide, were the second line agents as expected for developing countries like ours. AGIs, DPP-4 inhibitors or pioglitazone were added as third of fourth drug if required. Insulins were used in case of failure of triple drug regimen. Commonly used insulin preparations were – human actrapid, human mixtard and human insulatard. Most of these drugs mentioned in our study are present in the National list of Essential Medicines of India 2015 and WHO model list of Essential Medicines 2019. This indicates the

rational use of medicines [RUM] from our institutions.

Conflict of interest:	All authors declare no COI
Ethics:	There is no ethical violation as it is based on voluntary anonymous interviews
Funding:	No external funding
Guarantor:	Dr. Teja Deshpande will act as guarantor of this article on behalf of all co-authors.

References

1. Arvinth A., NS Muthiah, Suganya E., Sowmya P., Susshmitha R. Drug utilization pattern of antidiabetic drugs in diabetology outpatient department of a tertiary care teaching hospital. J. Chem. Pharm. Res. 2016; 8(5):186-189.
2. Agarwal AA, Jadhav PR, DeshmukhYA. Prescribing pattern and efficacy of anti diabetic drugs in maintaining optimal glycemic levels in diabetic patients. J Basic Clin Pharma 2014; 5:79-83.
3. Mohammad H, Girish T, Ateendra J, Surulivelrajan M. Study on prescribing pattern of anti-diabetic drugs among type 2 diabetes patients with complication in south Indian teaching hospital. Asian J Pharm Clin Res 2016; 9(1):194-197.
4. Ramachandran G, Rohith V, Isabella Topno. Evaluation of prescribing pattern of anti-diabetic drugs using WHO prescribing indicators in a tertiary care hospital in Puducherry: A cross-sectional study. Pharma Innovation 2015; 4(5):76-80.
5. Abramson, J.H. WINPEPI updated: computer programs for epidemiologists, and their teaching potential. Epidemiologic Perspectives & Innovations 2011;8:1.
6. Sarkar S, Srivastava V, Roy A and Mohanty M. Prescribing Pattern of Antidiabetic Drugs Amongst Pre-Obese Diabetic Patients in a Tertiary Care Hospital- An Observational Study. Diabetes Obes Int J 2019; 4(2): 000196.
7. Lorenzi GM, La Rue SM, Collins SE. Effects of a patient education support program on pramlitinide adherence. Clinical Diabetes. 2011; 29(1):17-24.
8. Bela P, Bhavit O, Kamlesh PP, Supriya DM, Varsha JP, Pattern of antidiabetic drugs use in type-2 diabetic patients in a medicine outpatient clinic of a tertiary care teaching hospital, Int J Basic Clin Pharmacol. 2013; 2(4):485-491.
9. Machanchery S and Marimuthu K, Prescription pattern of antidiabetic drugs in the outpatient departments of hospitals in Malappuram District, Kerala, J Basic Clin Physiol Pharmacol 2011;22(4):141-143.
10. Ashutosh K, Ipseeta RM, Sandeep R. Assessment of Prescription Pattern of Antidiabetic Drugs in the Outpatient Department of a Tertiary Care Hospital. Int J Clin Endocrinol Metab 2017; 3(1):001-007.
11. Chaudhary PK, Singh SP, Pandey D, Ranjan K, Chaudhary R, Pratap B. A prospective study on drug utilization pattern of anti-diabetic drugs in a tertiary care teaching hospital of eastern Uttar Pradesh, India. Int J Res Med Sci 2019; 7:669-75.
12. Mohammad YA, Md. AA, Mohammed A. A prospective study on prescribing patterns of antidiabetic drugs. World journal of pharmacy and pharmaceutical sciences 2018;3(5):45-57.