

Original Article

A STUDY ON THE PRESCRIBING PATTERN OF ANTI-DIABETIC DRUGS IN A COMMUNITY CLINIC IN TELANGANA STATE

NIKHIL YADA^{1*}, DHRUVA TEJA THRULAPATI², ARPIT MAHESHWARI³, VIHAR UPADHYAY⁴, PRANIT SHAH⁵

Doctor of Pharmacy (Pharm. D), Department of Pharmacy Practice, Acharya and B. M Reddy College of Pharmacy, Bangalore, India 560107
Email: nikhilyada23@gmail.com

Received: 14 Jun 2015 Revised and Accepted: 15 Jul 2015

ABSTRACT

Objectives: There are many variations in prescribing patterns of Diabetes mellitus with hypertension which requires lifelong treatment as enormously increased the burden of chronic diseases and needs much care while choosing drugs. In a tertiary care Centre, prescribing pattern are powerful tools to ascertain the role of drugs in society. Hence, there is a need for appropriate, safe, effective and economical study to find out the patterns of drug therapy among diabetic hypertensive patients with other complications.

Methods: Retrospective, randomized and non-interventional study design was conducted from September 2014 to November 2014 at a Community Clinic in Telangana State. The collected data are thoroughly analyzed and prescriptions were checked for appropriateness. For easy sorting all data obtained were entered into Microsoft Excel 2000 and cross-checked for accuracy. The data collected were analyzed to obtain averages, percentages and standard deviations. The data were grouped on the bases of age, gender, fasting blood glucose, blood pressure, co morbidities, various classes of drugs and analyzed for significance.

Results: A total of 109 patients were included in this two months study. All the patients had Type 2 diabetes, while 18 patients also had Hypertension (on treatment). All the patients were on treatment for Type 2 Diabetes. The mean fasting Blood sugar was 119.27 ± 40.34 mg/dl, while the mean post-prandial blood sugar was 212.78 ± 67.35 mg/dl. The average number of OHAs per prescription was 1.99 ± 0.54 . About 19.26% of the patients were on monotherapy with Metformin, while all the other patients received a combination of oral hypoglycemic agents. Insulin was used in 2.75% of the patients. Among combinations, the most commonly used combination was glibenclamide and metformin 41.2%.

Conclusion: Metformin is the drug of choice and glibenclamide is the most preferred combination with Metformin. Insulin was not preferred as monotherapy. Despite combination therapy, the post-prandial glucose levels were not in range—suggesting either poor patient compliance or inadequate dosing/inappropriate therapy. In addition to drugs, the services of a clinical pharmacist might be helpful in these patients.

Keywords: Prescription Pattern, Diabetes Mellitus, Oral Hypoglycemic Agents, Community.

INTRODUCTION

Diabetes mellitus (DM) is a pandemic disease that has struck each and every corner of the world. According to the Indian council of medical research-Indian diabetes study (ICMR), a national diabetes study currently has 62.4 million people with diabetes [1]. This is set to increase to over 100 million by 2030 [2]. The prevalence of diabetes among adults has reached approximately 20% in urban and approximately 10% in the rural population in India [3]. Indian onset of diabetes is about a decade earlier than their western counterparts [4].

Diabetes treatment depends on the type and severity of the diabetes. The two types of diabetes are referred to as type 1 (insulin dependent) and type 2 (non-insulin dependent). Insulin is vital to patients with type 1 diabetes they cannot live without a source of exogenous insulin. Type 2 diabetes is first treated with weight reduction, a diabetic diet and exercise when these measures fail to control the elevated blood sugars and oral medications are used. If oral medications are still insufficient, insulin medications are considered [5]. Various classes of anti-diabetic drugs including insulin and oral hypoglycemic agents (OHA) are currently used in the treatment of diabetes, which acts by different mechanisms to reduce the blood-glucose levels to maintain optimal glycemic control [6, 7]. Hypertension (HT) is frequently associated with diabetes mellitus (DM) and its prevalence doubles in diabetics compared to the general population. This high prevalence is associated with increased stiffness of large arteries, which often precedes macro vascular events [8]. The rapidly growing number of patients with coexisting diabetes and hypertension must be intensively treated to protect them from their very high risk for premature cardiovascular morbidity and mortality [9].

Negative attitude of patients towards diabetes managements such as dietary modifications, exercise, and insulin therapy are common and ultimately can lead to diabetic complications [10]. About 18% of patients perceive that balanced diet low in sugar/sweets is important for diabetes control while 52% thought that only sweets should be stopped [11]. Negative attitude can be developed due to various reasons one of which is lack of education [12]. Thus better understanding of perceptions and attitudes among both patients and providers is needed to guide initiatives to improve the management of diabetes [13, 14]. Though diabetes is the fatal disease of our knowledge, there are no comprehensive studies conducted in the study area.

Thus, this study is aimed to find out the trends of prescribing anti-diabetics in community clinic in Telangana State and what factors determine the prescribing of a particular anti-diabetic drug or a combination of multiple drugs, prevalence of diabetes related complications and related risk factors, identifying the prescribing errors and treatment adherence as per the JNC VII guidelines with its related barriers.

MATERIALS AND METHODS

The intended work can be divided into the following steps.

Step 1: To collect randomly the prescriptions of patients diagnosed with diabetes.

Step 2: To separate the prescriptions prescribing Anti Diabetic Drugs and the ones without anti diabetic drugs.

Step 3: To divide the prescriptions into various groups according to the following: Age and sex of patient and diseases associated with DM.

Step 4: To statistically analyze the prescriptions on the following aspects:

- Demographic characters of patients.
- Showing incidence of DM according to sex.
- Showing incidence of DM according to different age groups.
- Analysis of Prescription in DM with respect to dosage forms.
- Analysis of prescription showing incidence with other diseases.
- Patterns of utilization of major Pharmacological drug classes.

Step 5: To analyse the frequency of diseases associated with DM statistically and the drugs according to their pharmacological categories.

Location

The study was conducted in the Community Clinic, Warangal Dist, Telangana State.

Study design

It was a retrospective randomized non interventional study.

Study period

Data were collected from September 2014 to November 2014 in between 9 am to 12pm in the Community clinic.

Inclusion criteria

- Patients suffering from type2 diabetes mellitus attending the community clinic
- Diabetic patients of either sex.
- Diabetic patients above 18years.
- Diabetic patients having co-morbidity of hypertension are only included.

Exclusion criteria

- Pregnant females suffering from diabetes.
- Diabetic patients suffering from complications of diabetes like retinopathy, neuropathy and diabetic foot.

Patient consent

The patient and their bystanders were briefed about the study and consent was obtained prior to their enrolment through the consent form as shown in annexure I.

Data collection

A data collection format was designed to aid the collection of data as shown in annexure II.

Case notes

Data on sex, age, groups of medicines prescribed, number of prescriptions and number of medicines occurring per prescription were obtained.

Data analysis

The collected data were thoroughly analyzed and prescriptions were checked for appropriateness. For easy sorting all data obtained were entered into Microsoft Excel 2007 and cross-checked for accuracy. The data collected were analyzed to obtain averages, percentages and standard deviations.

Ethical issues

Permission was sought and obtained from the Clinic Physician Dr. Batchu Murali Krishna M. D., D. Diab, before commencement of study.

RESULTS

A total of 109 patients were included in this one month study. All the patients had type 2 diabetes, while 18 patients also had Hyper tension (on treatment). All the patients were on treatment for type 2 diabetes. The mean fasting Blood sugar was 119.27±40.34 mg/dl, while the mean post-prandial blood sugar was 212.78±67.35 mg/dl. The average number of OHA per prescription was 1.99±0.54.

Table 1: Age and sex distribution of diabetic patients

Age in years	Male	Female	Total
30-40	10	15	25
41-50	10	12	22
51-60	19	31	50
61-70above	5	7	12
Total (%)	40.36%	59.64%	100%

Table 2: Percentage of drugs prescribed

Name of drug	Dosage form	No. of times prescribed	% Of total no of Anti-diabetic drug prescribed
metformin	tablet(250 mg,500 mg)	22	20.18%
voglibose	tablet(0.2 mg,0.3 mg)	4	3.66%
human insulin	injection(16IU)	2	1.83%
isophane insulin	injection(16IU)	1	0.91%
glibenclamide+metformin	tablet(2.5 mg+500 mg,5 mg+500 mg)	45	41.2%
glimepiride+metformin	tablet(1 gm+500 mg,2 gm+500 mg)	42	38.53%

Out of 109 patients, most of the patients 50 were in the age group of 51-60 years while, 25 were in the age group of 30-40 years, followed by 22 were in age group of 41-50 years and 12 were in age group of 61-70 years. These demographic characteristics related to age and gender were shown in the table 1.

A total of 6 drugs were used during the time of study, in which glibenclamide+metformin was the most preferred drug combination followed by glimepiride+metformin. The former was used in 45(41.2%) prescriptions while latter was used in 42(38.53%) of them. The less commonly used anti-diabetic drugs were human insulin and isophane insulin.

They were used in only 2(1.83%) and 1(0.91%) prescriptions. The percentages of drugs prescribed were shown in table 2 and Percent of the total number of anti-diabetic drug prescribed is shown in fig. 1.

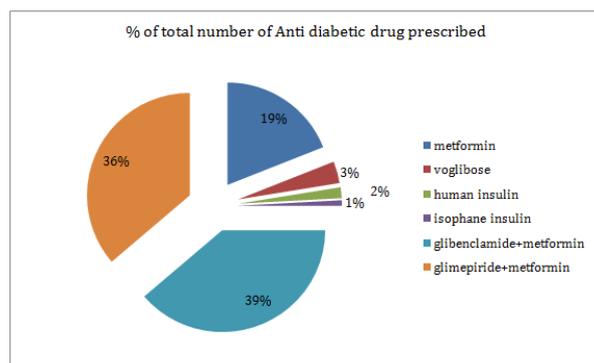


Fig. 1: Percentage of drugs prescribed

Table 3: Description of drugs present in each prescription

No. of drug per prescription	No. of prescription	No. of prescription containing oral diabetic drug	No. of prescription with Insulin	No. of prescription containing anti-hypertensive agents along with Anti-diabetic drugs
1	21	21	-	2
2	76	75	1	14
3	11	10	1	2
4	1	-	1	-
Total	109	106	3	18

In this study, a total of 6 anti-diabetic drugs were used for the treatment of diabetes and 5 anti-hypertensive agents were used for hypertension along with anti-diabetic drugs. 21 prescriptions received a single drug, while 76 prescriptions received

combination of two drugs. 11 prescriptions received a combination of three drugs and only 1 prescription received four drugs at a time. The description of drugs present in each prescription shown in table 3.

Table 4: Analysis of anti-hypertensive drug combinations

Drugs	Number of prescription	Frequency
Prazocin	2	OD
Spironolactone	1	OD
Telmisartan	6	OD
Telmisartan+Hydrochlorothiazide	7	OD
Torsemide+Spironolactone	2	OD

A Total of 5 anti-hypertensive agents were used in 18 prescriptions of hypertension patients along with anti-diabetic drugs. In which Telmisartan+Hydrochlorothiazide was most preferred one followed by Telmisartan, Torsemide+Spironolactone, Prazocin and less common was Spironolactone. The analysis of anti-hypertensive drug combinations was shown table 4.

Out of 109 patients, 80.74%, patients received combination therapy and 19.26%, patients received monotherapy as shown in fig. 3.

DISCUSSION

In this study, an attempt has been made to describe the current prescribing pattern and trend of anti-diabetic drug therapy along with the efficacy of these drugs in maintaining an optimal glycemic level in diabetic patients in a community clinic in Telangana.

A total of 108 patients were included in this two months study. All the patients had diabetes, while 18 patients also had Hypertension (on treatment). All the patients were on treatment for Diabetes. The mean fasting Blood sugar was 119.27 ± 40.34 mg/dl, while the mean post-prandial blood sugar was 212.78 ± 67.35 mg/dl.

The average number of OHAs per prescription was 1.99 ± 0.54 . OHAs were commonly prescribed drugs accounting for 97.24% of the total prescribed anti-diabetic products. Sulfonylureas plus biguanides (77.93%) were the most commonly prescribed class, which was similar to previous studies [15, 16], followed by biguanides (16.10%). This reflects that sulfonylureas and biguanides are still the choice of most physicians in the treatment of Diabetes mellitus.

In spite of sulfonylurea being the commonest class, we observed that metformin (biguanide) was the most common individual OHA to be prescribed 16.10% which is similar to several studies [17, 18]. This may be due to the fact that metformin was the only drug of its class to be prescribed, whereas many second generation

The following combinations were the most frequently prescribed: Metformin+Glibenclamide (39.8%), Metformin+Glimepiride (38.13%). A similar study, as ours conducted by KA Al Khaja, RP Sequeira, and VS Mathur concluded that as combinations, sulfonylureas plus Metformin was most popular [19].

Several studies showed that a combination of sulphonyl urea with metformin has been most widely used [20]. The present study also showed that a combination of sulphonyl urea and metformin was most frequently prescribed (77.93%). Metformin does not promote weight gain and has beneficial effects on several cardiovascular risk factors. Accordingly, metformin is reported to be regarded as the first drug of choice for most patients with Diabetes [21]. Our study also supported the same conclusion. At present, glibenclamide and glimepiride are the second-generation sulphonyl ureas most widely used in the United States [22].

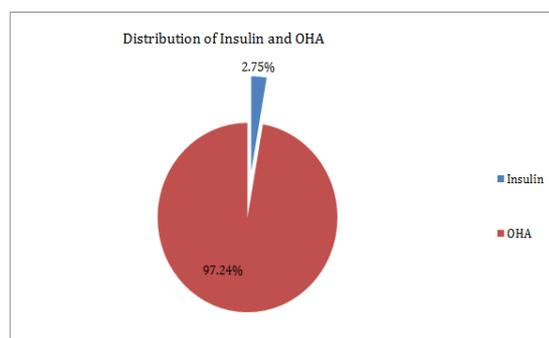


Fig. 2: Distribution of Insulin and OHA

In the study period, Insulin and Oral Hypoglycemic Agents (OHA) were used. A majority of 97.24% prescriptions received OHA while only 2.75% prescriptions received Insulin. The distribution of Insulin and OHA was shown in fig. 2.

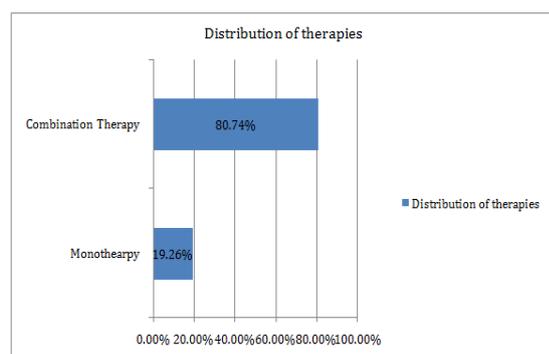


Fig. 3: Distribution of therapies

Table 5: Drugs prescribed on fasting blood sugar

Fasting blood sugar	Drugs	Number of prescription	Total number of prescription
72 mg/dl-90 mg/dl	Metformin	6	20
	Glibenclamide+Metformin	5	
	Glimipiride+Metformin	7	
	Glimipiride+Metformin+Insulin	1	
	Glimipiride+Metformin+Voglibose	1	
92 mg/dl-110 mg/dl	Metformin	11	43
	Glibenclamide+Metformin	16	
	Glimipiride+Metformin	15	
	Glimipiride+Metformin+Insulin+Voglibose	1	
111 mg/dl-130 mg/dl	Metformin	2	18
	Glibenclamide+Metformin	8	
	Glimipiride+Metformin	8	
131 mg/dl-150 mg/dl	Metformin	1	9
	Glibenclamide+Metformin	5	
	Glimipiride+Metformin	2	
	Metformin+Insulin	1	
151 mg/dl-176 mg/dl	Glibenclamide+Metformin	7	8
	Glimipiride+Metformin	1	
180 mg/dl-200 mg/dl	Glimipiride+Metformin	3	4
	Glimipiride+Metformin+Voglibose	1	
	Metformin	1	
201 mg/dl-280 mg/dl	Metformin	1	7
	Glibenclamide+Metformin	3	
	Glimipiride+Metformin	2	
	Glibenclamide+Metformin+Voglibose	1	

In this study prescribing pattern was analyzed on the bases of Fasting blood sugar of patients attending the Community Clinic.

CONCLUSION

The Retrospective, randomized and non-interventional study of prescribing pattern of Anti diabetic drug shows Metformin is the drug of choice and Glimipiride is the most preferred combination with Metformin. Insulin was not preferred as monotherapy. The combinations of anti diabetics are prescribed more to achieve a better glycemic control in order to avoid longer term complication. Despite combination therapy, the post-prandial glucose levels were not in range-suggesting either poor patient compliance or inadequate dosing/inappropriate therapy. In addition to drugs, the services of a clinical pharmacist might be helpful in these patients.

Limitation

Being a non-interventional study, data was collected at the given time. So no record of subsequent treatment was noted. For optimizing drug therapy in diabetic patients it has to be correlated with HbA1c level. In present study record of HbA1c level was not found in prescription. To achieve therapeutic goal, compliance of patients about pharmacological and non-pharmacological treatment is necessary. Diabetes mellitus is a chronic condition and demands active participation by the patients in adherence to treatment, questionnaire based interview regarding awareness, the services of a clinical pharmacist might be helpful in these patients.

Abbreviation

DM	Diabetes Mellitus
ICMR	Indian council of medical research
HT	hypertension
JNC	Joint National committee
OHA	oral hypoglycemic agents
%	percentage
No.	Number
HbA1c	Hemoglobin A1c
OD	Once a Day
mg	milligrams
dl	Deciliter
FBS	Fasting blood sugar
IU	International Units

CONFLICT OF INTERESTS

Declared None

REFERENCES

- Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, unnikrishnan R, *et al.* prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural india: phase I results of the indian council of medical research-INDIA DIABetes (ICMR-INDIAB) Study. *Diabetologia* 2011;54:3022-7.
- International diabetes federation. IDF Diabetes Atlas. 5th ed. Brussels, Belgium: International Federation; 2011. Available from: <http://www.idf.org/diabetesatlas>. [Last accessed on 2012 Jul 10].
- Ramachandran A, Snehalatha C. Current scenario of diabetes in India. *J Diabetes* 2009;1:18-28.
- Mehta SR, Kashyap AS, Das S. Diabetes mellitus in india: the modern scourge. *MJAFI* 2009;65:50-4.
- The expert committee on the diagnosis and classification of diabetes mellitus. Report of the expert committee on the diagnosis and classifications of diabetes mellitus. *Diabetes Care* 1997;20:1183-97.

6. Davis SN. Insulin, oral hypoglycemic agents, and pharmacology of the endocrine pancreas. In: Brunton LL, Lazo JS, Parker KL. editors. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 11th ed. United States of America McGraw- Hill; 2006. p. 1613-45.
7. Powers AC. Diabetes mellitus. In: Kasper DL, Braunwald E, Fauci AS, Hauser SL, Lango DL, Jameson JL. editors. Harrison's Principles of Internal Medicine. 16th ed. New York McGraw- Hill; 2005. p. 2152-80.
8. Tedesco MA, Natale F, Di Salvo G, Caputo S, Capasso M, Calabró R. Effects of coexisting hypertension and type II diabetes mellitus on arterial stiffness. *J Hum Hypertens* 2004;18:469-73.
9. Norman M. Kaplan, Treatment of coexisting diabetes and hypertension. *Current Cardiology Reports* Riddle M. Combining sulphonylureas and other oral agents. *AMJ Med* 2000;108:155-225.
10. Mukhopadhyay P, Paul B, Das D, Sengupta N, Majumder R. Perceptions and practices of type II diabetes: A cross-sectional study in tertiary care hospital in Kolkata. *Int J Diabetes Dev Countries* 2010;30:143-9.
11. Gul N. Knowledge, attitudes and practices of type 2 diabetic patients. *J Ayub Med College* 2010;22:128-31.
12. Ajayi IO, Arije A, Ekore JO, J Ekore RI. Attitude; diabetic foot care, education; knowledge; type 2 diabetes mellitus. *Afr Health Care Fam Med*; 2010. p. 2.
13. Vermeire E, Royen PV, Coenen S, Wens J, Denekens J. The adherence of type 2 diabetes patients to their therapeutic regimens: a qualitative study from the patient's perspective. *Practical Diabetes Int* 2003;20:209-14.
14. Peyrot M, Rubin RR, Lauritzen T, Snoek FJ, Matthews DR, Skovlund SE. Psychosocial problems and barriers to improved diabetes management: results of the cross-national diabetes attitudes, wishes and needs (DAWN) study. *Diabetic Med: J Br Diabetic Assoc* 2005;22:1379-85.
15. Hasamnis A, Patil S. Prescription pattern study in type 2 diabetes mellitus in an Indian referral hospital. *Internet J Pharmacol* 2009;7:1.
16. Truter I. An investigation into antidiabetic medication prescribing in South Africa. *J Clin Pharm Ther* 1998;23:417-22.
17. Adibe MO, Aguwa CN, Ukwé CV, Okonta JM, Udeogaranya PO. Outpatient utilization of anti-diabetic drugs in the South Eastern Nigeria. *Int J Drug Dev Res* 2009;1:27-36.
18. Rajeshwari S, Adikhari P, Pai MR. Drug utilisation study in geriatric type 2 diabetic patients. *J Clin Diagn Res* 2007;1:440-3.
19. KA Al Khaja, RP Sequeira, VS Mathur. Prescribing patterns and therapeutic implications for diabetic hypertension in Bahrain. *Ann Pharmacother* 2001;35:1350-9.
20. Hermann LS, Schersten B, Bitzen PO, Kjellstrom T, Lindgarde F, Melander A. Therapeutics comparison of metformin and sulphonylurea alone and in combinations: a double blind controlled study. *Diabetes Care* 1994;17:1100-9.
21. Krentz AJ, Bailey CJ. Oral antidiabetic agents: current role in type 2 diabetes mellitus. *Drugs* 2005;65:385-411.
22. Riddle MC. Oral pharmacologic management of type 2 diabetes. *Am Fam Physician* 1999;60:2613-20.